EXERCISE MOTIVATION AND AFFECTIVE EXPERIENCES OF RECREATIONAL RUNNERS IN CENTRAL FINLAND

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ABSTRAKTI

Kirill Merkulov, 2024. Keski-Suomen virkistysjuoksijoiden liikuntamotivaatio ja affektiiviset kokemukset. Urheilu- ja liikuntapsykologian pro gradu. Liikunta- ja terveystieteiden tiedekunta. Jyväskylän yliopisto. 23 p.

Kehittyneissä, korkean tulotason maissa, kuten Suomessa, teknologian muuttuvat trendit edistävät ihmisten liikkumattomuutta kaikissa ikäryhmissä, mikä johtaa istumisen omaksumiseen etenkin talvella. Erityisesti työ, joka mahdollistaa työskentelyn tietokoneella tai kotoa käsin, ruudulla tapahtuvan vapaa-ajan aktiviteetin (videopelit, elokuvat) ja liikkumisen. On olemassa vankkaa näyttöä siitä, että säännöllinen fyysinen aktiviteetti (FA) on välttämätöntä fyysisen ja henkisen terveyden ylläpitämiseksi ja edistämiseksi. Virkistysjuoksijoiden psykologiaa koskevassa kirjallisuudessa on ollut vähän huomiota. Tämän kirjallisuuden aukon korjaamiseksi tämän opinnäytetyön ensimmäinen tavoite oli selvittää sukupuolten välistä eroa fyysisen aktiivisuuden motivaatiossa. Toisena tavoitteena oli tutkia virkistysjuoksijoiden affektiivisia kokemuksia ennen ja jälkeen maratoniin osallistumisen. Virkistysjuoksijoiden motivaatiota ja affektiivisia kokemuksia koskevan tutkimuksen tuloksia voidaan käyttää motivoivassa FA-interventiossa ihmisten FA:n ja hyvinvoinnin edistämiseksi. Tämän tutkimuksen osallistujat olivat Finlandia 2023 -maratonilta Jyväskylästä. Motivaatiotiedot kerättiin PALMS-asteikolla (Physical Activity and Leisure Motivation Scale). Affektiiviset tilat kerättiin Affective Exercise Experiences (AFFEXX) -kyselylomakkeella. Tulokset paljastivat merkittäviä eroja miesten ja naisten välillä liikuntaan osallistumisen motiiveissa, erityisesti kilpailussa/egossa ja muiden odotuksissa. Tulokset eivät myöskään paljastaneet merkittäviä muutoksia AFFEXX-pisteissä ennen ja jälkeen maratonin. Tämä tutkimus osoitti, että liikunnan motiiveissa on eroja sukupuolen välillä, ja tämä voi johtaa ainutlaatuisten interventioiden kehittämiseen ihmisille. Erityisesti tulokset viittaavat siihen, että asiantuntijoiden tulisi harkita ennakkoluulotonta lähestymistapaa luodessaan asiakkailleen FA-interventioita sisäisten ja ulkoisten motiivien perusteella. Lopuksi tämä tutkimus tarjoaa mahdollisuuden tulevassa tutkimuksessa tutkia, voiko tasapaino kahden motivaattorin (sisäisen ja ulkoisen) välillä olla paras vaikutus elinikäisen liikunnan ylläpitämiseen ja aktiivisen ja tasapainoisen elämäntavan luomiseen.

Avainsanat: liikuntamotivaatio, affektiiviset kokemukset, virkistysjuoksut, liikunta.

ABSTRACT

Kirill Merkulov, 2024. Exercise Motivation and Affective Experiences of Recreational Runners in Central Finland. Master's Thesis in Sport and Exercise Psychology. Faculty of Sport and Health Sciences. University of Jyväskylä. 22 p.

In developed, high-income countries like Finland, the changing trends in technology promote the physical inactivity among people in all age groups, which leads to the embracement of sedentary lifestyles, especially in winter. Specifically, employment that allows working on computer or from a home, screen-based leisure time activities (video games, movies) and transportation. There is solid evidence that regular engagement in physical activity (PA) is essential to maintain and promote physical and psychological health. There has been little attention in literature on the psychology of recreational runners. To address this gap in literature, the first goal of this thesis was to explore the difference in motivation for physical activity between gender. The second goal was to research the affective experiences of recreational runners before and after marathon participation. The results of research on motivation and affective experiences of recreational runners can be used to design motivating PA intervention to facilitate peoples' PA and well-being. The participants of this study were from the Finlandia 2023 marathon in Jyväskylä, Finland. The data about the motivation was collected using the Physical Activity and Leisure Motivation Scale (PALMS). The affective states were collected using the Affective Exercise Experiences (AFFEXX) questionnaire. Results revealed significant differences between males and females in exercise participation motives, particularly in competition/ego and others' expectations. Results also revealed no significant changes in AFFEXX scores pre and post marathon. This study showed there is a difference in motives to exercise between gender and this can lead to developing unique interventions for people. Specifically, the results suggest specialists should consider having an open-minded approach when creating PA interventions for their clients based off intrinsic and extrinsic motives. Lastly, this study offers an opportunity in future research to examine if a balance between the two motivators (intrinsic and extrinsic) can have the best impact on maintaining a lifelong physical activity habit and creating an active and balanced lifestyle.

Keywords: exercise motivation, affective experiences, recreational runners, physical activity.

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1 INTRODUCTION

Statistics demonstrate running is a popular exercise, in the past three decades, there has been a dramatic increase in recreational marathon participation (Zinner & Sperlich, 2016; Nikolaidis, 2018). Running is a form of exercise and evidence shows that exercise increases positive well-being and decreases stress (e.g. Anderson & Brice, 2011; Berger & Motl, 2000; Biddle & Mutrie, 2001; Dasilva et al., 2011; Fontaine, 2000; Hoffman & Hoffman, 2008; O'Connor, Raglin, & Martinsen, 2000); Paluska & Schwenk, 2000; Raglin, 1990; Scully, Kremer, Meade, Graham, & Dudgeon, 1998). There has been little attention in literature on the motivation and affective responses of specifically recreational runners. To address this gap in literature, the goal of this thesis is to explore the motivation and affective experiences of recreational runners in Central Finland.

