Available online at www.HighTechJournal.org

HighTech and Innovation Journal

ISSN: 2723-9535

Vol. 4, No. 2, June, 2023

Descriptive Statistical Analysis of the Coach-Player Relationship with CART-Q and SCI

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Received 09 March 2023; Revised 14 May 2023; Accepted 21 May 2023; Published 01 June 2023

Abstract

Providing maximum performance in a long-term competitive load is associated with a quality relationship between the player and his coach. A coach plays one of the most important roles in an athlete's sports career and has the potential to positively or negatively impact the mental health of athletes. The aim of the presented paper is to map the bond between the quality of the relationship between the player and the coach and the sports self-confidence of elite junior tennis players. The research sample consisted of 236 elite junior tennis players competing at the national and international levels. The average age was 17.2 years. Data collection was carried out using the questionnaire methods of the Coach-Athlete Relationship Questionnaire (CART-Q) and the Sport Confidence Inventory (SCI). The results found significant differences in the perception of the quality of the coaching relationship between Czech and foreign athletes. Gender differences were also found among Czech athletes. A significant relationship was found between the quality of the player-coach relationship and sports self-confidence. The results point to the connections between performance, mental well-being, and the quality of the relationship between the player and the coach and can be the basis for further studies and motivate coaches to think about whether there is a need to modify the ways of training and dealing with their athletes.

Keywords: Player Coach Relationship; Elite Junior Tennis; Sports Self-Confidence (SCI).

1. Introduction

Coaching is a behavioral process. Coaches represent a significant authority in the lives of athletes, and their work is based on communication with their clients. The relationship between the athlete and the coach affects the performance of both the athlete and the coach. Within this relationship, the thoughts, feelings, and behaviors of the participants are causally linked. Mutual interpersonal expectations and their fulfillment in the relationship between the athlete and the coach significantly influence performance and the development of the relationship [1]. The relationship between the coach and the athlete is influenced, among other things, by personality traits [2], and the success of a coach's work is inextricably linked to his communication skills [3]. Coaches' behaviors and leadership styles are related to the athletic performance of their clients [4–7]. The athlete's perceived authority of the coach is an important source of his self-evaluation, identity, and self-confidence [8]. This significant influence works mainly during childhood and adolescence. Coaches are the most important adult in a young athlete's life after parents; their role as a coach is changing depending on the athlete's age and performance, and they influence the athlete's growing autonomy [9]. This great power of the coaches over the players also means great responsibility and the potential for mistakes.

A coach-athlete relationship in which authenticity, trust, and closeness are fostered leads to the development of the athlete's full potential and to the support of his autonomy and self-confidence [10, 11]. Self-confidence is a reflection of

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http://dx.doi.org/10.28991/HIJ-2023-04-02-01

an athlete's current level of self-esteem. An athlete is confident when he likes himself and is satisfied with who he is, what he is, and what he can do. When he is convinced that he is worthy of the recognition and love of others. A stable, high level of self-confidence is important for both training and competition. The source of self-confidence can be one's own abilities, experience, effort invested by the athlete in the preparation, commitments, state of fitness, support of close people, feeling of physical attractiveness or being led by a good coach, and the relationship between the athlete and the coach.

The demands placed on a coach's personality and his skills are high and require his ability to adapt and to be open to developing his coaching skills. The coach creates and determines the quality of the environment in which the training process takes place and thus significantly influences the motivation of athletes [4, 12, 13]. With the increase in tennis players performance, the coaching profession has become a complex of expertise that goes beyond the expertise of a specific sport [14, 15]. The coaching function has also an educational function and has great potential to participate in the development of the athlete not only from a physical but also a psychological and social perspective. Due to its complexity, tennis ranks among the high-volume sports where the coach and player spend several hours a day together. It can therefore be assumed that the relationship between the player and the coach plays a higher role than in other sports.

This study focuses on the relationship between the player and the coach, or more precisely, on the effect this relationship has on the tennis player's self-confidence, which we consider to be an important construct that is unconditional and essential for delivering constant performances, for maintaining the tennis player in a long-term competitive load, and for the quality of his personal life.

Mapping this bond can motivate coaches to pay due attention not only to the training process but also to the development of the relationship with their clients, because this can be a key factor that will build long-term successful, mentally resilient, and healthy individuals. In addition, the mapping of this relationship and its influence on the athlete's self-confidence have not been fully explored in the Czech Republic or Slovakia. There is not a single scientific publication or research report available that focuses on mapping or analyzing the relationship between the coach and the athlete's self-confidence. The only available material examining this context is the master's thesis of Minářová (2022) [16], which focused on determining the influence of the relationship between the elite table tennis players and the coaches on sports confidence, self-esteem, and well-being. In this regard, the research results presented in this paper will become an innovative starting point for further investigation of the importance of the specific form of the relationship between the coach and the athlete towards the development of the athlete's success not only in everyday life but above all in the fiercely competitive environment of a specific sport.

