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The influence of the sport of handball on the quality of life of women who practice recreational and performance activities – Integrative review

A influência do desporto handebol na qualidade de vida de mulheres praticantes recreacionais e de rendimento – Revisão integrativa

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ABSTRACT

Introduction: The practice of handball faces many challenges of gender inequality, physical activity, including team sports, has an impact on quality of life and the search for sports excellence involves several factors and is a complex process, quality of life is affected by changes in health status. Women faced challenges in playing sports in the nineteenth century, with gender stereotypes associated with men. Objective: To identify the influence of handball on the quality of life of women recreational and performance practitioners. Method: This integrative literature review included the search of articles in databases such as PUBMED, SCIELO and Google Scholar, using the descriptors in Health Sciences (DECs): Quality of life, sports performance, elite athletes and female athletes. Results: A total of 3,209 articles were identified and analyzed initially, and the selection was refined to 18 articles related to the proposed theme and approach to women's quality of life in the context of handball, both recreational and performance. Conclusion: This review provided a comprehensive understanding of the influence of handball on women's quality of life, considering different contexts of practice, motivational factors and consequences for physical and emotional well-being, despite small recurrent unforeseen events related to the career of performance athletes, showing a direct relationship in a more positive way when related to the recreational aspect. On the other hand, in the performance aspect, positive relationships were shown, but the negative ones are more prominent.

Keywords: Quality of life, Sports performance, Elite athletes, Female athletes.

1 INTRODUCTION

Handball was influenced by various activities that involved throwing, running, and jumping. According to one of the most well-known theories, this sport was created in Denmark in 1897 and gained popularity in 1910, thanks to the support of countries such as Germany, Denmark, and Sweden. In the beginning, Handball was played on a field with eleven players, this format came about thanks to the efforts of two German Physical Education teachers, Max Heisen and Karl Schillenz (Andres, 2010).

Handball is a high-speed team sport, with a focus on hand and eye skills, players need heightened coordination of movements to maneuver the ball accurately and execute tactics in response to external stimuli. To achieve maximum performance, it is essential to develop numerous sport-specific skills (Blecharz et al., 2022).

Recreational handball is intermittent and intense, involving actions such as jumping, throwing, and changes of direction, promoting cardiovascular benefits. Goalkeepers are less in demand than outfield players. Competitive sports are more demanding due to training, body composition and rules and it is valid to improve health and physical fitness (Póvoas et al., 2017).

On the other hand, the sports career is a process that involves different stages and transitions, from the beginning of sports practice to the moment when athletes decide to end their participation in sport, with the aim of achieving high levels of performance in sporting events. During this process, athletes face several influences, such as family, colleagues, coaches, context, and sports activity (Lima et al., 2022).

Differences in physical activity participation are notable among young people, with levels increasing among adolescent boys but persistently low among girls, accentuating gender disparity. Promising strategies to increase physical activity among women and girls include engagement in sports, which is associated with benefits such as improved physical and mental health, educational performance, and social cohesion. Personalized efforts to promote physical activity are needed to meet the specific needs and interests of girls (Pedersen; King, 2023).

Participation in team sports stimulates physical fitness and promotes the development of mental and social skills in young people, working in a team allows them to learn to collaborate effectively and feel supported and accepted, which can reduce depressive symptoms and promote healthy relationships with adults and peers. Positive experiences in teams contribute to greater social acceptance and decreased depressive symptoms among adolescents (Pluhar et al., 2019).

Quality of life has different conceptualizations in the area of health, according to the World Health Organization, which consists of defining it as "the individual's perception of his position in life, in the context of the culture and value systems in which he lives, and in relation to his goals, expectations, standards and concerns". Health-related quality of life is associated with the "aspects of a person's life that present changes in their health status, significant to impact their quality of life", thus understanding that there is a direct relationship with diseases and health interventions (Oliveira et al., 2020).