The reason why this study is focusing on participants in Finland is because there was direct access via this thesis's supervisor, Dr. Montse Ruiz, to an annual marathon conducted in Jyväskylä, Central Finland, called Finlandia Marathon 2023. As a marathon is a popular running event, gathering a lot of people increases the likelihood of access to a larger sample size. This is important for research because larger studies provide more reliable results and can more accurately represent the population studied (Andrade, 2023). In this case, the population is participants of Finlandia Marathon 2023. The reason why this study is focusing on marathon runners specifically, is because participating and completing a marathon is considered an extreme modality that requires special motivation. To successfully finish an anaerobic physical activity consisting of running a race, ranging from 5 to 42 kilometers, takes immense preparation, dedication and mental fortitude. Therefore, it can be assumed, these recreational athletes have experience with exercise, are in relatively good physical shape and have a healthy body mass index (BMI). Most importantly, a marathon suggests that most of its participants have an established exercise habit. Gathering motivation data from experienced exercisers, is best for this study because it can provide useful information on how to use data from what motivates experienced recreational athletes to run. This data can be used to change PA behavior and create an exercise habit for novice exercisers.

Motivation connects to creating physical activity maintenance because it is crucial to maintaining a habit. Motivation is the force that drives people to exercise. Additionally, motivation is a key determinant of physical activity maintenance, in other words motivation predicts the likelihood of someone to build an exercise habit. There are two types of motivation, extrinsic and intrinsic. Extrinsic motivation is driven by extrinsic rewards like approval or attraction from other people or monetary gains. Intrinsic motivation is driven by the good feeling one receives by doing the behavior. Physical rewards or rewards with the mindset of what one gets are not as powerful because they are powered by self-control. Neurochemical rewards are the most impactful to maintaining a habit, as an individual won't have to force themselves (less self-control) to compete for physical rewards (Berkman et al., 2017). A habit is a "settled or regular tendency or practice, especially one that is hard to give up." (Robbins & Costa, 2017) Creating a physical activity habit, for novice exercisers usually suggests they have broken the old habit of not being physically active. Subsequently, they have replaced the old habit with a new habit of being regularly physically active. Old health behavior habits that have been engrained in one's mind are difficult to break. Motivation to create a new health behavior habit is crucial for physical activity maintenance.

In addition to the motivation to prepare and complete the marathon, another essential part of this thesis is exploring the affective experience prior to and after the marathon. The adjective, "affective" in terms of psychology, relates to moods, feelings and attitudes. An affective experience, refers especially to the affective dimension of experience, which involves one's affective system through the generation of emotions, feelings and moods (Gentile, Spiller & Noci 2007). Affective exercise experiences are defined as a "summary valenced designation, ranging from pleasant to unpleasant, that reflects the history of associations between exercise over the life course of an individual and the attendant affective responses" (Ekkekakis et al., 2021, pp. 2-3). Dr. Panteleimon Ekkekakis is the leading author behind the AFFEXX questionnaire, used to measure affective exercise experiences. This questionnaire will be used prior to and after the marathon, to measure the affective exercise experiences relating to running a marathon. Affective experiences may influence physical activity maintenance indirectly, by affecting goal level and goal commitment. Current literature suggests, affective experiences are important for self-regulation, which is a form self-monitoring to help manage impulsive behavior. "Scholars from several disciplines suggest that affective

reaction is a core driver of conscious attention, which then influences the cognitive processes involved in decision making and goal setting". (cf. Damasio, 1994; Kitayama, 1997; Wells & Matthews, 1994)." Goal setting is a popular and important behavior change technique used by specialists to create an actional plan for novice exercisers.

2 LITERATURE REVIEW

2.1 Current knowledge and theory behind motivation and exercise

Internal motivation to exercise is connected to social support, better coping strategies and ability to handle life stress, self-efficacy, autonomy and assuming responsibility in life (Elfhag & Rössner, 2005). The strength of these factors regarding behavior change, are also acknowledged and are established in Deci & Ryan (2000; Ryan & Deci, 2017) Self-Determination Theory (SDT). The SDT is a theory of human motivation that has demonstrated efficacy in predicting motivated behavior in multiple contexts and populations, and for a variety of behaviors including healthy eating and maintenance of health-related behavior change results over time (Deci & Ryan, 1985, 2000; Ryan & Deci, 2017). The key premises of the theory is the quality (over quantity) of motivation and satisfaction of basic psychological needs; autonomy, competence and relatedness (Texerira et al. 2020). The theory emphasizes distinction between self-determined or autonomous, and non-self-determined or controlled forms of motivation (Deci & Ryan, 2000; 2017). Ryan and Deci (2006) suggest that individuals acting for autonomous reasons experience their actions as freely chosen and consistent with their genuine sense of self, values, and personal goals, and feel that they are the origin of their actions. Thus, the SDT supports an idea of autonomous, self-endorsed reasons to engage in behavior or pursuing a particular goal to successfully reach and maintain behavior change (Texeira et al., 2020). In addition, the theory suggests that people's motivation is influenced by how well their actions align with their basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan & Deci, 2017). The need status exists in one of three states – satisfaction, dissatisfaction or frustration – and satisfaction of these needs have been shown to mediate the associations between autonomous motivation and behavioral persistence in multiple contexts, including health behavior change (Cheon et al., 2019; Ng et al., 2012). The satisfaction or frustration of these psychological needs largely relies on the degree to which the individual's environment and relationships provide support for or hinder these

needs (Deci & Ryan, 1985; Ryan & Deci, 2017), thus in addition to focusing on individuals, intervention planners should focus on environment (i.e. factors that can affect an individual's behavior, but are physically external to that person) that facilitate behavior change (Eldredge, 2016, p.111). Thus, in addition to intrinsic behavior change techniques possible interventions can consider the potency of interpersonal dimensions in facilitating behavior change. In summary, SDT conceptualizes individual motivation and the regulation of behavior as a reciprocal process between the individual and the environment (Sundholm, 2000). Following SDT principles in the intervention planning, a possible intervention process should consider fostering intrinsic motivation by fulfilling basic psychological needs. This can be achieved through the inclusion of social agents and the implementation of appropriate techniques to support adaptive outcomes and internalization of desired behavior. An intervention grounded in the SDT and its given principles, does not just benefit the health of the target group members, but reflects its benefits to the physical- and social environmental levels within the organization as well. Furthermore, the SDT approach and its aim to reach maintained and sustained behavior changes provides a solid base for intervention providers to utilize in an organizational environment.