2. Literature Review

2.1. The Relationship between the Player and His Coach

Top sports, and tennis in particular, involve many hours spent training, preparing, or traveling to competitive events throughout the calendar year, with the exception of a few weeks a year. Due to early specialization, it does not last long, and the time spent with family, friends, school duties, or other interests is reduced to a minimum, and all concentration goes towards sports. In such a case, *"the coach gradually becomes the central person with whom the tennis player spends the most time, and a strong relationship is naturally established. Through his behavior, way of communicating, and creation of a suitable environment, the coach has a significant influence on the athlete"* [15]. It is known that a positive relationship between the player and the coach increases the value of self-esteem, self-confidence, and the athlete's performance itself [2, 17, 18]. It is therefore important to emphasize that, in addition to the career itself, the coach also plays an important role in the field of mental well-being. Enhancing personal well-being can lead to more satisfied and resilient athletes, regardless of bad or good sporting experiences [19].

What does the relationship between the player and the coach entail, and what is its definition? Currently, the most cited and used definition in sports literature is the one by Jowett (2017) [20], which describes the relationship between player and coach as dyadic and mutually influencing. In other words, how one feels or behaves affects the feelings and behavior of others. The coach and the player need each other to achieve sporting success [21]. A successful relationship is understood as one where both tangible (victory) and intangible (skills, well-being) outputs occur [22]. In every relationship, both participants play a role, but the responsibility for the direction in which the relationship will develop rests with the coach, according to most athletes [23], which is based on the different position and higher authority that the coaching role entails [24].

Nowadays, we can observe how the sports environment is more and more focused on money and advertising. Success and winning are the most important things, and the players are seen as performers who are just doing their job here. Losing to a weaker player on paper is not tolerated; one sees unreasonably harsh criticism and abuse from punters, just as we can see in the media that rule the world today. It is almost impossible to cover up any mistake or failure, and the pressure on the athlete in this direction rises rapidly. In this context, one can also observe an inappropriate approach from the ranks of coaches and sports officials, who are again pressured from somewhere and oriented only to the result.

Pressure and threats may work in the short term, but in the long term, they can have fatal consequences. A greater interest in the mental well-being, satisfaction, and healthy development of athletes can, on the contrary, be the way to achieve stable and longer-term performances.

Professional sport, including tennis, starts at an early age, and being exposed to an environment dominated by a "win at all costs" atmosphere [25] can have a very negative impact not only on a future sports career but also on the overall development and attitude toward the life of an athlete. Although we believe that coaches mostly have good intentions and pull athletes together, unfortunately, they do not always become the right role models and provide support in the difficult situations that the top sport brings. Sometimes it is they who make it difficult for athletes, and because of them, athletes choose to terminate their careers. In other words, a coach is someone who can make or break a young athlete's sports career [26]. In tennis, the coach plays a particularly important role. Tennis is a complex sport in which technique, physical abilities, the ability to read the game, coordination, mental endurance, concentration, etc. are important. At the top level, there are only small differences between players, and the difference between a winner and a loser can be decided by correctly chosen tactics or higher mental endurance in endings. The role of the coach is absolutely indispensable in many of the mentioned areas, both in the training process and during competitions.

Historically, the work of a coach was expected to develop athletes' physical, technical, and strategic skills [27]. Today, the relationship between the player and the coach and the coach's ability to find and unlock the player's potential are considered the basis of coaching. Marcus Weise is a field hockey coach who was the only one to bring gold from the Olympic Games, both with the women's team and later with the men's team. He himself claims that from the coach's position, it is important to discover the door through which one can "reach" the athlete. Achieving what the aforementioned German coach was able to achieve requires a genuine, high-quality relationship between the player and the coach, full of trust in the player's abilities, mutual respect, and open communication [20].

The relationship, or more precisely, the quality of this relationship, affects the receptivity of the athlete. Thanks to this, the coaching process can be fully activated, which includes listening, guidance, support, acceptance, and much more. As a result, there is mutual development and, thus, joint success [21]. Jowett & Shanmugam (2016) [20] have intensively researched the quality and function of the player-coach relationship over the last twenty years. The result of their qualitative and quantitative studies caused the creation of the 3+1 C model, which defines the quality of this relationship. A coaching style supporting athletes' autonomy is consistent with the principles of this model [2].

