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A review of personality research in sport

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Abstract

Background and aim. The significant role of personality in sport is often emphasized. The purpose of this article is to review the research in sport psychology that has contributed to the understanding of relationships and potential avenues for research into personality traits in sport.

Material and method. The collected material consisted only of the works of sports psychologists available in Poland. The method of source materials analysis was used. Analysis with deductive reasoning and synthesis with inductive reasoning were used.

Results. The results of research on: the relationship between personality and sports discipline, the role of personality in combat, individual and team sports, the influence of personality on sports performance and motor skills, accidental studies of personality in sports and health psychology, developmental psychology, dietetics, and gender are presented.

Conclusions. Physical and sports activity affects the personality of people who train. Personality traits relate to long-term sport success, interpersonal relationships, and mental states of athletes before, during and after competition. In addition, they refer to the use of leisure time, strength and mobility in old age, and unhealthy, addictive physical behavior.

Key words: sport psychology, personality, sport, research

Introduction

Personality psychology aims to capture what makes various processes, dispositions and mental functions create a specific whole in a person, and their activity is coherent and integrated. In the field of physical culture - generally speaking - personality issues are raised

when describing and explaining various interindividual psychophysical properties and behaviors of people who exercise or pursue the goals of physical culture from the position of organizers, teachers and educators (Jarvis, 1999; Gracz, Sankowski, 2007). The theoretical background of research on personality in sport are factor theories, also called trait theories. The Big Five model is often used for this purpose. Personality traits describe relatively constant dispositions, hence the search for their manifestations in repeated patterns of behavior is more justified. The Big Five model explains socially and culturally important behaviors that usually depend on several personality traits in parallel (Buss & Craik, 1983; Wiggins, 1996). Therefore, the aim of this article is to review the research that has contributed to the understanding of relationships and potential research directions for personality traits in sport. The review presents the classic and innovative results of sports psychology research.

Personality and sports discipline

In 1977, Schurr and his team (1977) tested over 1,500 American students with the 16-Factor Personality Questionnaire to show associations between their involvement in sports, their choice of discipline, and their level of athletic performance and the personality traits measured. Research results showed differences between athletes and non-training. Athletes were more independent and objective, and exhibited less anxiety.

Later, Clingman and Hiliard (1987) found that particularly hardy athletes, who performed well in sports such as triathlon, were highly motivated, autonomous, dominated, and easily avoided harm. Also, Stroczyński (1988; 1992) conducted the same method of research among players of team sports games and confirmed the results of Schurr et al. (1977) - the surveyed athletes had a lower level of anxiety than the general population.

It was also found that the internship has an impact on the personality of high-class players (Rychta, 1982; Żyto-Sitkiewicz, 1993). The longer the competition period, the more clearly the personality of sportsmen is outlined, which distinguishes them from the general population - lower aggressiveness and anxiety. The shaping of the athlete's personality along with gaining experience is associated with the acquisition of skills to deal with stressful situations in sport (Norakidze, 1976).

Research by Rychta (1998a, 1998b) on the personality determinant of purposeful behavior in sport is important. The personality determinants of sports achievements in different disciplines are different. The results showed that the dimensions of goal, action and interpersonal relations were mutually varied with personality traits. This should be associated with the specificity of sports rivalry in the studied disciplines of individual and team sports, as well as slightly different psychological requirements that they set for competitors. It has been proven that sports activity shapes the personality and the developed personality traits have an impact on decision making (intentional behavior) in the starting situation. When taking up a sports task, a competitor knows his competences, knows what he can do and assumes that he can perform this task, regardless of the circumstances and difficulties on the part of the opponent.

Moreover, Kuk (1998) checked the relationship between personality and dimensions of purposeful behavior among students - athletes, measured by KCEL II Zaleski. It has been shown that neuroticism does not affect endeavor, with the exception of persistence of action. The less neurotic student athletes were more persistent than their more neurotic classmates. Purposeful behavior does not vary according to the level of extraversion and reactivity. Student athletes with a high lie score were more persistent, put more effort into achieving their goals, and had higher expectations. Subjects with high mobility of nervous processes were more persistent in action and more dependent on their partner while being more controlling. In the case of most dimensions of the need for achievement in sport, people with higher scores were willing to put more effort into achieving the goal, and estimated the

probability of achieving it higher. The subjects with high motivation to win set goals of subjectively high value, and in the case of the power of competition, they were more dependent on the partner and more strongly supported by him. Competition orientation did not differentiate the dimensions of purposeful behavior among student-athletes.

Differences in the value-to-behavior relations may result from the normative pressure on the performance of specific personality behaviors. Such findings suggest that values motivate behavior, but that the relationship between values and behavior is partially obscured by norms (Bardi, Schwartz, 2003).