According to Texeira and colleagues (2020) and Ryan and Deci (2017) autonomy can be defined as "the psychological need to experience self-direction and personal endorsement in the initiation and regulation of one's behavior. The hallmarks of autonomy need satisfaction are volitional action and wholehearted self-endorsement (i.e., personal ownership) of that action." Promoting autonomy: providing choice over reward or punishment by offering the possibility of choice for volitional engagement considering behavior over reward or punishment, it is possible to support the target group members autonomy, and thus intrinsic motivation (Hagger et al 2000; Deci & Ryan, 2000; Ryan & Deci, 2017). Encouraging self-observation: by helping the target group members identify personal values, interests, and personal goals related to behavior change, it is possible to promote individuals ownership and autonomy of the change process (Deci & Ryan, 2000). By providing an opportunity for the target group members to experience tasks as volitional and behaviors as consistent with their needs, values, and motives, it is possible to promote autonomous reasons for participating in the behavior of interest (Hagger et al., 2020).

According to Texeira and colleagues (2020) and Ryan and Deci (2017) competence can be defined as “the psychological need to be effective in one’s interactions with the environment, and it reflects the desire to extend one’s capacities and skills and, in doing so, to seek out optimal challenges, take them on, and exert effort and strategic thinking until personal growth is experienced.” Fostering competence: providing graded tasks and setting realistic goals by providing specific and realistic goals, the target group members have an opportunity to experience a sense of growth and mastery as well as competence and achievement (Hagger 2020; Deci & Ryan 2017). Offering feedback and support: by providing positive feedback about target group members’ successful weight loss related behavior, it is possible to enhance intrinsic motivation towards developing the skills for desired behavior change (Deci & Ryan 2017). According to Deci & Ryan (2017) it should be noted that positive feedback and performance has been studied to reveal their effect on enhanced intrinsic motivation only when individuals feel responsible for the competent performance or when it does not impede their feelings of autonomy.

According to Texeira and colleagues (2020) and Ryan and Deci (2017) relatedness can be defined as “the psychological need to establish close emotional bonds and attachments with other people, and it reflects the desire to be emotionally connected to and interpersonally involved in warm relationships. The hallmarks of relatedness need satisfaction are feeling socially connected and being actively engaged in both the giving and receiving of care and benevolence to the significant people in one’s life.” Building Relatedness: creating a supportive environment by providing opportunities for the target group members to connect with others, experience a sense of belonging, and cultivate supportive relationships fosters the psychological need for relatedness (Deci & Ryan, 2000). In addition, by providing social support establishing a positive and inclusive atmosphere that fosters a warm, caring relationships characterized by mutual concern, liking, acceptance, and the establishment and enrichments of close and meaningful relationships, it is possible to promote intrinsic motivation (Hagger et al., 2020; Ryan & La Guardia, 2000). Although autonomy and competence have been identified as the predominant factors influencing intrinsic motivation, emerging evidence indeed supports the notion that relatedness also exerts a significant impact on the maintenance of intrinsic motivation (Deci & Ryan 2017). In addition, a secure relational base seems to provide a valuable asset for intrinsic motivation in the form of a distal support (Deci

& Ryan 2017). The sense of security contributes to the development of a robust foundation for the manifestation of one's inherent propensity towards personal growth (Deci & Ryan, 2017).

Lauderdale et al. (2015) was essential for creating the first hypothesis. “Motivation for exercise participation will differ between females and males”. This study specifically focuses on gender differences in motivation for physical activity. The target population were physically active college students. The study showed statistically significant results in males being intrinsically motivated, compared to females. Therefore, the thesis’s hypothesis was supported from this study, as well as similar findings from (e.g., Currie et al., 2008). “The findings of the study can be used to design motivating PA intervention to facilitate college students’ PA and well-being.”

Motivation is the catalyst of behavior in pursuit of a goal. All animals share motivation to obtain their basic needs, including food, water, sex and social interaction. (Simpson & Balsam, 2016) In developed, high-income countries like Finland, the changing trends in technology promote the physical inactivity among people in all age groups, which leads to the embracement of sedentary lifestyles, especially in winter. Specifically, employment that allows working on a computer or from home, screen-based leisure time activities (video games, movies) and transportation. There is solid evidence that regular engagement in physical activity (PA) is essential to maintain and promote physical and psychological health. PA refers to any bodily movement produced by skeletal muscles that requires energy expenditure. (Langhammer et al., 2018) Exercise is a part of physical activity that is planned and has as a goal of developing or sustaining physical fitness/mental well-being. Physical activity consists of both structured (aerobic/anaerobic training) and unstructured (walking to grocery store) PA. Lack of PA is associated with higher morbidity and mortality (Caspersen et al., 1985). These facts make researching the motivation behind exercise critical, as it can help with PA behavior change for people struggling with implementing this activity that is critical for mental and physical health that improves quality of life. In terms of measuring motivation in this study, the PALMS questionnaire was used, which is further uncovered in the procedure section.

2.2 Current knowledge and theory behind affective experiences and exercise

Wang et al. (2023) tested the Chinese version of the AFFEXX questionnaire (administered in the thesis). 2,875 Chinese college students participated in the study. The objective was to see if the AFFEXX questionnaire can be used to establish a link between affective exercise experiences and future participation in exercise. The results were successful as the core affective exercise experiences and attraction-antipathy mediated the relationship between antecedent appraisals and the level of moderate to vigorous intensity physical activity. (Wang et al., 2023) This study is important for the subject of the thesis, as it demonstrates that other researchers utilize the AFFEXX questionnaire in a similar manner as the thesis. Furthermore, this study demonstrates that other researchers have translated the original English version of the questionnaire and used it successfully. Lastly, as the target population of this thesis are Finnish runners, a Finnish version of the AFFEXX questionnaire was utilized.

Furthermore, Wang and colleagues do a spectacular job of detailing the theoretical foundation the AFFEXX questionnaire was built upon. This information is critical to understand the validity and how the questionnaire works. This scale is built on Affective-Reflective Theory (ART), which was proposed by Brand and Ekkekakis (2017). As a new dual-process theory, ART links reflective evaluation (referred to as reflection, rationality, and behavioral goals) and automatic affective evaluations (referred to as momentary, direct, and anticipated affect) in a single model, and further illustrates the role of these two factors on exercise motivation and exercise adherence. In particular, ART stresses that the automatic associations related to the object of evaluation or automatic affective valuation serve as the basis for reflective evaluation, controlled by individuals' availability of self-control resources. Based on ART theory, Ekkekakis and colleagues originally defined affective exercise experiences as a summary valanced concept, reflecting the history of associations between exercise in a person's life and the attendant affective responses. (Wang et al., 2023)

Roeh et al. (2020) focused on the evaluation of cause and consequence of endurance training. For the tools of measurement depressive symptoms were evaluated with Beck Depression Inventory (BDI) and Hamilton Depression Scale (HAMD). The study concluded, marathon runners had lower scores in scales measuring somatic and cognitive complaints, stress, demoralization, hopelessness and distrust. These

conclusions support the idea of the importance of intrinsic motivation to exercise. In particular, people whose motivation to exercise is to chase that “good feeling” and reduction in stress post completion of a physical activity behavior are most likely to maintain an exercise habit. This is compared to individuals who chase a certain extrinsic reward like having a beach body, which will give them attention from others and more confidence in themselves. This type of extrinsic motivation may last for some time and the individual may achieve their desired body for the summer. However, they are not likely to maintain this physical activity behavior habit consistently year-round and make it part of their lifestyle and identity, which is most important for physical activity maintenance.