The quality of the relationship is built on four main components, which are:

1. ***Closeness*** – represents an emotional bond between the player and the coach full of respect, mutual trust, and recognition. Closeness is considered the basis of a sports partnership;
2. ***Commitment*** – reflects the created bond that is close and long-term. Especially important in sports, as achieving success requires time and patience;
3. ***Complementarity*** – describes the behaviors of players and coaches that complement each other. There are two sets of complementary behaviors:
    a. Corresponding, refers to the same behavior that is expected from the player and the coach, for example, mutual openness and friendliness on the field;
    b. Reciprocal, which is characterized by different behaviors based on the roles that the individual occupies in the relationship. An example is a coach giving instructions and a player trying to fulfill them [20–22].
4. ***Co-orientation*** – mutual understanding and sharing of the same goals and values, so-called how much the stakeholders are on the same side. If it is insufficient in a relationship, it can lead to erroneous judgments about the other's behavior. An important aspect of this component is communication [28].

The quality of the relationship that fulfills the components described above is influenced by the socio-cultural factors and particular characteristics of individuals [29]. Building a quality relationship increases the value of physical self-concept [30-31], well-being [18, 32, 33], level of motivation [34, 35], collective efficacy [36], personal growth [31] and passion [32]. Poor relationship quality is correlated with the interpersonal conflict [33], stress [34], and athlete burnout [37]. Relationship quality also has a direct and indirect effect on the athlete´s satisfaction, the indirect effect was mediated by communication strategies [36]. A connection with the satisfaction of athletes was also found in the research of the authors Jowett & Nezlek (2012) [28] through gender, length of relationship and player level. The same gender in the coach-athlete relationship increased satisfaction because a better and stronger relationship was formed.

Satisfaction is the subject of many studies because satisfied individuals are more persistent and desire to achieve success in those areas of life that are important to them [9]. Moreover, satisfaction is a more sensitive, detailed, and accessible measure of sports performance than performance itself [35]. Athletes describe the ideal coach as listening, understanding and able to recognize their individual needs [38], who values the respect, trust and the ability to communicate openly about everything [39]. The relationship must be meaningful on both a personal and a cultural level in order to support the athlete's motivational processes and the mental well-being [40].

The relationship between the player and the coach is significantly different from the relationship´s studied so far (romantic, family, etc.), and therefore it was necessary to develop the alternative strategies that will help maintain and develop such a relationship. Despite the uniqueness of each relationship, a model emerged that highlights key strategies to follow. We are talking about the COMPASS model described in Rhind & Jowett (2010, 2011) [41, 42]:

- **C - Conflict Management**: reflects the ability to cooperate during the disagreements, to identify, discuss and resolve the conflict before it escalates;
- **O – Openness**: the possibility to talk openly about everything, even outside of sports;
- **M – Motivation**: an effort from both parties to create a working partnership that is beneficial, ambitious, mutually motivating and brings pleasure;
- **P – Prevention**: clarification of rules, expectations and possible consequences if they are not fulfilled;
- **A – Assurance**: commitment to the relationship and readiness to sacrifice something for the sake of a functional relationship;
- **S – Support**: mutual help in difficult moments;
- **S - Social Networks**: creating strong bonds with others. It is not appropriate to separate the relationship between the player and the coach from others [2].

It takes two to achieve a performance level corresponding to elite sport. Neither the coach nor the player can achieve this alone [2]. The same rule applies to the development of the relationship between the athlete and the coach, even though the responsibility lies mainly (because of the position) with the coach [41, 42]. It is not easy to create a healthy and functioning relationship in an elite sports environment. Organizational culture, financial pressure, competition, pressure for results, all of this can negatively affect the behavior and thus the development of the relationship between the player and the coach. Building a quality partnership is difficult, but it can be a key element leading to a career and life satisfaction, and is therefore worth working towards.

The player-coach relationship is complex, like any other dyadic relationship, and is influenced by a number of factors, some of which we have mentioned and described. When a quality relationship can be built, the chances of achieving high performance are increasing. The connections between these variables have been intensively studied in recent years [1, 43, 44]. Performance in tennis is difficult to measure objectively, and therefore, following the example of Lochbaum et al. (2022) [39] and Davis et al. (2019) [32] we decided to pay more attention to psychological constructs, specifically sports self-confidence, which without any doubt contribute to the performance and are at risk in the conditions of elite sports. On the one hand, it is a construct that is no less important in personal life, but has also not yet been properly explored in the correlation to the relationship between the player and the coach. A coach plays an important role in the life of an elite athlete, and we believe that a quality relationship leads not only to higher performance, but also to higher sports self-confidence.