Women began to play sports in several countries during the nineteenth century, however, she points out that this happened differently compared to men, with the latter establishing hegemonic power through characteristics such as aggressiveness, competitiveness, physicality and courage (Palhares et al., 2012)

The lack of theoretical and methodological precision hinders research on quality of life, and the absence of a theoretical consensus means that this concept is addressed in several areas, such as health, well-being, and lifestyle. These authors also highlight the existence of four general approaches to quality of life, including economic, psychological, biomedical, and holistic aspects. These approaches involve factors related not only to physical, emotional, and mental health and well-being, but also to other circumstances of the individual's daily life, such as family, work, friends, happiness, love, and freedom (Pereira et al. 2012).

Athletes can develop their careers in different sports contexts, both amateur and professional, and engagement and permanence in these contexts requires athletes to be able to deal with different levels of competition and performance, taking into account their individual characteristics and the socio-cultural context. In elite sport, places to compete are limited, and only a select group of athletes reach the level of sporting excellence (Galatti et al., 2017).

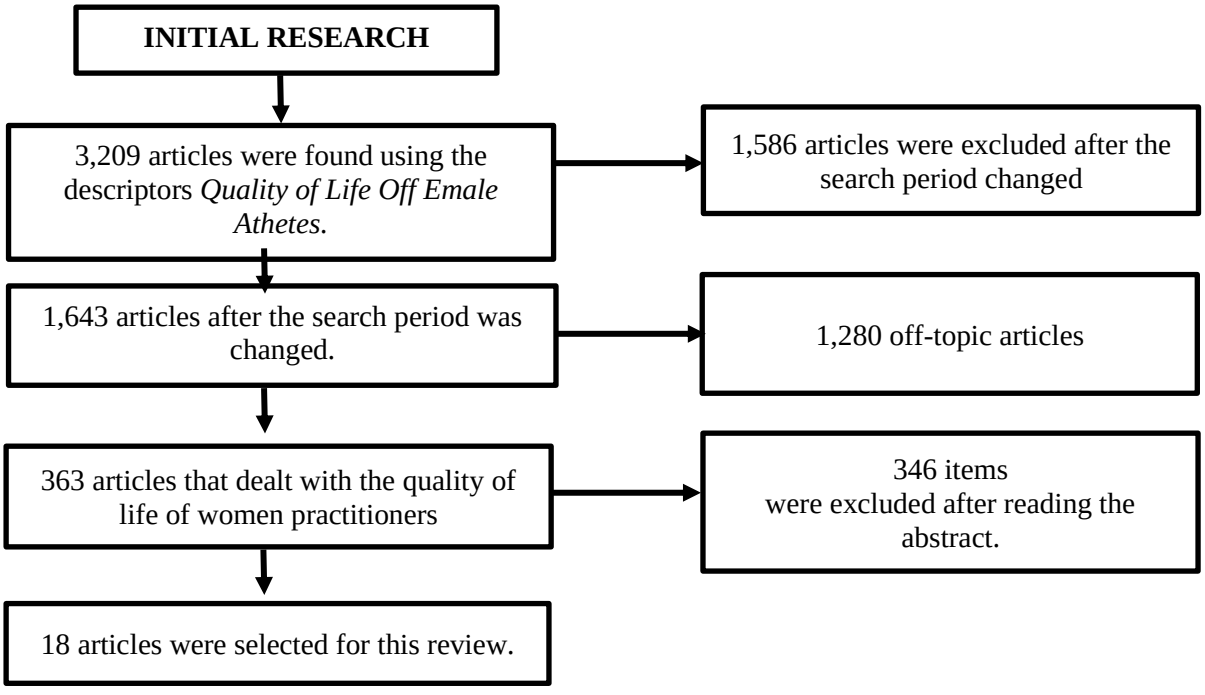
Therefore, investigating the trajectory of athletes towards excellence requires considering different dynamic elements of their development, it is important to understand the phases of the athlete's career and the experiences that shape their trajectory, as well as the challenges they face in different sports contexts, it is essential to consider the individual characteristics and the socio-cultural context, in order to understand how they can influence the athlete's career development. Finally, sports excellence is a complex and multifaceted process that involves different parameters, and it is necessary to consider these elements to understand the trajectory of athletes towards sports success (Lima et al., 2022).