Seo et al. (2004) identified a set of direct and indirect paths through which affective feelings at work affect three dimensions of behavioral outcomes: direction, intensity, and persistence. In this study, he describes motivation as being essential in work related behavior. The author details that motivation is goal directed and occurs within the context of self-regulation (cf. Bandura, 1991; Carver & Scheier, 1998; Kanfer & Ackerman, 1989; Klein, 1989). From a self-regulation perspective, people cope with their complex and unpredictable environments by developing and managing a set of hierarchically organized (from central and abstract to peripheral and concrete) goals (cf. Bandura, 1991; Carver & Scheier, 1998; Cropanzano, James, & Citera, 1993). Individuals anticipate desired future states/outcomes, commonly called “goals,” develop strategies and plans that allow them to reach their goals, and mobilize and monitor their behaviors in such a way to attain their goals. Self-regulation provides an important conceptual linkage through which motivation and emotion can be integrated theoretically. (Seo et al., 2004)

Martínez-Díaz IC and Carrasco (2021) addressed the neurophysiological stress response and mood changes induced by high-intensity interval training commonly known as HIIT. The subjects were university students, specifically, 25 active males. And the intervention consisted of rigorous cycling. The POMS or profile of mood states was the administered questionnaire pre and post intervention as well as there was a collection of blood samples for measuring plasma corticotropin and cortisol levels. Focusing primarily on mood states, they decreased immediately after exercise, however, a significant increase in mood was found thirty minutes after exercise. Finally, significant

relationships between increases in stress hormones concentrations and changes in mood states after intense exercise were observed.

Evangelista et al. (2017) focused on the effects of high intensity calisthenic training on mood and affective responses. Affective responses are the psychological states of an individual within a certain environment or situation. In this study, 26 fit adult men participated in high intensity calisthenic training. The exercises used were the burpee, jumping jack, mountain climber, and squat and thrust. These exercises being calisthenic, meaning they were all bodyweight based and no added weight was used. All participants have done these exact exercises before. The POMS or Profile of Mood States was the administered questionnaire pre and post intervention. The study demonstrated an increase in fatigue post-workout. However, the most impactful results for this thesis's work was the reduction in anger, depression and tension post-workout. Once again, supporting the psychological benefits of exercise.

Roka et al. (2010) focused on the impact of exercise intensity on the mood state of participants in dance aerobics programs. 136 adults were divided into two groups, one high intensity and the other moderate intensity. The beat of the music determined the intensity. The POMS or profile of mood states was the administered questionnaire pre and post intervention. NOVA analysis showed that there was a statistically significant difference in the psychological mood state of the sample, before and after the subjects' participation in both programs. The study concluded there was a statistically significant decrease in the markers of tension, depression and aggressiveness post both intensity interventions.

Lane et al. (2002) evaluated the mood changes of 26 female subjects. Specifically, anger, confusion, depression, fatigue, tension, and vigor immediately before and immediately after two exercise sessions. The BRUMS scales, also known as the POMS for adolescents was used. To assess the results a two factor repeated measures multivariate analysis of variance means and standard deviations were used. Resistance training was the primary intervention in this study. As the fatigue levels increased in the subjects, the depressed mood scores reduced significantly. Hence, this study shows how exercise impacts mood by lowering depressive symptoms, which was one of the main motivating factors for exercise in the Finlandia marathon runners.

Ekkekakis et al. (2011) examined 33 articles published from 1999 to 2009 on the relationship between exercise intensity and affective responses." Short burst high intensity exercise was found to be associated with an increase in self-esteem. In applied exercise psychology literature, self-esteem, is closely related to the concept of self-efficacy or one's confidence in achieving set behavioral goals. Compared to short burst high intensity exercise, moderate intensity exercise reported both an increase and decrease in the same variable. The review concluded that "mid-range intensities should result in optimal affective changes, whereas intensities that are 'too low' or 'too high' are less effective.

3 PURPOSE OF THE STUDY

After thorough review of existing literature, a gap exists in the lack of psychological characteristics of runners, compared to the array of studies on the physiological characteristics. (Nikolaidis et al.,2018) In addition, compared to research on variables like gender, age and performance level, current information on the personality of these athletes is missing, latest research in this area has been conducted several decades ago, and lack replication and peer review. As this thesis does focus on the mood and motivation of recreational athletes, there is a contribution to a current gap in literature.

The purpose of the study is to first, explore whether motivation for physical activity differs between gender and second, research the affective experiences of recreational runners before and after marathon participation.

For the first aim, the hypothesis is: motivation for exercise participation will differ between females and males. Specifically, from the PALMS questionnaire, the motives for females will be greater in affiliation, appearance, physical condition and others' expectation. In contrast, the motives to exercise for males will be greater in mastery, competition/ego and psychological condition. For the second aim, the hypothesis of this study is, after the marathon, there will be a positive/favorable change in affective experience towards exercise.

4 METHODS

4.1 Research Design

The marathon took place in Jyväskylä, Finland from September 15 to September 16, 2023. A multi-section questionnaire was hosted and managed within Webropol. The participants accessed the questionnaire through a QR code on the flyers that were distributed by the marathon organizers. A unique code was given to each participant so their responses can be matched for the before and after questionnaires, while maintaining their anonymity. In the flyers, contact details of the researchers were provided for any questions the participants may have. The entire survey lasted less than 20 minutes and the participants were made aware of this in the beginning.
Prior to the marathon, participants were asked their consent to be involved in this survey, with a link to the details of the study. Afterwards, basic demographic questions were asked like age, gender and their exercise participation rate.. The participants then were provided with the PALMS questionnaire focusing on the motivation to exercise. After the PALMS, the AFFEXX questionnaire was given, which focused on the affective experiences regarding exercise, “Do you find exercise pleasant or unpleasant?”. After the marathon, the participants completed the the AFFEXX questionnaire, in order to have a pre and post variable that will demonstrate if there is change in affective experience to exercise.