2.2. Sport Self-Confidence

One of the first conceptualizations of sports self-confidence was Vealey's (1986) [45] unidimensional model of self-confidence as a character and a state. The author divided sports self-confidence into personal (character) and situational (state). Personal sports self-confidence represents a dispositional construct, and expresses the belief or the degree of the certainty that a person usually has about his abilities to achieve the sports success. This dispositional self-confidence subsequently interacts with the situational factors to create the so-called situational sports self-confidence, which then differs only in terms of time frame, and expresses a belief in one's abilities at a given moment (right now).

This dichotomous approach was then revised to be more consistent with Bandura et al. (1997) [46] self-efficacy theory, which views the sports self-confidence model as a dynamic, social cognitive construct and belief system. While the original model considers the sports self-confidence as a one-dimensional construct and includes only one type of sports self-confidence, the new model conceptualizes it as a multidimensional construct, following the theory of self-efficacy, which takes into account several types of the self-confidence. In the revised model, three types - or components - of sports self-confidence are identified, which are important for athletes participating in competitive sports [47, 48]:

1. The first component of sports self-confidence ***SC-Physical skills and Training*** is explained as *"an athlete's belief or level of the confidence regarding his ability to perform the physical skills necessary for the successful performance"*.
2. Another type of sports self-confidence is ***SC-Cognitive Efficiency***, which can be defined as *"an athlete's belief or degree of the confidence that he can mentally focus, maintain the concentration, and make effective decisions in order to perform successfully"*.
3. The third type is ***SC-Resilience***, which is described as *"the athlete's belief or degree of the confidence that he can regain to focus after the performance errors, to bounce back from poor performance, overcome the doubts, problems and obstacles, and to perform successfully"*.

These three types of sports self-confidence are shown to be independent of each other, differently predicting the competitive anxiety, coping skills and sports performance, thus proving the multidimensionality of an athlete's self-confidence [48]. Vealey & Knight (2002) [48], in the context of identifying these three skill areas important for success in sport, developed a ***Sport-Confidence Inventory (SCI) tool*** to measure the sport confidence for each of these areas, which is used to conduct research in the context of the presented paper.

In this study, the concept of the sports self-confidence is based on the theory of self-efficacy with an effort to better capture the context of the competitive sports [45, 49]. The term sports self-confidence is then defined as an individual's belief in his ability to succeed in sports [45, 50]. The athletes rely on the multiple sources of self-confidence in a sporting context [51] similar to those identified by Bandura´s self-efficacy theory [46], with the original sources also being influenced by the personality and the cultural, demographic and organizational factors. Based on this, the sports self-confidence model was revised and the new one identifies nine sources of sports self-confidence, which were defined as the sources an athlete uses to form a judgment about his self-confidence [51]:

1. "*Mastery*" experience: successful mastery of the improvement in particular skill.
2. Skill demonstration: self-confidence comes from comparing one's skill level with that of an opponent, demonstrating one's skills to an opponent.
3. Physical and mental preparation: feeling of a sufficient physical and mental preparation for the competition.
4. Physical self-presentation: the athlete's perception of his physical "me" and his satisfaction with it.
5. Social support: the perception of support, the positive feedback and encouragement from significant others in the individual's sporting environment (i.e., from the coach, family, teammates, etc.).
6. Vicarious experience: watching the successful performance of teammates, friends or significant others.
7. Coach's leadership: the confidence in the coach's leadership and the decision-making abilities and coaching skills.
8. Comfort environment: the feelings of comfort and the satisfaction with the competition environment (for example, particular field on which the game will be played).
9. Situational advantage (or the favorability of the situation): the feeling of the athlete that the situational conditions play in his favor.

These sources essentially overlap with the sources of self-efficacy presented by Bandura & Walters (1977) [52], but are more specific to the context of competitive sport. For example, the experience of successful task mastery identified by Bandura & Walters [52] is by Vealey et al. (1998) [51] divided into mastery experience and skill demonstration. Physical and psychological preparation overlap with Bandura & Walters [52] physiological and emotional states, social support with verbal persuasion, and vicarious experience are perceived identically [51]. In addition to the five interchangeable sources, four more sport-specific sources were described, namely the leadership (or way of leading) of the coach, physical self-presentation, comfort of the environment and situational advantage [51].