2 METHODOLOGY

The study consists of an integrative literature review on the influence of handball on the quality of life of recreational and performance women. This review was conducted using information obtained from the databases of PUBMED, SCIELO, and Google Scholar, containing information on handball, quality of life, women, recreation, and performance. The selected articles were written in English and Portuguese. Keywords (Quality of life, sports performance, elite athletes and female athletes) were used in the Health Sciences Descriptors (DECS).

In the initial search, 3,209 articles were found using the descriptors, after restricting the search period between the years 2018 to 2023, 1,643 articles were selected, 1,586 excluded articles were not within the proposed period. Then, it selected only articles that dealt directly with the theme of women's handball, 154 that did not fit within the proposed theme were excluded, leaving 48 articles, then the abstracts of the articles were analyzed and all those that did not contain a relationship with the influence of handball on the quality of life of women were excluded. Thus leaving 20 articles. As inclusion criteria, we used articles written in the selected languages, which carried out the quality of life of the women, which had a relationship between recreational handball and performance handball and addressed the influence of recreational handball until reaching performance. The following exclusion criteria were used: articles that were not related to the proposed theme, selected language, and that were not within the established publication period, and were not clinical trials.

Figure 1 – Flowchart with the process used for the construction of this review



3 RESULTS AND DISCUSSION

In total, 18 articles were selected for the development of the work, presenting the authors, objectives, methods and conclusion, as shown in Table 1.

Table 1 - Studies Influence of handball on the quality of life of women recreational and performance practitioners

Author/Year	Objectives	Methods	Conclusion
(CARNEIRO et al., 2022)	The aim of this study was to describe how the physical and physiological demands, activity profile and fun levels of recreational handball (HT) game formats with people with no previous experience with this sport (n = 17, 67.4±3.3 years)	5v5, 6v6 and 7v7 matches on 40x20 m, 3x15 min. They evaluated HR, perceived effort and lactate for internal load. Locomotor profile and accelerometer measured external load. Recorded fun levels. Average HR decreased in 6v6 and 7v7.	Recreational field hockey (HT) games in different formats (5v5, 6v6, 7v7) on the same field (40x20 m), periods of 3x15 min. Similar internal load for cardiovascular adaptations. 5v5 and 6v6 have more intense actions and throws, favoring musculoskeletal improvements and motivation. Recreational HT is motivating in all formats.
(PÓVOAS et al., 2018)	The aim of the study was to investigate the impact of short training in sedentary former handball players (33-55 years old) on physical fitness and cardiovascular health.	Twenty-four participants were divided into a handball team (GHT; n = 15) and a control group (CG; n = 9). THG played 2-3 weekly matches for 12 weeks. Average HR in matches: 80% of maximum HR, peak: 91% maximum HR. THG showed improvement in aerobic performance, balance, VO2 max, resting HR, HDL and blood glucose.	THG improved aerobic performance, VO2 max, and balance. Resting HR decreased, fasting glucose and HDL increased. Recreational handball benefits fitness and health, with high attendance, reducing risk of lifestyle-related diseases.
(LARSEN et al., 2021)	The study sought to investigate the correlation between activities in sports clubs and parameters of well-being and physical health.	Questionnaires on sports participation and well-being were used, as well as physical health profile tests (body composition, RHR, blood pressure, balance, jumping, and Yo-Yo IR1C). Data analysis was performed considering sports participation and the five most mentioned sports.	Athletes in sports clubs showed greater physical and psychological well-being, with more social support and a positive perception of the school environment. Improved performance in Yo-Yo IR1C, jumping and balance. They had greater muscle mass and a lower percentage of fat. It is concluded that participation in sports clubs benefits well-being, physical health and conditioning
(FRISTRUP et al., 2020)	This study aimed to investigate the effects of reduced handball team training in young adults, including lower limb muscle strength, postural balance, and body composition.	Sample size estimates were based on expected standard deviations of changes in key VO2peak outcomes and body composition after recreational soccer training in untrained subjects. A minimum of 64 participants were expected to be included in order to reach a satisfactory conclusion.	The study investigated the benefits of short-term recreational handball training in young adults, and found significant gains in rapid strength capacity, postural balance, lean body mass and bone mineralization, as well as a reduction in fat body mass. Handball training has been shown to be beneficial for physical health and fitness.
(BOJKOWSKI, 2022)	The study sought relationships between psychological dimensions of femininity, motivation and specific parts in female athletes of team sports (49 participants aged 19 to 32 years)	A total of 49 women (mean age 22.82 years) representing different team sports participated in the study. The average training time was 9.27 years.	The final findings highlight the importance of considering the psychological dimensions of femininity when selecting female players in team sports. These dimensions have an influence on