4.2 Participants

Examining the participation in the study, there was a total of 125 responses. Unique codes were assigned to each participant to identify their responses for the before and after questionnaires. Before marathon participation (N = 72). After marathon participation (N = 53). (N = 47) completed all the before and after questionnaires. Therefore, only data for (N = 47) Finlandia 2023 marathon participants will be used for analysis. Ages 16 – 69 (M = 34.9; SD = 11.1; $\bar{x}$ = 36.3; females = 26; males = 21). Running and skiing were the most popular exercises of choice for participants. The participants were asked an open-ended question on how much they typically train per week. The participants activity level varied, but there was a common theme of regular exercise. It was difficult to pinpoint the average as the participants gave varied answers such as, 4-8 hrs per week. Analyzing the data, the estimated average of training per week was 6 hours.

4.3 Measures

PALMS Questionnaire

To begin the survey, participants started with a short demographics questionnaire, which first asked the participants' consent, gender and age. Afterwards, questions focused on the participants' favorite physical activity, frequency of running training and the type of marathon they are participating in. The first questionnaire given to the participants focused on the motivation to run. The Physical Activity Leisure Motivation Scale (PALMS), was "created to be a comprehensive tool measuring motives for participating in PA." (Molanorouzi et al., 2014) This questionnaire consisted of five items that constitute each of the eight sub-scales (mastery, enjoyment, psychological condition, physical condition, appearance, other's expectations, affiliation, competition/ego) reflecting motives for participation in PA that can be categorized as features of intrinsic and extrinsic motivation based on self-determination theory. The runners were given statements like "I run because…it helps me relax" and they had to check a box from totally disagreeing to totally agreeing with the statement. The 40-item PALMS assesses the same eight motives for participation in PA. It was developed as a short form of the REMM by selecting the five items with the strongest psychometrics on each of the eight sub-scales. Responses to the PALMS are made on the same 5-point Likert scales as used with the REMM. The range of each PALMS sub-scale is 5 to 25 because each sub-scale has five items. Recreational Exercise Motivation Measure (REMM) The 73-item REMM measures eight motives for participation in recreational exercise, namely mastery, enjoyment, psychological condition, physical condition, appearance, other's expectations, affiliation, competition/ego, on a 5- point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). (Molanorouzi et al., 2014)

AFFEXX Questionnaire

"The AFFEXX (describe own version) consists of 30 items and 8 factors assessing three constructs, namely antecedent appraisals (four factors), core affective exercise experiences (three factors),and attraction-antipathy (single factor). Even though, all three constructs were given to the participants, for analysis only the core affective exercise experiences were used. This was done because the core affective exercise experiences is the focus of this thesis. In addition, this makes the time to conduct the

analysis shorter, more understandable, and straightforward. The other constructs were not necessary for this thesis. The three subscales analysis for core affective experiences were: pleasure vs. displeasure, energy vs. tiredness, calmness vs. tension). A similar process was used by (Woelfel, 2022).

Each item was scored on a 7-point Likert scale ranging from 1 (“if the statement on the left perfectly matches what you would say”) to 7 (“if the statement on the right perfectly matches what you would say”). Higher scores on each factor (average scores of subordinate items) indicate a more positive level of these three constructs (referred to better antecedent appraisals and core affective exercise experiences, and more attraction towards exercise).” (Wang et al., 2023) The reasoning behind why the AFFEXX was used twice was to see whether running the marathon has an impact or changes the participants’ experiences right after they run it. Volunteer participants were informed that if at any time before or during the session they wish to withdraw from the study they may simply exit the browser window and not re-access the survey. They were also notified that once the results of the study have been submitted (once the survey has been completed) it will not be possible to withdraw individual data from the research. Participants were briefed on confidentiality and anonymity prior to participation in the research. All participants gave consent to perform the study and let their responses be used for research purposes.

4.4 Data Analysis

The questionnaires were administered via Webropol and the results were downloaded to SPSS for analysis. The open-ended demographic questions were analyzed by grouping similar responses. The individual identification codes of the marathon participants were manually matched for the pre and post AFFEXX scores. The starting point for comparison and post-measures were analyzed using MANOVA. T-scores and probability values were calculated using paired t-tests. Using the t-tests, specifically, the estimate effect size option, the Cohen’s d-value was calculated.

5 RESULTS

Differences between gender in motivation for exercise participation were examined across marathon participants. The results of the MANOVA analysis indicated statistically significant differences between males and females in exercise participation motives (Wilks' Lambda = .43, $F_{1,381} = 8.74$, $p < .001$, $\eta P^2 = .25$). There was no significant difference in the PA motives of affiliation, psychological condition, enjoyment and mastery. The post hoc analysis was used to determine where the specific difference came from. Focusing on the subscales of PALMS and applying the Bonferonni correction, showed statistically significant differences between men and women in competition/ego ($F = 9.94$, $p < .001$, $\eta_p^2 = .04$) and other's expectations ($F = 11.27.60$, $p < .001$, $\eta^2 = .07$). Table 1 details the means (M) and standards deviations (SD) for seven motives for participating in exercise by gender.

Table 1

PA motives	Females (n=26) M/SD	Males (n=21) M/SD	*t* (df=46)	*p*
Affiliation	3.61 (0.79)	3.71 (0.72)	0.53	0.639
Others' expectations	4.87 (0.63)	4.33 (0.82)	4.89	<0.001
Appearance	3.92 (0.66)	3.57 (0.64)	0.58	0.646
Enjoyment	3.75 (0.74)	3.87 (0.77)	0.66	0.887
Mastery	3.71 (0.74)	3.86 (0.74)	0.63	0.855
Competition/ego	3.11 (0.63)	4.29 (0.82)	5.17	<0.001
Psychological condition	4.09 (0.79)	3.96 (0.79)	-0.41	0.560
Physical condition	4.22(0.81)	4.42 (0.82)	0.62	0.611

Though evidence and theory creates an assumption there will be statistically significant changes in affective experience toward exercise (Purpose of Study), the AFFEXX pre and post scores showed no *significant* changes, as the p value for all three AFFEXX measurements were substantially above 0.05, thus making the difference not significant. However, the core affective measurement of pleasure and energy showed small improvements and the calmness measurement reflected a medium effect (*d*=0.17, *d*=0.42, and *d*=0.68). Table 2 details the results for core affective experiences across all AFFEXX measurements.