In order to facilitate the job and the competences of sport psychologists and consultants in the design and implementation of self-confidence interventions, Vealey (2001) [50] classified these nine sources under three main source domains – achievement (mastery experience and skill demonstration), self-regulation (physical and psychological preparation and physical self-presentation), and social climate (social support, coach leadership, vicarious experience, environmental comfort and situational favorability) [50, 51].

In addition to identifying the sources of the sports self-confidence, Vealey et al. (1998) [51] investigated which resources are the best predictors of the level of the sports self-confidence. Higher levels of sports self-confidence were associated with a focus on physical/mental preparation for competition, while lower levels were associated with a focus on body image [51, 53]. Other studies, e.g., Wilson et al. (2004) [54] also found similar findings, which identified the mastery experience and skill demonstration as an important source in addition to preparation [54].

Sports psychologists and consultants have identified key strategies they use to build the sports self-confidence. These techniques can be covered by the following six categories:

1. Developing of understanding and awareness (understanding of yourself and what self-confidence is, exploring the sources of your self-confidence and its operationalization),
2. Evidence gathering (e.g., keeping a diary, monitoring of a progress or video using),
3. Manipulation with the training environment (exposing the athlete to situations under pressure),
4. A customized approach (e.g., self-confidence profiling method [55-57]),
5. Using of psychological skills (e.g., the goal setting, the visualization or the inner speech [58]),

6. Developing the athlete's unique strengths [59].

Furthermore, four key strategies for the sports self-confidence maintenance were identified:

1. Continuation of the process of building the strategies leading to the development of the self-confidence,
2. Influencing the athlete's environment,
3. Stable conviction,
4. Abilities strengthening [59].

Evidence gathering, the use of psychological skills, and the abilities strengthening support previous research suggesting that interventions based on key sources of self-confidence such as successful performance, skill demonstration, and preparation can help develop and maintain robust athletic self-confidence [59]. When forming and subsequently choosing the psychological interventions for strengthening of the sports self-confidence, it is also important to take into account the various variables, primarily the nature of the sport, the time period of the competition season, the role of the sources, but also the level of the development of the individual components of self-confidence.

Another – recently very modern – approach to the topic of sports self-confidence is the so-called third wave of the cognitive-behavioral therapy, which includes the mindfulness and the Acceptance and Commitment Therapy (ACT) [60]. The third wave follows two waves of the behavioral therapy, the first being classical behavioral therapy and the second the cognitive-behavioral therapy [61]). The main feature of the third wave is a shift away from work on the psychological skills training. The therapy does not seek to change the negative affect and the cognitions that are perceived as undesirable, but the goal is to accept these thoughts and feelings and thus to save energy for making efforts to change them. Subsequently, the individual can concentrate better on the given task, because his cognitive capacity is released and there is no need to stress about the need to change the current state [61]. The aforementioned ACT is currently very popular in sports psychology [60]. It works with six key processes:

1. Acceptance,
2. To be present,
3. Cognitive diffusion:
   a. The cognitive diffusion means being able to observe one's own inner experiences, thoughts, affective states, bodily sensations and needs, and capture them as inner feelings,
   b. The cognitive diffusion, for example, can replace the inner speech, (a classic technique of the cognitive-behavioral therapy approach used in the training of the psychological skills, which often fails in the attempts to change the content of the inner experiences),
4. "*me*" as a context,
5. Values,
6. Committed activity towards one's values [61].

The third wave techniques are closely related to the older clinical tradition and are using the behavioral intervention procedures such as psychoeducation, exposure, or experimental learning. They can be viewed as the advanced forms of the cognitive-behavioral therapy. Both the cognitive-behavioral therapy and third wave cognitive-behavioral therapy emphasize the importance of the learning processes in the development and the maintenance of the functional behavior. However, they differ in which theories are used to describe the development of the dysfunctional behavior. Classical cognitive-behavioral therapy attributes the maladaptive behavior to faulty cognition arising from the distorted information processing, while the so-called third-wave therapies see maladaptive behavior as stemming from the emotional/experiential avoidance, problematic attempts to control the internal experiences, and the inflexibility caused by the fusion of thoughts and feelings [62].

The third wave therapies include the mindfulness to increase the awareness, to reduce the experiential avoidance and the judgments about the personal experiences, the goal is to give a new perspective or a relationship to one's thoughts and emotions, and to help maintain the attention to the present moment [61].

3. Materials and Methods

The essential of the research is to identify the correlation between the tennis player-coach relationship and the player's sports self-confidence. Secondary objectives include the identifying of the cross-cultural and gender differences in the level of player-coach relationship. The performance level in the context of the analyzed variables was also incorporated.