	such as soccer, handball, hockey, volleyball and basketball.		the satisfaction of development needs and the applicable social rules.
(ALESI et al., 2019)	The study sought to investigate the effects of the motivational climate established by the coach and perceived by young high-performance handball players on their sports motivation, self-determination, sports psychological needs and sports commitment.	The study was observational and descriptive, with a cross-sectional design. The sample consisted of 479 youth handball players (250 boys and 229 girls) participating in the Spanish Regional Championships.	Handball players showed high levels of task climate and low levels of ego climate. In addition, they demonstrated high satisfaction of basic psychological needs, self-determined motivation, and commitment.
(MUNTIANU et al., 2022)	The study investigates the psychomotor skills and psychological aspects that impact the performance of junior III handball players. The main instruments are field tests and measurements of psychological characteristics.	In this study, we evaluated 181 junior III handball players from 10 teams in Romania. The research group had an average age of 13.5±0.5 years and came from different areas of residence (rural/urban). The findings were based on test results and measurements, and the analysis was performed using statistical software.	The statistical analysis data highlight the importance of comparing psychomotor and psychological factors in junior handball players. The presence of significant correlations validates the use of control tests to identify the main characteristics of these junior players.
(ESPOZ-LAZO et al., 2023)	An observational study was conducted with 14 school handball players in Santiago, Chile. The players participated in three special handball training sessions using the NLP methodology and three different conditions. The study had a follow-up, idiographic, multidimensional design.	This is an observational descriptive study with 14 school handball players from 4 different teams in Santiago, Chile. Purpose of obtaining relevant information. Quantitative approach.	Results indicate that the constraints in the proposed exercise are effective in activating specific defensive behaviors in young handball players.
(BRANCO et al., 2021)	The aim of this study was to investigate the effects of two modes of physical activity on body composition, physical fitness, cardiometabolic risk, and psychological responses in adolescent females who participated in a multidisciplinary program.	In this randomized controlled study, 43 female adolescents were recruited from schools and Basic Health Units near the University, through posters and meetings with parents or guardians.	Both models of physical activity resulted in significant reductions in body mass, BMI, body image dissatisfaction, and LDL-c, as well as significant increases in MME, VO2max, and HDL-c. The GSP group showed an interaction with a reduction in body fat percentage in the post-intervention period.
(POPOWCZAK et al., 2022)	This study aimed to evaluate the relationship between body height, body mass index and motor skills in elite female basketball and handball players. The hypothesis raised was that body height and body mass index may be significantly associated with agility and speed of change of direction.	The study involved 31 elite female athletes, 12 from basketball (mean age: 24.98 ± 3.38 years; mean body mass: 74.38 ± 8.54 kg) and 19 from handball (mean age: 27.34 ± 4.68 years; mean body mass: 71.13 ± 8.35 kg). All handball players were part of the same team, competing in the PGNiG Women's SuperLeague handball league (1st League in Poland) and the EHF Women's Cup in the 2018–19 season.	The study partially confirmed the hypotheses raised, showing a relationship between body height (BH) and body mass index (BMI) with the results of speed of change of direction (CODS) and agility (AG) only in female handball players. The relationship between anthropometric measurements and motor skills may be curvilinear.
(VÁCZI et al., 2022)	The aim of the study was to analyze the EMG characteristics of NHE (Nordic Hamstring Exercise) exercise in its eccentric phase, and also to investigate the effects of long-term eccentric NHE training on muscle strength and vertical	Players from the same handball team were randomly divided into an eccentric NHE training group (13 players) and a control group (10 players). The NHE group performed additional NHE eccentric exercises once or twice a week, with progressive increase in volume, over 20 weeks, while both	The 20-week NHE training increased eccentric hamstring strength in female handball players, without altering the optimal knee angle. It is recommended to incorporate NHE into regular training to improve hamstring strength.