Table 2

AFFEXX Measurements	Before Marathon Questionnaire (Time 1) *M* *SD*		After Marathon Questionnaire (Time 2) *M* *SD*		*t*	*p* (level of significance =5%)	*d*
Pleasure vs. Displeasure	5.33	0.97	6.12	0.91	-0.74	0.249>*0.05*	0.17
Energy vs. Tiredness	4.97	1.14	6.01	1.08	-0.55	0.061>*0.05*	0.42
Calmness vs. Tension	4.95	1.01	5.29	0.99	-1.51	0.350>*0.05*	0.68

6 DISCUSSION

The first goal of this study was to explore the difference in motivation for physical activity between gender. The second goal was to research the affective experiences of recreational runners before and after marathon participation. The first hypothesis was to a limited degree substantiated in this study. In particular, the motives of competition/ego and others' expectations were found to have statistically significant differences between gender. Females scored higher in being motivated to exercise by others' expectations. Males scored higher in being motivated to exercise by competition/ego. There was no significant difference in PA motives of affiliation, psychological condition, enjoyment, mastery, physical condition, and appearance. In terms of assessment of affective exercise experiences, though evidence and theory create an assumption there will be statistically significant changes, the AFFEXX pre and post scores showed no significant changes. The results of research on motivation and affective experiences of recreational runners can be used to design motivating PA intervention to facilitate peoples' PA and well-being. Evidence shows, intrinsic motivation is more effective to maintain physical activity than extrinsic motivators. (Silva et al., 2008). Self-determination theory explains that intrinsic motivation is enhanced when the basic psychological needs of autonomy, competence, and relatedness are met (Ryan & Deci, 2000).

In terms of this thesis' limitations, it is important to understand the original thesis plan was not approved, due to it forcing participants be involved with high intensity interval rowing and due to time limitations and issues with the ethics process, an alternative

route was advised. An opportunity was given to replicate a master's thesis procedure from another cohort. A pre-designed study was undertaken, that was large and complex, it included three intricate foreign language questionnaires (most of the literature reviewed had one main questionnaire) and the data was processed in a unique reporting platform. These limitations hindered the validity of this thesis' results.

In the 21st century, people have a low attention span and human error is part of any study. After careful evaluation of this thesis an invaluable lesson was learned, it is essential to focus on one concise and credible questionnaire the researcher has a high level of comprehension in and is from a language the researcher is fluent in. In addition, it is important to provide participants with time to complete the questionnaire and ideally not on an electronic tablet, but on paper with the researcher present to answer any questions.

During the year it took to complete this thesis, there were several significant limitations that arose during the development, processing and writing of this study. One significant limitation that stands out would be, originally, the PBS-S scale or psychobiosocial scale was part of the questionnaire that was distributed to participants. This questionnaire was used to complement the information about affective states of participants. Specifically, the PBS-S scale was employed to measure how the participants' emotional experiences impact their performance. The questionnaire described the participants experience in sport performance before and after exercise. Unfortunately, because the Webropol system did not automatically match unique codes of the participants for their before and after responses, there was an overwhelming amount of data that appeared randomly based off the time a questionnaire was completed. A decision was made to eliminate the PBS-S scale completely and focus on two questionaries rather than three. Furthermore, due to the system allowing a question to be omitted or skipped, the majority of the data was not used, hence that is why there was a focus on the three core AFFEXX measurements rather than the eight. After much research, a published study was found that chose a similar approach of focusing on the three core AFFEXX measurements, which improved the credibility of the study.

Another limitation of this study is, the "MANOVA is rarely recommended today, as it can be extremely restrictive" (Booth, 2013). Furthermore, after much analysis the

AFFEXX may have not been the best choice of instrument for this type of study. This is because the AFFEXX measures the affective experience of exercise in general rather than the specific exercise, which was running. A more suitable alternative would be the "Exercise-induced Feeling Inventory, the Subjective Exercise Experiences Scale, or the Physical Activity Enjoyment Scale, all of which were developed to assess responses during or after single sessions of exercise or physical activity." (Ekkekakis et al., 2011).

6.1 Conclusion

The main findings of this study were, females scored higher in being motivated to exercise by others' expectations. Males scored higher in being motivated to exercise by competition/ego. In terms of the assessment of affective exercise experiences of the runners, the AFFEXX pre and post scores showed no significant changes. Consequently, this study showed there is a difference in motives to exercise between gender and this can lead to developing unique interventions for people and having an open mind when creating intervention based off intrinsic and extrinsic motives. Even though it has been scientifically demonstrated that intrinsic motivators are most impactful for exercise adherence, mental coaches and psychologists should consider using extrinsic motives as well. Lastly, this study offers an opportunity in future research to examine if having a balance between the two motivators (intrinsic/extrinsic) can have the best impact on maintaining a lifelong physical activity habit and creating an active and balanced lifestyle.

7 REFERENCES

Anderson JW, Smith BM, Gustafson NJ. Health benefits and practical aspects of high-fibre diets. Am J Clin Nutr. 1994 May;59(5 Suppl):1242S-1247S. doi: 10.1093/ajcn/59.5.1242S. PMID: 8172129.

Andrade C. Sample Size and its Importance in Research. Indian J Psychol Med. 2020 Jan 6;42(1):102-103. doi: 10.4103/IJPSYM.IJPSYM_504_19. PMID: 31997873; PMCID: PMC6970301.

Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy- enhancing and suppressing teaching behaviors predicting students' engagement in schoolwork. *British Journal of Educational Psychology*, 27, 261–278. https://doi.org/10.1348/ 000709902158883

Berman, A., Beckman, M., & Lindqvist, H. (2020). Motivational Interviewing Interventions. In M. Hagger, L. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen (Eds.), *The Handbook of Behavior Change* (Cambridge Handbooks in Psychology, pp. 661-676). Cambridge: Cambridge University Press. DOI :10.1017/9781108677318.045

Bloom, J. R., & Monterossa, S. (1981). Hypertension labeling and sense of well-being. American Journal of Public Health, 71(11), 1228-1232.

Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Rep. 1985 Mar-Apr;100(2):126-31. PMID: 3920711; PMCID: PMC1424733.