Paunonen (2003) used measures of the Big Five factors to predict various criteria variables that represent the behavior of athletes of some social and cultural importance. The results showed significant consistency in the behavioral predictions across the Big Five ratings. These studies were confirmed by Marks and Bukowska (2012) in the Polish gymnastics community: the specificity of the sports discipline being practiced determines personality and behavior. In addition, it has been shown (Piepiora et al., 2020) that the sports technique, understood as the degree of stabilization of the kinematic and dynamic structure and disturbances in the performance of a motor activity, distinguishes the personalities of sportsmen. This confirms that athletes of various sports are characterized by different personality profiles.

A start under pressure for a sports result under stressful conditions was described by Hill and her team (2010). These researchers presented suggested mechanisms and potential moderators of 'choking in sport' and considered the role of personality as a factor in relieving pressure. In this idea, Allen and his team (2011) investigated the main and interactive effects of the Great Five Dimensions of Personality (NEO-FFI) on coping with stress (Kowalski and Crocker questionnaire) and compared the personality profiles of different groups of athletes. Extroverted athletes who were also emotionally stable and open to new experiences (tripartite interaction effect) showed greater use of coping strategies. Conscientious athletes (main effect), athletes with high levels of extraversion, openness to experience, and agreeableness (tripartite interaction effect), and athletes with low levels of openness to experiences and high rates of neuroticism (main effects), exhibited more frequent use of coping strategies. Different personality traits have been observed between upper and lower level athletes, between male and female athletes, and between individual and team sports athletes. These findings suggest that the five-factor personality model can help distinguish levels of sport involvement and can help identify stress-coping strategies that athletes can adopt when participating in competitive sports.

The relationship between personality and competitive sports with a high risk of health loss was also checked. McGill et al. (1986) observed people who trained rodeo and rock climbing and found that they were people with special thrill-seeking readiness and low levels of anxiety. Chirivella and Martinez (1994) undertook an interesting job. They compared tennis players (low risk), karate players (medium risk) and sailors (high risk). They showed significant differences, especially in the anxiety avoidance scale. Sailors collected significantly less points than the other disciplines. In turn, Kajtna and team (2004) examined the relationship between personality and competitive sports with a high risk of health loss, sports with a low risk of health loss and non-training using the NEO-FFI method. They proved that risk-taking athletes were characterized by a low index of neuroticism in relation to other respondents, while the remaining athletes were distinguished by high conscientiousness and openness to experiences compared to other respondents.

Tok (2013) re-examined the relationship between the personality of athletes and sports disciplines with high health risk. It has been shown that "risky athletes" are characterized by a much higher level of extraversion and openness to experience, and a lower level of conscientiousness and neuroticism compared to non-training. McEwan and team (2019)

performed a meta-analysis of the relationships between personality traits and participation in high-risk sports. A total of 149 effect sizes were obtained from 39 eligible studies in which the personality traits of participants in high-risk sports were compared with participants in low-risk sports and non-participants. The results revealed the magnitude of the effects in favor of high-risk athletes in seeking sensation, extraversion, and impulsivity. Significant sizes of effects were found in favor of the comparison groups for neuroticism (low level), dominance, and sensitivity. There were no significant differences in psychoticism, reward sensitivity, socialization, agreeableness, conscientiousness, and openness to experience. Therefore, measuring the personality traits of the Big Five can be a valuable way of assessing the propensity of people to engage in sports with various degrees of risk.

The relationship between personality and sports levels of football players was conducted by Krawczyński (2004). He tested first and second league players with the NEO-FFI questionnaire and found no differences in player personality profiles between leagues. He did not show any significant differences in terms of sports level in personality traits in football team players. Namely, footballers were low-neurotic, average open to experience and conciliatory, highly extroverted and conscientious (Krawczyński, 2004). Similar subjects with the NEO-FFI inventory were conducted by Piepiora and Kaśków (2019), but on groups of first, second and third league volleyball players. It turned out that the first league volleyball players (professionals) showed a lower level of neuroticism and higher rates of extraversion and conscientiousness than players from the third league (amateurs). There were no differences between the first (professional) and second (professional) leagues. This shows that there are differences in the personalities of athletes depending on the level of sport advancement.

Personality and martial arts

In the martial arts group, Horbulewicz (1979) studied the influence of anxiety on the performance of judokas. He showed that emotional stability has a significant impact on the bravery of judokas, and may translate into effectiveness in combat. Also, Żyto-Sitkiewicz (1981) studied judo and freestyle wrestling players and found no statistically significant differences in personality components between the studied samples. The research by Sieka, Terelak and Bielecki (1988) shows that advanced and beginner karate players differed in a statistically significant way in terms of anxiety as a personality trait. More experienced people were characterized by a lower intensity of this feature.

On the other hand, Poczwardowski and Makurat (1993), in their research on judoka, did not establish any characteristic personality traits for championship level players. In studies of karate players and people practicing jujitsu (Baczyńska, Biernacka, 2001), the difference in the intensity of the level of extroversion between people training and not training these martial arts turned out to be statistically insignificant, although people training martial arts had a higher level of extroversion than people who did not practice sports at all. Moreover, it has been shown that in combat sports competitors the intensity of only individual dimensions of extraversion in relation to amateurs is higher. Amateurs who do not compete in sports are not put in a win-win situation facing a person with the same goal, and in addition, as determined as they are. They only exercise during training, under controlled conditions. They train mainly to relieve stress, maintain health and fitness, and to acquire self-defense skills (Lickiewicz, 2006). But as Watson and Pulford (2004) found, amateurs scored more on the extraversion and psychotic scales than non-athletes. It should be assumed that this is because during the training there are sparring, which are associated with hitting and receiving blows.