	jump performance in female handball players.	groups continued with their regular handball training routine.	
(ERMIDIS et al., 2021)	The objective of this research was to evaluate the intensity of the exercise and the technical involvement of handball in different game formats, both for men's and women's teams, and to analyze the differences between genders.	Participants: 37 boys (U9) and 20 girls (U9) recreational handball players. Use of wearable device with accelerometer and gyroscope to record activity patterns.	U9 handball matches have high HR and high-intensity distances, regardless of the format of the game. Data shows that different game formats contribute to the improvement of physical and cardiovascular fitness.
(AGEBERG et al., 2020)	The objective of this study was to describe the development of the I-PROTECT model, which involves injury prevention training and a follow-up implementation strategy.	The I-PROTECT project uses the TRIPP framework to inform sports injury prevention research.	The I-PROTECT model is an injury prevention intervention specific to youth handball, which includes evidence-based training and an implementation strategy.
(ŚLIŻ et al., 2022)	Statistically significant differences were found in reaction and movement times between handball players at different levels of competition.	Test2Drive computer tests were used to assess psychomotor skills in a group of 118 female handball players in the PGNiG Polish Women's Super League. Tests included Simple Reaction Time, Choice Reaction Time, Hand-Eye Coordination, and Spatial Anticipation.	Body mass index and fat percentage were related to players' movement times, while aerobic capacity influenced reaction times, as measured by the multi-stage 20-meter running test.
(FALCH et al., 2022)	The study investigated the effect of six weeks of strength training versus plyometric training on change of direction (COD) performance in 21 young female handball players. The strength group consisted of 11 participants with a mean age of 17.5 years, an average height of 1.69 m and an average weight of 65.8 kg.	The study used an intra-subject design with pre- and post-training measurements to investigate the effect of strength training and plyometrics on turn-of-direction (COD) performance in female team sports athletes. In addition, an inter-subject design was employed to compare the effect of the two training modalities.	Both strength training and plyometric training were effective in improving performance on strength, plyometrics, and power tests in young female handball players.
(TORABI et al., 2022)	The aim of this study was to investigate throwing kinematics and muscle activation in elite handball players, comparing those with and without shoulder pain.	A total of 43 female handball players were invited, but only 30 participated in the study, which was considered sufficient for this exploratory study, in line with previous research on the kinematics of handball throwing.	The study looked at throwing in elite handball players with and without shoulder pain. A total of 30 players were included, 15 with pain and 15 without pain.
(GONOSOVA et al., 2018)	This study sought to monitor seasonal variations in strength performance and injury risk in elite female athletes. Muscle strength levels, relationships between different muscle groups, and bilateral strength deficit in female handball players were analyzed.	Three isokinetic strength measurements were performed at different seasonal periods: one week after the end of the season, after an off-season period with 4 weeks of rest followed by 4 weeks of individual conditioning, and at the end of the pre-season after another 6 weeks of conditioning.	The proposed conditioning program needs to be enhanced with specific exercises for the lower limbs in order to further enhance the benefits of off-season conditioning.
(HAGMAN et al., 2021)	A study investigates regular exercise throughout life in 129 healthy, non-smoking women, divided into elderly handball players (HS, n=35) and untrained elderly controls (CE, n=35), analyzing characteristics of aging.	The study included a sample of 129 healthy, non-smoking women with no chronic diseases. The sample size was determined based on previous studies conducted by the same group of authors and former collaborators.	Cross-sectional study indicates that lifelong handball training is associated with beneficial anti-aging cellular effects in women. Elderly handball players showed higher expression of PGC-1α and PGC-1β compared to untrained elderly controls.

(ESPOZ-LAZO et al., 2022)	This observational study aims to describe and compare the effectiveness of the NLP methodology applied in two different socioeconomic contexts to assess whether it assists in the development of motor skills through mini handball.	The study included the voluntary participation of 22 Chilean schoolchildren (15 boys and 7 girls), with a mean age of 10.7 years. The Kruskal-Wallis H and Mann-Whitney U statistical tests were used for data analysis within the group and comparisons between groups, respectively.	achieved the same expected behaviors. Further investigations involving experimental and research groups control are required to confirm these results.