Cheon, S. H., Reeve, J., & Song, Y.-G. (2019). Recommending goals and supporting needs: An intervention to help physical education teachers communicate their expectations while supporting students' psychological needs. *Psychology of Sport and Exercise*, 41, 107–118. https://doi.org/10.1016/j.psychsport.2018.12.008

Clark, D., A. (2013). Cognitive restructuring. *The Wiley Handbook of Cognitive Behavioral Therapy*, 1-22. https://doi.org/10.1002/9781118528563.wbcbt02

Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination. *Personality and social psychology bulletin*, *27*(8), 930-942.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York, NY: Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227-268. http://dx.doi.org/10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian psychology/Psychologie canadienne*, *49*(3), 182. https://doi.org/10.1037/a0012801

Ekkekakis, P., Zenko, Z., & Vazou, S. (2021). Do you find exercise pleasant or unpleasant? The Affective Exercise Experiences (AFFEXX) questionnaire. *Psychology of Sport and Exercise, 55*, 101930. Advance online publication.

Eldredge, L. K. B., Markham, C. M., Ruiter, R. A., Fernández, M. E., Kok, G., & Parcel, G. S. (2016). *Planning health promotion programs: an intervention mapping approach*. John Wiley & Sons. 107-109, 111.

Elfhag, K., & Rössner, S. (2005). Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obesity reviews*, 6(1), 67-85. https://doi.org/10.1111/j.1467-789X.2005.00170.x

Ellis, A. (2003). Cognitive restructuring of the disputing of irrational beliefs. *Cognitive behavior therapy*: Applying empirically supported techniques in your practice, 79-83.

Flay, B. R. (1986). Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. Preventive medicine, 15(5), 451-474.

GBD 2015 Risk Factors Collaborators (2016). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015. *Lancet (London, England), 388*(10053), 1659–1724.

Glasgow, R. E., Eakin, E. G., & Toobert, D. J. (1996). How generalizable are the results of diabetes self-management research? The impact of participation and attrition. The Diabetes Educator, 22(6), 573-585.

Glasgow, R. E., McCaul, K. D., & Fisher, K. J. (1993). Participation in worksite health promotion: a critique of the literature and recommendations for future practice. Health education quarterly, 20(3), 391-408.

Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: the RE-AIM framework. American journal of public health, 89(9), 1322-1327.

Hagger, M., Hankonen, N., Chatzisarantis, N., & Ryan, R. (2020). Changing Behavior Using Self-Determination Theory. In M. Hagger, L. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen (Eds.), *The Handbook of Behavior Change* (Cambridge Handbooks in Psychology, pp. 104-119). Cambridge: Cambridge University Press. DOI:10.1017/9781108677318.008.

Lane AM, Crone-Grant D, Lane H. Mood changes following exercise. Percept Mot Skills. 2002 Jun;94(3 Pt 1):732-4. doi: 10.2466/pms.2002.94.3.732. PMID: 12081273.

Langhammer, Birgitta & Bergland, Astrid & Rydwik, Elisabeth. (2018). The Importance of Physical Activity Exercise among Older People. BioMed Research International. 2018. 1-3. 10.1155/2018/7856823.

Lauderdale, Michael & Yli-Piipari, Sami & Irwin, Carol & Layne, Todd. (2015). Gender Differences Regarding Motivation for Physical Activity Among College

Students: A Self-Determination Approach. The Physical Educator. 10.18666/TPE-2015-V72-I5-4682.

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. British Journal of Health Psychology, 2(4), 361–376.

Martínez-Díaz IC, Carrasco L. Neurophysiological Stress Response and Mood Changes Induced by High-Intensity Interval Training: A Pilot Study. Int J Environ Res Public Health. 2021 Jul 8;18(14):7320. doi: 10.3390/ijerph18147320. PMID: 34299775; PMCID: PMC8304833.

Molanorouzi, K., Khoo, S. & Morris, T. Validating the Physical Activity and Leisure Motivation Scale (PALMS). *BMC Public Health* **14**, 909 (2014). https://doi.org/10.1186/1471-2458-14-909

Miller, W. R., & Moyers, T. (2017). Motivational interviewing and the clinical science of Carl Rogers. *Journal of Consulting and Clinical Psychology*, 85, 757–766. https://doi.org/10.1037/ccp0000179

MINT (Motivational Interviewing Network of Trainers). (2019). MINT. Website. Retrieved: May 26th 2023. https://motiva tionalinterviewing.org

Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts. *Perspectives on Psychological Science, 7*, 325-340. http://dx.doi.org/10.1177/1745691612447309

Ntoumanis, N., Quested, E., Reeve, J., & Cheon, S. H. (2018). Need supportive communication: Implications for motivation in sport, exercise, and physical activity. In B. Jackson, J. A. Dimmock & J. Compton (Eds.), *Persuasion and communication in sport, exercise, and physical activity* (pp. 155-169). Abingdon, UK: Routledge.

Patel, S. R., & Hu, F. B. (2008). Short sleep duration and weight gain: a systematic review. *Obesity*, *16*(3), 643-653.

Pedersen, B. K., and Saltin, B. (2015). Exercise as medicine - evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scand. J. Med. Sci. Sports* 25(Suppl. 3), 1–72.

Pi-Sunyer, F. X. (1996). A review of long-term studies evaluating the efficacy of weight loss in ameliorating disorders associated with obesity. *Clinical Therapeutics*, *18*(6), 1006-1035. https://doi.org/10.1016/S0149-2918(96)80057-9

Reeve, J., & Cheon, S. (2020). Autonomy-Supportive Interventions. In M. Hagger, L. Cameron, K. Hamilton, N. Hankonen, & T. Lintunen (Eds.), The Handbook of Behavior Change (Cambridge Handbooks in Psychology, pp. 510-522). Cambridge: Cambridge University Press. doi:10.1017/9781108677318.035

Reeve, J. (2016). Autonomy-supportive teaching: What it is, how to do it. Building autonomous learners: Perspectives from research and practice using self-determination theory, 129-152. DOI: 10.1007/978-981-287-630-0_7

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist*, 44, 159–178. https://doi.org/ 10.1080/00461520903028990

Rokka, S., Mavridis, G., & Kouli, O. (2010). The impact of exercise intensity on mood state of participants in dance aerobics programs. *Studies in physical Culture &Tourism, 17*, 241-245.

Rose, E. A., Parfitt, G., & Williams, S. (2005). Exercise causality orientations, behavioural regulation for exercise and stage of change for exercise: exploring their relationships. *Psychology of Sport and Exercise*, *6*(4), 399-414. https://doi.org/10.1016/j.psychsport.2004.07.002

Rhodes, R.E. Boudreau, P. Josefsson K. W. & Ivarsson, A. (2021) Mediators of physical activity behaviour change interventions among adults: A systematic review and meta-analysis, *Health Psychology Review, 15*:2, 272-286.