In another study by Botwin (2004), he showed that wrestlers were more active, extroverted, and neurotic than players in team sports games. Moreover, it has been shown (Bernatek et al., 2006) that competitors of combat sports and team sports games differ significantly in those

personality traits that are most biologically determined, suggesting that there is natural selection at the stage of enrollment in the sport.

Whereas Wcisło (2007) proved that kickboxing training can have a positive impact on the development of an individual's personality. The greatest influence was noted in the volitional and physical spheres, followed by the socio-moral sphere, and the lowest in the emotional sphere. It has been proven that kickboxing training helps to reduce aggressiveness, develop willpower, perseverance and patience, and increases self-control and self-confidence.

Fuller (2011) presented an interesting work. The results of research on the personality, views and behaviors of martial artists generally indicate positive psychological effects of mental training. Clinical and psychotherapeutic applications are still in the exploratory stage, but appear to be promising. The psychological aspects of the art of aikido were presented as an example of a model personality moderator (low neuroticism, high-level other traits) and the future application of martial arts principles as systemic or supportive therapy was considered.

In an avant-garde study by Binbog and team (2012), they examined the relationship between psychophysiological arousal, cognitive anxiety, and personality traits in young taekwondo athletes. The NEO-FFI personality questionnaire and the State-Trait Anxiety Inventory (STAI) scale were used to measure personality and cognitive state. Electrodermal activity (EDA) was measured twice, one day and approximately one hour before the competition, to determine psychophysiological excitement. Several aspects of the Big Five were related to the EDA delta scores, which were measured both one day and one hour before the competition. Stepwise regression analyzes were performed to see if personality traits could significantly predict both delta EDA scores. The final model, containing only the neuroticism of the Big Five factors, could greatly explain the differences in delta EDA scores measured the day before the competition. Agreeableness can greatly explain the variation in delta EDA scores measured one hour prior to the competition. There was no relationship between cognitive anxiety and delta EDA scores measured one hour before the competition. It has been found that agreeableness and neuroticism in particular can be useful in understanding the arousal response to competition.

In addition, Unrug and Malesza (2012) tested players of muay thai, kickboxing, Brazilian jiu-jitsu, kravmagai and MMA training amateur and competitive for temperamental traits with the FCZ-KT questionnaire (Formal Characteristics of Behavior - Temperament Questionnaire) by Zawadzki and Strelau; personality traits using the Eysenck and Barrett EPQ-R (Eysenck Personality Questionnaire-Revised); and the level of anxiety with the STAI Spielberg questionnaire. They found differences between the amateur and the competitive group in terms of certain personality and temperamental traits. In particular, martial arts fighters showed higher levels of psychoticism and sensory sensitivity, and lower levels of extraversion than amateurs.

A year later, Tomczak and his team (2013) presented a juxtaposition of personalities with various styles of coping with stress in wrestlers from the Polish national team of cadets. The results of the NEO-FFI personality inventory were compared with the CISS (Coping Inventory of Stressful Situations) questionnaire by Endler and Parker. The wrestlers were characterized by low neuroticism and openness to experience, as well as high extraversion and conscientiousness compared to the general population. In difficult situations, wrestlers showed a style of coping with avoidance. Wrestlers with high neuroticism and low conscientiousness preferred coping with emotions and tasks. Moreover, male wrestlers with greater conscientiousness showed a preference for coping with tasks, as opposed to wrestlers with lower conscientiousness. Wrestlers were characterized by a style of dealing with emotions. This study found that personality was a good predictor for coping with styles in wrestlers.

Similar results of the relationship between personality (NEO-FFI) and the style of coping with stress (CISS) were shown in the group of professional dancers Kowal (2011). This means that we can try to relate the results of wrestlers and dancers to the population of individual athletes. Giacobbi and Weinberg (2000) presented similar results in team sports. Accurate diagnosis of personality type in the early stages of training can help identify the tendency of athletes to develop less adaptive coping strategies for stressful situations, which is characteristic of more neurotic and less conscientious athletes. Also Boostani and team (2013) attributed a significant role to personality in the mental takeover of initiative in martial arts on the example of karate.