The aim of the research is to prove that the relationship between the elite tennis player and his coach is especially important for tennis players, not only in the training process, but also extends to the area of the mental health, which can

lead to a longer-term successful and satisfied career of top athletes. As the research focuses on a specific sample of the top tennis players and the data collection took place using two versions, both in the Czech Republic and abroad, for exploratory reasons we asked ourselves the research question:

RQ: Is there a difference in the length of training between foreign and Czech athletes?

Furthermore, based on the theoretical knowledge and relevant studies related to the analyzed issue, for example, Horne et al. (2022) [63], Mouelhi – Guizani et al. (2022) [64] or Li et al. (2021) [65], we present research hypotheses with the aim of fulfilling the stated research objectives:

H1: There are cross-cultural differences in the level of the elite tennis player player-coach relationship.

H2: Men score higher on The Coach Athlete Relationship Questionnaire (CART) than women.

H3: Tennis players competing at the international level show higher values in the area of sports self-confidence.

H4: The elite tennis player-coach relationship and sports self-confidence are positively correlated with each other.

H5: There are stronger correlations between the elite tennis player-coach relationship and sports self-confidence in women.

To verify the hypotheses, a quantitative design was used, which was implemented in the form of the administration of one-time online questionnaire. The questionnaire was distributed among clubs, academies and athletes themselves both in the Czech Republic and abroad. For this reason, two versions were created, one in Czech and the other in English. Due to the nature of the research objectives, the research battery contained demographic data (age, gender, nationality), information on the training process and performance level (number of training units per week, number of training hours, competition level) and questionnaire instruments measuring the relationship between the player and the coach (The Coach -Athlete Relationship Questionnaire) and sports confidence (Sport Confidence Inventory). The flowchart of the research methodology that was used to achieve the study's aims is shown in Figure 1.