In the study by Carneiro et al. (2022), the physiological response of activity during 5v5, 6v6 and 7v7 recreational games was evaluated, showing that the 5v5 format has greater cardiovascular demand, and the measurement of the players' internal load through heart rate, blood lactate concentration and subjective perception of exertion and the levels of fun after the sessions was analyzed. As a result, during the 5v5, 6v6 and 7v7 game formats, players spend different percentages of time in various intensity zones, with variations in the total load accumulated during matches and it has been found that the higher involvement and total number of actions in 5v5 and 6v6 can also increase motivation and fun, encouraging long-term adherence to the exercise program. Therefore, recreational games are valid options for improving health.

The effects of a short-term handball team training program on former handball players divided into control group and handball training group were evaluated. The handball training group participated in 2 to 3 60-minute recreational matches per week over the course of 12 weeks, while the control group maintained a sedentary lifestyle. The handball training group resulted in significant improvements in aerobic performance, oxygen uptake (VO2max), postural balance, resting heart rate, high-density lipoprotein (HDL) cholesterol levels, and fasting blood glucose, and it was found that the practice of handball in recreational teams can be positive on physical fitness and metabolic and cardiovascular health, contributing to the reduction of the risk of lifestyle-related diseases (Póvoas et al., 2018).

In the study of Larsen et al., (2021), the relationship between leisure sports activities and health parameters was evaluated, being analyzed by means of tests covering cardiovascular fitness, body composition, functional capacity and questionnaires on leisure sports activity and well-being, resulting in better performance in physical fitness tests, long jump and balance lower body mass index (BMI), and resting heart rate (HRR) and it has been found that participation in leisure-time sports activities in clubs appears to be beneficial and important for well-being, physical fitness, and physical health.

The effects of handball training in small teams on lower limb muscle strength was evaluated, postural balance and body composition in adults, and the cardiovascular effects of

handball in small teams in untrained women were analyzed. resulting in increases in bone mineral content throughout the body, changes in bone mineral density and hip T-score compared to the control group, and it was found that small-team handball is an activity that can effectively improve musculoskeletal fitness and physical health, even for adults without prior training due to specific physical demands (Fristrup et al., 2020).

In the study of Bojkowski (2022), independent variables related to the psychological dimensions of femininity and masculinity and dependent variables related to the dimensions of motivation were evaluated, and the inventory was analyzed to assess psychological gender: Assessed characteristics of femininity and masculinity with 35 adjectives on a five-point scale, sports motivation scale: Based on the theory of self-determination, it measured intrinsic motivation, extrinsic and motivation in relation to sports practice, resulting in the importance of considering gender and motivation characteristics when planning sports activities and selecting athletes for certain sports modalities, and relationships were found between culturally shaped characteristics of femininity and masculinity and different types of motivation, it is important to consider their psychological characteristics, the ability to meet intrinsic developmental needs and basic psychological needs as described in self-determination theory.

In the study of Alesiet al., (2019), was evaluated how the motivational climate created by the coach and perceived by young high-performance handball players affects their sports motivation, self-determination, psychological needs, and sports commitment, being analyzed using different study instruments, a questionnaire of motivational climate perceived in sport, a scale of sports motivation, a scale of basic psychological needs in exercise, and a questionnaire of sports commitment (SCQ), with the results of the correlations found, indicated that the motivational constructs investigated were positively and sensitively associated, resulting in increasing the commitment of the athletes through the satisfaction of their motivational needs.

Already Muntianu et al. (2022), evaluated correlations between psychological characteristics and psychomotor skills in handball players, and field tests were analyzed to evaluate specific psychomotor components, such as hand-eye coordination, dynamic balance, spatio-temporal orientation and general dynamic coordination, resulting in statistical analyses including the calculation of correlations between psychomotor skills and psychological characteristics, using ANOVA to investigate differences in the position of In this context, linear regression was performed for the variables, and the importance of comparing psychomotor and psychological factors in junior handball players was found. The significant correlations found validate the control tests used to identify the main characteristics of these players.