Directional research using the NEO-FFI method in the karate environment was carried out by Piepiora and his team (Piepiora, 2015; Piepiora, Piepiora, 2015; Piepiora, et al., 2015; Piepiora et al., 2016a; Piepiora, et al., 2016b; Piepiora et al., 2018b). Outstanding Polish kumite players from five styles took part in the experiment: Olympic karate, shotokan, kyokushin, Oyama, and shidokan. Karate personality was shown to be dependent on the style they trained. Thus, personality may be conditioned by the specificity of the trained sport discipline. Also, personality selection cannot be ruled out. Then the results of all world championship medalists were compared with the rest of the karate fighters. Masters was characterized by a significantly lower rate of neuroticism than the rest of the respondents. Similar results were obtained by Litwiniuk with his team (2019) when examining players from traditional karate, kyokushin karate, taekwondo and aikido adepts. Karate kyokushin fighters showed the highest negative indicators of personality traits from the point of view of social norms. And in aikido practitioners, the opposite personality profile was found. Therefore, recommending aikido and martial arts as well as combat sports that prefer mild combat means as "life sports" for everyone fulfill the mission of effectively strengthening all dimensions of health and survival (Litwiniuk et al., 2019).

Personality and individual and team sports

Research into the differences between individual and team sports has also proved important. Krawczyński (1998) examined the personality traits and achievement motivation by Gough and Heilburn's ACL (Adjective Check List) test and Gil and Deter SOQ (Sport Orientation Questionnaire) in groups of football players (youngsters) and table tennis players (cadets). Football players, compared to tennis players, were more persistent in every action taken. Their personality image was more in line with the ideal. These players were more masculine and had more characteristics of adults: they were less aggressive, they were less involved in activities that could hurt others, they expressed less inferiority, which manifests itself as self-criticism, guilt or attribution of ineptitude, and possessed more characteristics of adults than of an adapted child, even though they were younger in age. There were no significant differences in competition, motivation for winning and motivation for the goal between the studied football and table tennis players.

Shrivastava and team (2010) reported the experiment of high-performance athletes from a variety of sports. It has been shown that team sports players were distinguished by a high level of extraversion in relation to athletes of individual disciplines. The remaining markers were varied. In the same year, Nia and Besharat (2010) examined the personality traits of athletes in individual and team sports with the NEO-PI-R (NEO Personality Inventory-Revised) and SAS (Sociotropy-Autonomy Scale) questionnaires. The results showed that individual athletes achieved significantly higher scores in terms of conscientiousness and autonomy than team athletes. Team athletes achieved significantly higher scores of agreeableness and sociotropy than individual athletes. There was no significant difference between the two groups in terms of neuroticism, extraversion, and openness to experience.

Also Ilyasi and Salehian (2011) examined the personalities of individual athletes (judo, weightlifting, mountain climbing) and team sports (volleyball and basketball) using the NEO questionnaire. Athletes in individual disciplines showed a greater level of extraversion, openness to experience, and conscientiousness than athletes in team sports. Later, Piepiora and colleagues (2017a, 2017b, 2018a) tested swimmers and volleyball players at the junior stage with the NEO-FFI questionnaire and found a higher level of conscientiousness in swimmers compared to volleyball players.

In another study, Piepiora and Witkowski (2018) tried to create psychological personality profiles of athletes practicing individual and team disciplines, depending on the type of pressure exerted on the opponent in the starting situation. The selected criterion for the division into types of pressure exerted on the opponent was physical contact with the opponent during the competition. The NEO-FFI questionnaire was used to examine players of individual sports: bodybuilding (indirect contact), Olympic karate (direct contact) and team sports: volleyball (indirect contact), football (direct contact). Differences were found in the scales of neuroticism and conscientiousness between sports disciplines where pressure is exerted indirectly on the opponent from disciplines with the pressure exerted directly on the opponent. The study groups, with the exception of the volleyball players and footballers, differed from each other in terms of neuroticism, while the volleyball players showed less agreeableness and conscientiousness than other athletes. These results showed further differences between individual and team disciplines.

Further research with the NEO-FFI questionnaire in this area was carried out by Piepiora (2019) among professional athletes from six sports disciplines, i.e. luge, tennis, wrestling, team mountaineering, volleyball and rugby. He stated that the behavior of athletes depends on the type of contact between the sports discipline. Personality profiles are specific to the requirements of a given sport and are consistent with the average behavior profile of all athletes, characterized by high conscientiousness and extraversion, average openness to experience and agreeableness. The indicator differentiating the personality of athletes in terms of the type of contact between the sports discipline was neuroticism. In the next stage of the research (Piepiora et al., 2019d), personality profiles of athletes training endurance disciplines - long-distance running (individual sport) and football (team sport) were checked. Higher levels of neuroticism and extraversion were shown in soccer players, while conscientiousness was higher in runners. This showed significant discrepancies between individual and team sports (Piepiora et al., 2019b, 2019c, 2019d). In addition (Piepiora, Petecka, 2020), seniors from contact sports were examined: kumite karate kyokushin players (individual sport) and female handball super league players (team sport). Kyokushin karate senior women showed a significantly higher level of openness to experience than handball players.

Personality and sports score

It was also checked whether personality traits could be used as predictors of sports results. Tutko and Ogilvie (1966) made the first attempts to use personality to identify successful athletes. They found that athletes achieved high scores on eleven personality traits: aggressiveness, ability to train others, dominance, conscientiousness, consistency, persistence, energetic, emotional differentiation, mental resilience, and trust. On this basis, they developed an AMI (Athletic Motivation Inventory) scale to measure the eleven previously mentioned personality traits that are key to sports performance. Unfortunately, in retrospect, this method has failed to distinguish between successful and non-successful athletes and is considered unreliable.