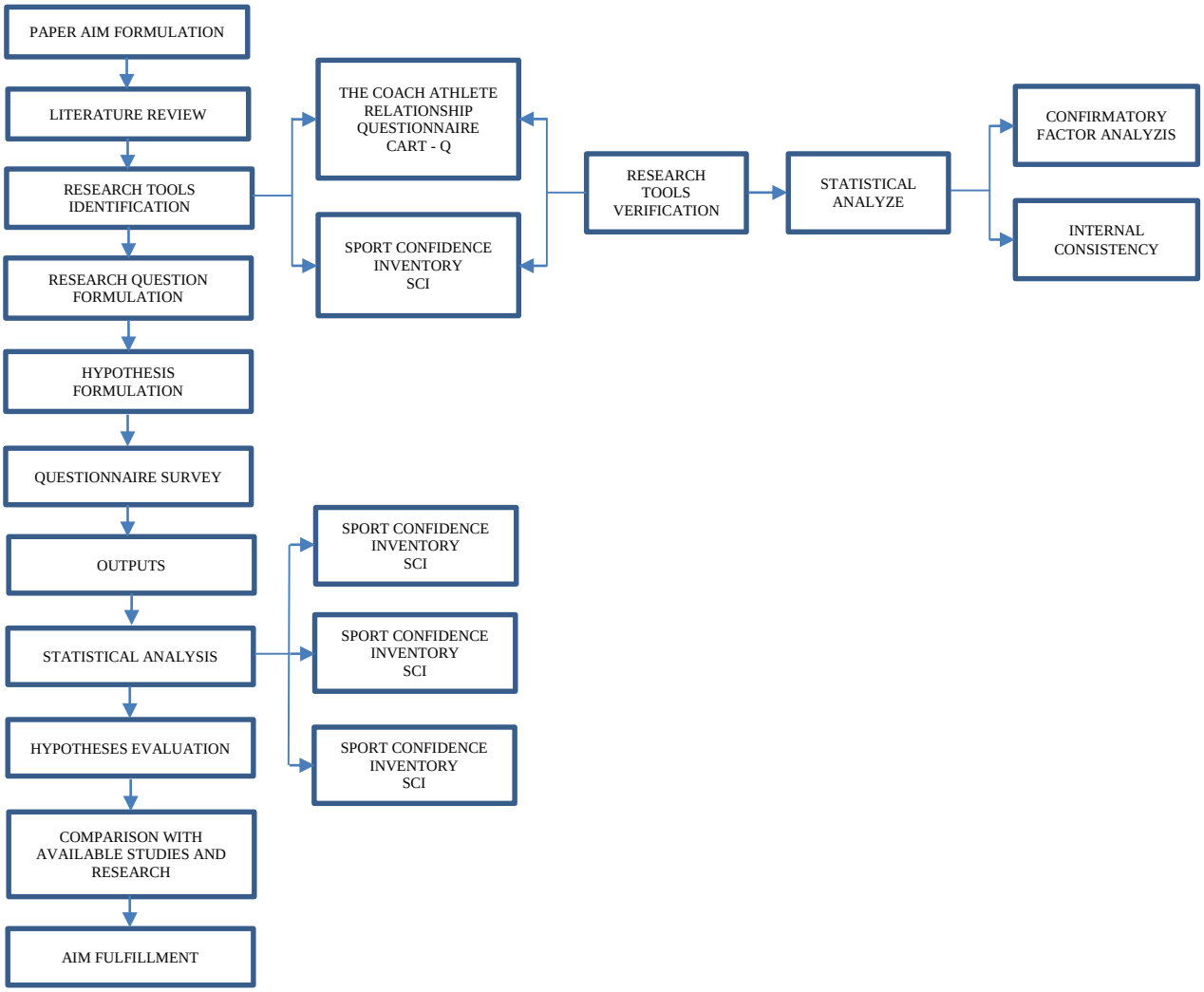

Figure 1. Methodology process workflow flowchart

3.1. The Coach-Athlete Relationship Questionnaire (CART-Q)

The Coach-Athlete Relationship Questionnaire (CART-Q) was used to measure the quality of the elite tennis player-coach relationship. This analytical tool is the only one of its kind dedicated to analyze the relationship between an athlete and his coach. We are not aware of any other similar analytical tool of the same nature. The Coach-Athlete Relationship Questionnaire (CART-Q) is considered a relevant tool and its validity has been demonstrated in many studies, for example [30, 66, 67]. This questionnaire was created by the authors Jowett & Ntoumanis (2004) [30] and serves to measure the quality of the relationship between the athlete and his coach. The quality of the relationship is measured using three factors, which are:

1. Closeness (e.g., "*I trust my coach*"),
2. Complementarity (e.g., "*When my coach trains me, I am ready to give my best*"),
3. Commitment (e.g., "*I feel committed to my coach*").

The original model consisted of 23 items, which was subsequently shortened to 11 items after psychometric adjustments. The reliability of the model reached satisfactory values (commitment α=0.82; closeness α = 0.87 and complementarity α = 0.88). The factor load ranged between 0.68-0.90. The athlete answers to the items using a Likert scale from 1 = "strongly agree" to 7 = "strongly disagree". The questionnaire is often administered to both the athletes and the coaches, but following the example of Yang & Jowett (2012) [29], we only worked with athletes. The athlete-coach relationship is considered a universal phenomenon in sports.

The universality of the psychometric scale was assessed across seven states in a total sample of 1363 individual and team sports athletes. The results supported the factorial validity of the questionnaire (χ^2 = 563.22, CFI = 0.94, NNFI = 0.92, RMSEA = 0.03) and confirmed that it is a reliable instrument that can be used to measure across different cultures [29]. For these reasons, it was also applied in the presented research.

The original version of the questionnaire was used for the English version. The Czech version was translated using double back translation.

3.2. Sport Confidence Inventory (SCI)

Sports self-confidence was originally conceptualized as a unidimensional construct with "state" and "character" parameters, which was reflected in the inventories of Vealey (1986) [45], who developed three tools to ascertain the relationships represented in her conceptual model:

1. Trait Sport-Confidence Inventory (TSCI);
2. State Sport-Confidence Inventory (SSCI);
3. Competitive Orientation Inventory (COI).

The validation of the tools was carried out in five stages of data collection on a sample of a total of 666 athletes from high schools and universities as well as adult athletes. The TSCI, SSCI, and COI questionnaires have shown adequate item discrimination, internal consistency, test-retest reliability, content validity, and concurrent validity [45]. However, the construct validity of the model was determined on a relatively small sample of 48 professional gymnasts. The only results that supported this model were that the personality confidence and the competitive orientation were significant predictors of the situational confidence as well as several subjective outcomes. Pre-competition situational self-confidence did not predict the performance, and no significant correlation between the performance and the personality self-confidence emerged. However, the performance predicted the post-competition situational self-confidence.

This inability of the situational self-confidence to predict the performance is attributed to the nature of the sample, which consisted of professional athletes themselves. The importance of the particular competition the athletes were participating in and its structure played an important role – the competition lasted two days, which made it impossible to measure the sports self-confidence immediately before and during the competition, and thus also to accurately determine/measure situational self-confidence. The sample of elite athletes was evidently very homogeneous and scored high on self-confidence. Athletes would therefore most likely not even admit any feelings of timidity and lack of the confidence in themselves. Using a small and homogeneous sample - whether scoring high or low on ability - obviously makes it almost impossible to find any predictive links [50].