In another work Limitations of traditional training models in team sports, such as handball, which tend to standardize the game, reducing the creativity of players and neglecting tactical and decision-making behaviors, were evaluated. defensive motor behaviors of handball players, with some variables being more activated in certain constraints than in others and it was found that the constraints applied in the proposed exercise are shown to be effective in activating handball-specific defensive motor behaviors in young female players (Espoz-lazo et al., 2023).

In the evaluation of Branco et al., (2021), verified the effects of two different models of physical activity on body composition, health-related physical fitness, psychological parameters and cardiometabolic risk, and two groups were analyzed: Sports Practice Group (SPG) and Functional Training Group (FTG), The SPG practiced three different sports, while the FTG followed a structured exercise program, having similar results in relation to parameters such as body measurements, body composition, health-related physical fitness, as well as lipid, glycemic and liver enzyme profiles, and both models of physical activity were found to promote significant reductions in body mass, body mass index (BMI), body image dissatisfaction and LDL-c, in addition to a significant increase in musculoskeletal mass (MME), VO2max, and HDL-c.

In the study by Popowczak et al., (2022), the relationship between anthropometric measurements, such as body height and body mass index (BMI), and two motor skills change speed (CODS) and agility (GA) was evaluated, and was analyzed after a preparatory period and followed strict ethical standards, including approval by the bioethics committee and obtaining written informed consent from all participants, having as results that the functional forms of these relationships differed between the sports disciplines, in the case of CODS, handball had a quadratic relationship found, this analysis revealed distinct patterns of association between anthropometric measurements and motor skills, depending on the sport practiced, and it was found that anthropometric measurements were significantly associated with the results of the change of direction (CODS) and agility (GA) tests only in female players of handball (HB).

One study evaluated the EMG (electromyography) characteristics of the hamstring muscles during the execution of the Nordic Hamstring Exercise (NHE) exercise and the capacities of the hamstring muscles, momentum, optimal knee angle and the height of the Counter Movement Jump (CMJ), being analyzed the jump with countermovement (CMJ), the eccentric thrust of the hamstrings, the peak torque and the angle of the peak torque before, during and after the training period, with the results of eccentric hamstring drive improved in both legs after 10 weeks in both groups. After 20 weeks, eccentric drive remained unchanged in the NHE group but decreased in the control group, and it was found that NHE should be incorporated into regular player training

to improve hamstring eccentric strength, which is relevant in injury prevention and the development of functional performance (Váczi et al., 2022).

In the work of Ermidis et al., (2021), exercise intensity and technical involvement were evaluated, in addition to comparing genders in handball during different game formats, analyzing formats that included S3 + 1 (3 vs. 3 + offensive goalkeepers on a small field), S4 (4 vs. 4 on a small field), M4 (4 vs. 4 on a medium-sized field), M5 (5 vs. 5 in medium size) and L5 (5 vs. 5 in a large field), with the results that the practice of handball in different game formats provides adequate exercise intensity, contributing to their health and physical development and it was found that, in all game formats, the physical load seems to be similar, But in the larger fields, the physiological load was greater. In addition, smaller pitches and fewer players resulted in small changes in physiological load, but increased the technical involvement of the players, which can be beneficial for the development of their technical skills.

In the study by Ageberg et al., (2020), the development of the I-PROTECT model was evaluated, which aims to provide evidence- and theory-based injury prevention training, adapted to the context of youth handball, along with an implementation strategy, and the RE-AIM SSM framework was analyzed to design and evaluate implementation outcomes at individual and organizational levels, The results will be conducted with coaches and players of different age groups to deeply understand the feasibility, acceptability and usability of the program, as well as any barriers to adoption and sustainability, and it has been found that the involvement of end-users, both at an individual and organizational level, is crucial in the process of developing a successful intervention, such as injury prevention training.

In another work, it was evaluated how to increase the knowledge about the importance of these abilities in women's handball, determine which factors influence these skills and identify those that significantly differentiate the results in the psychomotor tests, being analyzed computer tests, including Simple Reaction Time Test (SIRT), Choice Reaction Time Test (CHORT), Hand-Eye Coordination Test and Spatial Anticipation Test (SPANT), to assess psychomotor skills, with statistically significant differences in reaction and movement times between handball players at different levels of competition, and it was found that there is a relationship between BMI and body fat percentage of handball players and movement time measured in the tests (Śliz et al., 2022).