Garland and Barry (1990) reported to an experiment of American college athletes varying in physical fitness and athletic level to test the relationship between personality as measured by the 16-Factor Personality Questionnaire and athlete performance. It was shown that

personality traits such as belief rigidity, extraversion, group dependence and emotional stability were responsible in 29% of variations in physical fitness. Davis (1991), on the other hand, tried to predict the success of professional hockey players by measuring their personality traits, but found no connection here. He believed that success was influenced by more important psychophysical factors.

On the other hand, Krawczyński (1991a, 1991b, 1993, 1995) pointed out that anxiety, which is a component of neuroticism and appears both before and during the competition, is one of the most frequently studied emotions characteristic of sports competition. It is ubiquitous in the professional life of every athlete, and its impact is highly controversial due to inconclusive research results. Observing the players, it can be noticed that on the one hand, the perceived pre-start tension may motivate them to act, on the other hand - paralyze them at the moment of the start and disorganize the performed activities. Krawczyński stated that the determination of the orientation of anxiety is a better predictor of the level of sports achievement than analyzing only its intensity. Therefore, it can be assumed that the higher the level of the trait of anxiety in players, the lower their sports results. The level of sports achievements increases with the increase in the intensity of somatic anxiety until it reaches the optimal point, after which it decreases. The higher the intensity of cognitive anxiety, the lower the level of athletic performance. The more the experienced anxiety is assessed by the player as mobilizing, the higher the level of sports achievement.

In another study, Lerner and Locke (1995) measured the willingness of American college athletes to compete in relation to achievement motivation. To this end, they used the SOQ questionnaire and measured endurance by performing squats. As in Garland and Barry (1990), a relationship was found between personality and success. Psychological factors such as goal setting and self-efficacy have been shown to justify the influence of personality on athletic performance.

In a cutting-edge experiment, Piedmont et al. (1999) included four different Division 1 NCAA football teams in the NEO-FFI study. Trainers' evaluations were also collected on several dimensions of performance and actual game statistics. Regression analyzes indicated that personality dimensions of neuroticism and conscientiousness explained about 23% of the variance ratings of the trainers ratings, while conscientiousness was the only predictor of actual game statistics, explaining about 8% of the variance.

Basiaga-Pasterniak (2000; 2007) analyzed the personality types of football players (juniors) and found that the personality of footballers significantly correlates with a low level of anxiety and is one of the main components of the motivation of young athletes. Similar results were shown by Wlazło (2001) among athletes - students of the coaching specialties of AWF Wrocław. The athletes were characterized by low levels of drug and neuroticism. On the other hand, units belonging to the national team showed even lower indicators of anxiety and neuroticism in relation to the studied sample.

Slightly different research work was carried out by McKelvie and the team (2003) using the Eysenck personality inventory on groups of university athletes divided into contact and non-contact disciplines as well as non-athletes. Extraversion did not differ significantly between athletes and non-athletes, and between contact and non-contact athletes, but was higher for athletes overall compared to American academic standards. For neuroticism, athletes scored significantly lower than non-athletes. Because neither extraversion nor neuroticism has changed over the four years of continuous research, it has been concluded that people with higher extraversion and lower neuroticism are interested in academically active sports. Similar results were obtained by Mikołajczyk (2004) - physically active people differ in a high level of conscientiousness from physically inactive people, while athletes are distinguished from the rest by low neuroticism and high extroversion.

In another study, Anghel and the team (2009) showed that the personality traits of elite athletes were dependent on and distinctive for the trained sport discipline. The athletes were characterized by low neuroticism, high extraversion and conscientiousness, but the intensity of individual personality traits depended on the trained sport discipline. This indicates the existence of a general personality profile of athletes, in which the intensification of personality traits is determined by sports disciplines.

Mirzaei et al. (2013) made further attempts to investigate the relationship between personality traits and sports performance in the Big Five model. The population covers more than 200 non-elite soccer players and futsal soccer players. It was shown that among the personality traits only conscientiousness had a significant correlation with sports performance - only conscientiousness was the only predictor of sports performance.

Later, Kim with the team (2018) conducted an experiment on a sample of team sports players and showed that low neuroticism, high extraversion and conscientiousness all influence informal role-taking in a sports team-dependent manner. In the same year, Steca and the team (2018) examined the Big Five of over 800 non-training and athletes. It has been shown that the most successful athletes in their sports discipline achieved higher scores than the untrained in every dimension of the Big Five personality except neuroticism - lower scores. In contrast, unsuccessful athletes outperformed those who did not train only in extraversion and agreeableness. Athletes who were significantly successful in competitive sports (champions) showed greater emotional stability (lower neuroticism), extraversion, openness to experience, agreeableness and conscientiousness than less effective athletes. Individual athletes turned out to be more energetic and open-minded than team athletes.