Robbins TW, Costa RM. Habits. Curr Biol. 2017 Nov 20;27(22):R1200-R1206. doi: 10.1016/j.cub.2017.09.060. PMID: 29161553.

Roeh A, Engel RR, Lembeck M, Pross B, Papazova I, Schoenfeld J, Halle M, FalkaiScherr J, Hasan A. Personality Traits in Marathon Runners and Sedentary Controls With MMPI-2-RF. Front Psychol. 2020 May 8;11:886. doi 10.3389/fpsyg.2020.00886. PMID: 32457686; PMCID: PMC7225272.

Ruiz, M. C., Robazza, C., Tolvanen, A., & Hanin, J. (2019). The Psychobiosocial States (PBS-S) Scale Factor : Structure and Reliability. European Journal of Psychological Assessment, 35(5), 658-665. https://doi.org/10.1027/1015-5759/a000454

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality, 74*, 1557- 1586. http://dx.doi.org/10.1111/j.1467-6494.2006.00420.x

Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development and wellness. New York, NY: Guildford Press.

Ryan, R. M., & La Guardia, J. G. (2000). What is being optimized?: Self-determination theory and basic psychological needs. In S. H. Qualls & N. Abeles (Eds.), Psychology and the Aging Revolution: How we Adapt to Longer Life (pp. 145–172). American Psychological Association. https://doi.org/10.1037/10363-008

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Riebe, D., Blissmer, B., Greene, G., Caldwell, M., Ruggiero, L., Stillwell, K. M., & Nigg, C. R. (2005). Long-term maintenance of exercise and healthy eating behaviors in overweight adults. *Preventive medicine*, *40*(6), 769-778. https://doi.org/10.1016/j.ypmed.2004.09.023

Rogers, C. R. (1957). Becoming a Person. In S. Doniger (Ed.), Healing: Human and divine: Man's search for health and wholeness through science, faith, and prayer (pp. 57–67). Association Press. https://doi.org/10.1037/10811-003

Sacks, G., Lawrence, M. A., & Swinburn, B. A. (2008). A systematic policy approach to changing the food system and physical activity environments to prevent obesity. *Australia and New Zealand health policy*, *5*(1). https://doi.org/10.1071/HP080513

Sartorelli DS, Franco LJ, Cardoso MA. High intake of fruits and vegetables predicts weight loss in Brazilian overweight adults. Nutr Res. 2008 Apr;28(4):233-8. doi: 10.1016/j.nutres.2008.02.004. PMID: 19083413.

Seo MG, Barrett LF, Bartunek JM. THE ROLE OF AFFECTIVE EXPERIENCE IN WORK MOTIVATION. Acad Manage Rev. 2004 Jul;29(3):423-439. PMID: 16871321; PMCID: PMC1519413.

Sorensen, G., Emmons, K., Hunt, M. K., & Johnston, D. (1998). Implications of the results of community intervention trials. Annual review of public health, 19(1), 379-416.

Sundholm, L. (2000). Itseohjautuvuus organisaatiomuutoksessa. Jyväskylä University, Department of Psychology, Faculty of Social Science and Research. Doctoral dissertation. Retrieved: May 19th 2023.

Sparks, C., Dimmock, J. A., Lonsdale, C., & Jackson, B. (2016). Modeling indicators and outcomes of students' perceived teacher relatedness support in high school physical education. *Psychology of Sport and Exercise, 26*, 71-82.http://dx.doi.org/10.1016/j.psychsport.2016.06.004

Sparks, C., Lonsdale, C., Dimmock, J. A., & Jackson, B. (2017). An intervention to improve teachers' interpersonally involving instructional practices in high school physical Education: Implications for student relatedness support and in-class experiences. *Journal of Sport and Exercise Psychology, 39*, 120-133. http://dx.doi.org/10.1123/jsep.2016-0198

Simpson EH, Balsam PD. The Behavioral Neuroscience of Motivation: An Overview of Concepts, Measures, and Translational Applications. Curr Top Behav Neurosci. 2016;27:1-12. doi: 10.1007/7854_2015_402. PMID: 26602246; PMCID: PMC4864984.

Swinburn, B. A., Sacks, G., Lo, S. K., Westerterp, K. R., Rush, E. C., Rosenbaum, M., ... & Ravussin, E. (2009). Estimating the changes in energy flux that characterize the rise in obesity prevalence. *The American journal of clinical nutrition*, *89*(6), 1723-1728. https://doi.org/10.3945/ajcn.2008.27061

Teixeira, P. J., Marques, M. M., Silva, M. N., Brunet, J., Duda, J. L., Haerens, L., ... & Hagger, M. S. (2020). A classification of motivation and behavior change techniques used in self-determination theory-based interventions in health contexts. *Motivation science*, *6*(4), 438.

Teixeira, P. J., Silva, M. N., Mata, J., Palmeira, A. L., & Markland, D. (2012). Motivation, self-determination, and long-term weight control. *International Journal of Behavioral Nutrition and Physical Activity*, *9*, 1-13. https://doi.org/10.1186/1479-5868-9-22

Thomson, C. A., Morrow, K. L., Flatt, S. W., Wertheim, B. C., Perfect, M. M., Ravia, J. J., ... & Rock, C. L. (2012). Relationship between sleep quality and quantity and weight loss in women participating in a weight-loss intervention trial. *Obesity*, *20*(7), 1419-1425.

Valmet. (n.d.). Ura Valmetilla [Career at Valmet]. Retrieved May 13th, 2023. Retrieved from https://www.valmet.com/fi/valmet-yrityksena/ura-valmetilla/

Varkevisser, R. D. M., Van Stralen, M. M., Kroeze, W., Ket, J. C. F., & Steenhuis, I. H. M. (2019). Determinants of weight loss maintenance: a systematic review. *Obesity reviews*, *20*(2), 171-211. https://doi.org/10.1111/obr.12772

Wang, Ting & Gerber, Markus & Herold, Fabian & Bardeen, Joseph & Ludyga, Sebastian & Taylor, Alyx & Kramer, Arthur & Zou, Liye. (2023). A Bifactor Analysis Approach to Construct Validity and Reliability of the Affective Exercise Experience Questionnaire among Chinese College Students. International Journal of Mental Health Promotion. 25. 10.32604/ijmhp.2023.029804.

Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate patients with diabetes for glucose control. *Diabetes care*, *21*(10), 1644-1651. https://doi.org/10.2337/diacare.21.10.1644

World Health Organization (2019). Sustainable Development Goals: Health targets https://www.euro.who.int/__data/assets/pdf_file/0008/416816/Physical-activity-factsheets_SDGs.pdf