Also Falch et al., (2022), evaluated how to determine which training modality was most effective for improving performance in specific CODs for handball, strength training or plyometric training, being analyzed in a within-subject design with pre- and post-training measurements to investigate the impact of strength training and plyometric training on the performance of strength

and speed-oriented direction changes (COD) in female team sports athletes, both groups were found to have improved in strength tests, plyometrics, and 30-meter sprints, but the lack of specific training for key COD muscles may have limited improvements in this specific skill, and both types of training were found to be effective in improving other physical skills in young female handball players, It is recommended to use squat variations that target the knee flexors and hip extensors, along with hamstring-specific training to improve deceleration abilities.

In the study by Torabi et al. (2022), they evaluated the kinematics and patterns of muscle activation during standing handball throws to examine whether there were differences in throwing technique and neuromuscular activation patterns between healthy handball players and those suffering from shoulder pain, being analyzed tests that were conducted in a biomechanics laboratory using eight Vicon T4 infrared cameras, The joint angles were calculated based on the positions of the markers, with the results of which no significant differences were found in the maximum angles and angles of ball launch between the groups. However, the no-pain group had the maximal shoulder flexion compared to the pain-bearing group, and it was found that the group with shoulder pain had the maximum shoulder extension and maximal external rotation of the shoulder occurring earlier during the throw, compared to the group without shoulder pain.

Another study evaluated the changes in the muscle strength of the lower extremities in players, being analyzed the evaluation of the bilateral isokinetic strength of the knees of elite handball players over three seasonal periods, the evaluation of strength was performed with an isokinetic dynamometer and included knee extensors and flexors in concentric and eccentric reciprocal actions, As a result, the bilateral concentric strength deficit decreased after the rest period followed by individual and group conditioning, compared to the test carried out during the season, also with a significant effect, and it was found that the conditioning program needs to be improved, especially in the area of specific exercises for the lower limbs, in order to further improve the development of muscle strength during the off-season period (Gonosova et al., 2018).

In the study by Hagman et al., (2021), the relationship between the practice of physical activity and its effects on healthy aging, telomere length, and mitochondrial function was evaluated, and untrained young people, elderly handball players, and untrained elderly controls were analyzed. From resting blood samples, mononuclear cells (MNCs) were isolated and sorted into monocytes and lymphocytes, with the results that lifelong handball training in elderly women are associated with anti-aging mechanisms in leukocytes, and it was found that lifelong involvement in elite sports, such as handball, It may be associated with anti-aging mechanisms in blood cells, including preservation of telomere length and upper mitochondrial characteristics.

This highlights the importance of regular exercise in promoting healthy aging and maintaining cellular function.

4 CONCLUSION

Handball is a high-intensity team sport that requires specific skills, and is also characterized as a physical activity, in which it benefits collective well-being, with new recommendations emphasizing the importance of aerobic exercise and muscle strengthening, and practiced recreationally provides physical, emotional and social well-being. It was also shown to have a great gender inequality, access to health and social and economic participation, as well as challenges in terms of infrastructure, opportunities for competition. Self-awareness can help people enjoy life better and seek new challenges, social support plays an important role in reducing depressive symptoms, and physical activity is key to physical and mental well-being, with specific recommendations for volumes and intensities.

Handball practiced in a performance way is effective in improving cardiovascular fitness, musculoskeletal fitness, body composition, motor coordination, among others. Team sports are beneficial for female practitioners, however, the job market in high-level handball is dominated by men in leadership positions, in which the existence of risk factors are cited, including movement limitations and muscle weakness, psychological factors affecting recovery from knee injuries, and the menstrual cycle can affect physical performance. The sports career involves transitions and social influences, in which gender stereotypes limit women's opportunities in sport and regardless of the intensity applied in training there will be beneficial results, however, even handball promoting quality of life, it can face challenges such as injuries and unforeseen events.

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