Personality and motor skills

Research on the relationship between the personality and motor skills of an athlete is also important. Borysiuk (2002) showed that the sports level of the fencers of the Olympic group is significantly determined by the coordination skills and personality characteristics. In the junior group, the level of extraversion and spatial orientation had the greatest impact on the level of professional development. The greatest area of common variation (14.8%) was constituted by the factor of body structure, followed by the factor of personality characteristics (11.9%) and the factor of fencing efficiency (11.4%).

And Tolea and team (2012) verified the relationships between personality measured in the five-factor model, physical activity and muscle strength, which were assessed using data from the Baltimore Longitudinal Aging Study. Researchers used general linear modeling for age, gender, race and body mass index, and a bootstrap for mediation. They found that neuroticism and most of its aspects negatively correlated with strength. The extraversion domain and its aspects of warmth, activity, and positive emotions were positively correlated with strength, irrespective of covariates. The results of the mediation analysis suggest that these associations are partly explained by the level of physical activity. The findings extend the evidence of the relationship between personality and physical function to its strength component and point to health behavior as an important path.

Later, Van Puyenbroeck and the team (2020) explored the role of the Big Five model and impressive narcissism in positive and negative terms in elite sports teams. Players from six field hockey and seven korfbal teams were judged over four weeks. The personality of the players was related to their reported voice frequency, the voice frequency perceived by all team members (different ratings) and the degree to which the players gave their voice. It was shown that extraversion was positively related to the frequency of positive and negative voices of players. Other traits, such as conscientiousness and emotional stability, only applied to positive or negative voice types, respectively. Not all personalities were consistent in judging their own voice compared to how others perceived it. Interestingly, traits like

extraversion, emotional stability, and the aggressive aspect of narcissism were found to predict voice transmission. This study demonstrated the importance of personality to the frequency of players of the varied set of positive and negative voices and the extent to which they function as 'gates' that implicitly transmit the voice. In addition, the results showed a perspective on how specific individuals perceive their vocal behavior in relation to the perception of their vocal behavior by team members. Thus, this research is the first step in identifying players who can potentially threaten or strengthen the team in a clear or subtle, but above all, influential way.

Personality in sport and health psychology

Research on personality in sport has been in the area of health psychology. Rychta and team (1992) indicated that the use of illegal substances in sport brings not only the expected effects, but also the risk of personality disorders. Most athletes do not know how much negative impact the regular use of such substances would have on their health. Among amateur athletes, there is a much greater belief that individual doping substances can have a large negative impact on human health if they are used regularly. Only a few competitive athletes believe that regular doping would not have any harmful effect on their mental health. Backmand and the team (2003) undertook a study of the personality and mood of former senior athletes with the Big Five and BSI 53 (Brief Symptom Inventory). Representatives of Finland from 1920–1965 were examined and divided into four groups: endurance sports, combat sports, team sports, and shooting sports. In addition, untrained 20-year-old men were tested as the reference sample. Researchers found group differences in extraversion, neuroticism, and life satisfaction, but not in hostility. Athletes who participated in combat sports and team sports were more extroverted than the rest of the subjects. Endurance and shooting athletes had lower neuroticism scores than the reference sample. Endurance, combat, team, and shooting sports players were more satisfied with their lives than the rest of the population. Differences in depression were also statistically significant between the groups as the population reference scores showed higher markers than the endurance and team sports groups. Former athletes differed from unsportsmen in some personality traits and a tendency to depression. This relationship was also confirmed by A. Wieteska (2017) in the group of sports adolescents – physical activity in late age was associated with lower anxiety states.

In another experiment, Shipley and team (2007) examined the effects of neuroticism and extraversion on all cause and cause-related mortality over 21 years after risk factor control. Participants were members of the Health and Lifestyle Survey, a UK national sample of 9003 adults from all walks of life, including athletes. Early (1984–1985) subjects completed a sociodemographic and health questionnaire, underwent a physical health test, and completed an Eysenck personality inventory. Mortality was assessed for 21 years from baseline. A total of 5,424 people had complete data. Researchers found that high neuroticism was significantly associated with the risk of death from cardiovascular disease. The effect of neuroticism on death from cardiovascular diseases resulted from sociodemographic factors, physical activity undertaken, health behavior, and physiological factors.

On the other hand, Rutkowska (2007, 2014) showed that there are no significant differences in personality profiles between non-disabled and non-disabled athletes. This shows sports activity as an important determinant of personality development and a determinant of sports selection. On the other hand, Botwina and Kowalik (2013) described that the sport of disabled people is a great opportunity to discover the possibilities of one's own development in the area of improving one's own motor skills. Moreover, the sport of disabled people allows you to compare your own sports achievements with those of other people in a similar life situation. It has been pointed out that the obstacles that a disabled athlete has to overcome in achieving

success in sports are unimaginable. Those who followed this path proved their own mental resilience and were ready to take up new life tasks posed by sports training at a competitive level. Sport also shapes the psyche of people with disabilities. It is in the minds of people with disabilities that their fate is most decisive (Więclaw, Kochanowski, 2017).

An important experiment was carried out by Terracciano and the team (2013). They investigated the relationship between personality traits and energy expenditure at rest (basal metabolism) and during normal and maximal prolonged walking. Personality traits and oxygen consumption (VO₂) were assessed in over 600 participants in the Longitudinal of Aging study in Baltimore. The results indicated that personality traits were mostly unrelated to resting metabolic rate and energy expenditure at normal walking pace. However, those with lower neuroticism scores and higher extroversion, openness to experience, and conscientiousness had significantly higher energy expenditure at peak walking pace. In addition to greater aerobic capacity, people with a more athletic personality profile walked faster and were more productive because they required less energy per meter traveled. The relationship between personality and energy expenditure was not moderated by age or gender, but was partially explained by the proportion of fat mass. Thus, personality differences may be most significant in more challenging activities that require cardiopulmonary fitness. These findings suggest potential pathways between personality, physical activity and a healthy lifestyle.

Sports psychology additionally provides an approach to understanding various aspects of tourism. Ekinci and Hosany (2006) adopted the Aaker Personality Scale. The study aimed to find out whether tourists attributed personality traits to tourism purposes. The results of the study indicated that the perception of the target personality was three-dimensional: sincere, exciting and extroverted. The study also showed that the personality of tourists has a positive impact on the perceived image of the destination and the intention to recommend. In particular, the dimension of extraversion softened the impact of cognitive image on the intention of tourists to recommend. In contrast, Mirehie and Gibson (2020) examined the personality and well-being associated with snow tourism among women. A larger study based on mixed methods assessed the usefulness of the PERMA system (positive emotions, commitment, relationships, relevance and achievement) as a tool to measure well-being in the context of active sports tourism. It was shown that women who traveled to participate in snow sports felt better than those who participated locally. Hierarchical multiple regression showed a positive relationship between shorter frequent trips and higher well-being.

Personality in sport and developmental psychology

Research in sports psychology also took place in the area of developmental psychology. Lipowski (1996, 1998) studied children practicing gymnastics, swimming and non-training primary school students using the I-E scale to test the Sense of Localization of Control in Children by Nowicki and Strickland. Lipowski stated (after: Reykowski, 1975) that the behavior of a young athlete in a training situation or a student in physical education lessons is significantly influenced by the extent to which a given individual makes himself the cause of specific results. The complex structure of the personality influences the occurrence of these and not other behaviors in a specific situation and directs the behavior of the individual. The locus of control is a personality dimension that is part of the internal functional organization that regulates human relations with the environment. Children with a sense of their own authorship strive to achieve the goal with greater commitment, better than people with a sense of external control use the situation to increase the effectiveness of their actions, they look for information more actively, they are more perceptive in new situations. People who feel that they have little influence on what will happen in the future will be less likely to change it. Lipowski (1999) also stated that sport promotes a child's physical, mental, emotional and

social development. But the factors that disrupt or support this development are parents, trainers and physical education teachers. Moreover, Lipowski (2004) showed that self-esteem has a significant influence on the formation of the personality of a young athlete. Low self-esteem, a sense of self-incompetence can reduce activity, sometimes causing complete passivity caused by a lack of faith in the possibility of achieving success. When a child's self-esteem is positive, unchallenged, the energy that a young competitor would have to spend on fighting negative emotions can channel into improvement on the way to sports championship. In another study, Soto and the team (2008) examined the developmental trends of physically active people from late childhood (at the age of 10) to early adulthood (at the age of 20) year by year. During this period, the increase in the intensity of extraversion was significant. On the other hand, agreeableness and conscientiousness changed with age. Neuroticism and openness to experience showed moderate consistent growth. These findings have important implications for the study of personality traits and other psychological attributes in childhood and adolescence.

In an interesting study, Blecharz and Siekańska (2009) indicated that sport brings benefits in shaping the personality of a young athlete. Undoubtedly, it stimulates physical development, teaches cooperation, independence and self-discipline. It allows children to experience the joy of physical activity, teaches them how to deal with failures and successes, and encourages them to develop spontaneously a variety of skills, not only sports, which have a positive impact on the entire life of an individual.

Moreover, Siekańska (2012) described tips on how parents should effectively support children training sports. Namely, the pressure exerted by the parents can vary in intensity and cause different effects on the personality of the young athlete. Moderate pressure may be perceived positively by children, fathers' behavior is associated with children's sports activity, but it depends on their age and the specificity of the discipline. The atmosphere created by parents around their children is an important predictor of children's behavior in sports (GPSB - Good and Poor Sport Behaviors; LaVoi, Babkes-Stellino, 2008). Siekańska (2013) also focused on searching for some general regularities regarding the psychological and environmental conditions of the development of talented players. Selected factors and circumstances were analyzed. It was indicated that, inter alia, personality determined by the environment influences the course of development and the level of competence of gifted players.

On the other hand, Rychta (2013) examined the individual predispositions of teenagers training and non-training team sports. For this purpose, he used the NEO-FFI questionnaire, measuring the motivation of Nishida's achievements in the physical education test (AMPET) and the KCEL-II questionnaire (Questionnaire of Achieving Goals) by Zaleski. The research showed, among other things, that adolescents who trained sports not by accident achieved higher scores in extraversion, agreeableness and conscientiousness, and also understood the importance of goal, effort, perseverance, satisfaction with achieved results and interpersonal relationships with the trainer. This research group of athletes also achieved higher motivation indicators for: learning strategy, overcoming obstacles, diligence and responsibility, sense of competence and learning value, with lower results of fear of success and fear of failure. It is worth noting that statistically significant correlations between the studied predispositions occurred more often in the group practicing sports and were consistent with each other in most cases.

Personality in sport and dietetics

Researchers also undertook to verify the relationship between a dietitian and personality. Piepiora and the team (2017e) examined the connections between the personality and the eating habits of the Polish wrestler cardinal youth with the NEO-FFI questionnaire and their own questionnaire. The comparison groups were volleyball players and tennis players. All the

players were younger and represented a similar sports level. Within each of the disciplines, after analyzing the questionnaire regarding eating habits, the players were divided into two groups: those who pay attention to the quality of their nutrition (they follow a diet) and players for whom the diet is not significant (they do not follow a diet). The conducted study showed no relationship between personality and eating habits, both in the Polish youth punishment of wrestlers and in control groups.

Later, the same research team (Piepiora et al., 2017d) examined the relationship between the personality and body composition of female national wrestlers. The results of the NEO-FFI questionnaire were compared with the body composition analysis performed with the TANITA BC-418 analyzer. The conducted research showed no relationship between the personality and body composition of female national wrestlers. Then the same group of scientists (Piepiora et al., 2017c) undertook a study of the correlation between personality, body weight and adipose tissue level on a group of volleyball players - younger juniors. The research was carried out with the same methods as before. The study showed no relationship between the personality and body fat level of the players. In contrast, volleyball players with a higher level of conscientiousness were characterized by lower body weight. This study marked further directions of research. Another study was carried out by Piepiora and colleagues (2019f) among tennis players at the junior stage. The aim of the research was to check the relationship between individual personality traits and the subjective assessment of the body weight of tennis players. The research was carried out with the NEO-FFI questionnaire and a questionnaire created for this study. It was shown that all tennis players were characterized by a low level of neuroticism and agreeableness, a medium level of extraversion and openness to experience, and a high level of conscientiousness. There was no relationship between the personality and the subjective assessment of the body weight of tennis players.

Personality in sport and gender

The relationship between personality and gender has also been the subject of research in sports psychology. Rychta and Wysocka (1988) examined the personality of athletes and athletes using the NEO questionnaire. They found a higher rate of neuroticism in women than in men. In addition, the need for social approval and the localization of reinforcement control was evident in the players' personality structure. On the other hand, Mroczkowska and Kownacka (2004) showed that women training martial arts were more active and lively, and also showed higher perseverance and emotional reactivity than women who did not train sports. Piepiora and the team (2019e) checked this relationship in the groups of ultimate frisbee players with the NEO-FFI questionnaire. It was shown that women had significantly higher levels of neuroticism than men. The remaining personality indicators were at the average level. In another study, Piepiora and the team (2019a) verified the personality of Olympic archery players in relation to life records and other shooting disciplines. The personality of Olympic archery players was characterized by high diligence. The top archers showed a slightly higher rate of conscientiousness and a lower rate of openness to experience than the rest of the women, while the top archers showed lower extraversion, openness to experience, and agreeableness compared to the rest of the men. The level of diligence turned out to be insignificant for the amount of the life record achieved by members of the national team. The athletes of the Olympic archery were slightly different from each other. Women showed greater intensity of extraversion and conscientiousness, while men showed openness to experiences. Neuroticism and agreeableness in these samples were similar. Archers and female archers who achieved high life scores showed a tendency to be less open to experience and agreeable. There were high rates of conscientiousness in all athletes. The personality profile of Olympic archers differed slightly from that of sports shooters and biathletes. The

rate of neuroticism was highest among the biathletes. Sport shooters were highly open to experience, while biathletes were low. Extraversion, agreeableness and conscientiousness were on a similar level in all three groups of athletes.

End

Physical and sport activity influences the personality of people who train (compare: Rychta, 2001; Allen et al., 2013; Allen, Laborde, 2014; Kang et al., 2016). In the context of athletic performance, personality traits relate to long-term sports success, interpersonal relationships, and the mental states of athletes before, during and after competition. In the context of exercise related to health, personality traits relate to leisure management, strength and mobility in old age, and unhealthy, addictive physical behavior.

Research on personality in sport is extremely popular because it is useful in diagnosing the psychological image of individual athletes. Thanks to this, the psychologist can determine the problems that a given player has to deal with. The personality diagnosis allows for the definition of the image of good, desired, strong and weak features of a given player. Such information is extremely important for trainers because thanks to it they can guide their pupils in an appropriate and most beneficial way. The trainer's lack of knowledge about the specific features and personality structure of representatives of various sports may adversely affect the sports development of players and manifest itself in artificial and ineffective activities.

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