These Vealey´s self-confidence tools represent an improvement over the physical self-efficacy scale [68] and Harter's physical subscale [69]. Against them, they discover the generative abilities needed for successful performance in most sports situations. On the other hand, however, they do not take into account the specific contexts of individual sports or the assessment of these contexts in a micro-analytical approach, which would provide the strongest prediction.

Many studies of sports self-confidence also use a tool called the Competitive State Anxiety Inventory-2 (CSAI-2) to measure the self-confidence in sports situations [70]. Here, the self-confidence is seen as a separate subcomponent of

the anxiety, along with cognitive and perceived body anxiety. Self-confidence is specifically conceived here as the conceptual opposite of the cognitive anxiety. This is in opposition to Bandura's (1984) [71] view of the self-confidence, which does not include the anxiety in either the definition or the measurement tools.

Just because three factors were found in a factor analysis does not mean that the self-confidence is a subcomponent of anxiety or that anxiety is a subcomponent of the self-confidence. No consistent pattern of the performance prediction has been shown using the CSAI-2 self-confidence tool [70-73]. But there were not found no positive predictive relationship between the self-confidence and the performance when attempting to the correct previous inconsistent findings using the intraindividual analysis [74]. These findings are consistent with a growing body of evidence that the utility gained from the dispositional approaches comes at the expense of the explanatory and the predictive power [75].

The unidimensional view of sports self-confidence changed after the publication of the dispositional model of sports self-confidence by Manzo et al. (2001) [76]. Within this model, the athletes develop a relatively enduring belief system that is the result of the interactions between athletic self-confidence and dispositional optimism. To operationalize this construct, the 13-item Carolina Sport Confidence Inventory (CSCI; Manzo et al., 2001 [76]) was developed with two subscales – the dispositional optimism and the sports competence. Confirmatory factor analysis supported the proposed two-factor structure. The scales created from these two factors were moderately correlated and showed the satisfactory reliability of internal consistency.

A year after the publication of the CSCI, the most widely used Sport-Confidence Inventory (SCI; Vealey and Knight, 2002 [48]) was published, also with different subscales, but with a different structure, trying to capture the complex nature of the sports self-confidence. There were identified three types of sports self-confidence, which are:

- Physical skills and training;
- Cognitive efficiency;
- Resilience [48].

The main sentence of the inventory is: "How sure are you that..." Followed by 15 additional statements to which the respondent answers using a 7-point scale from 1 = "absolutely sure" to 7 = "I am not able to do it (at all No)". Each type of self-confidence is fuelled by five items.

There was compared a sample of 510 athletes with 1125 non-athletes and found that with the sports self-confidence variable, it is really necessary to work multidimensionally in athletes, whereas in non-athletes a unidimensional model may be more appropriate [77]. Athletes seem to be better able to differentiate between the types of sports confidence. The fit of the model for athletes was relatively adequate ($\chi^2_{87} = 447.45$, $p < 0.001$; CFI = 0.93; RMSEA = 0.09; SRMR = 0.06). Cronbach's alpha for athletes was 0.89 (physical skills and training), 0.85 (cognitive efficiency) and 0.89 (resilience) [78].

On a sample of 611 respondents, it was confirmed that the SCI tool is a valid and reliable tool for measuring sports self-confidence. Thus, a three-factor model of sports self-confidence was confirmed, where the subscales of the SCI show the adequate internal consistency (with all Cronbach's alpha coefficients exceeding 0.84), the intercorrelation (ranging between 0.53 and 0.56), and the test-retest reliability (0.73 for Physical Skills and Training, 0.78 for Cognitive efficiency, 0.78 for Resilience, and 0.80 SC-total). Construct validity was supported by the fact that each type of pre-competition sports self-confidence varied independently over time. Different types of sports self-confidence also predicted the performance based on the social-cognitive demands of the competitive environment. It was also found that these three forms predicted the coping skills, the competitive anxiety and the sports performance to varying degrees, which supports the assumption that sports self-confidence is multidimensional in nature [79].

The SCI was revalidated on a sample of 260 athletes using the exploratory structural equation modelling (ESEM), which supported the measurement models of SCI. ESEM analysis of a total of 33 items (SCI, LOT-R, and CSCI) showed the satisfactory divergent validity. The SCI was able to distinguish between the athletes competing at different levels, and proved to be the most suitable tool for measuring the individual differences in sports self-confidence [80]. That is why we decided to use it in our research as well.

Due to the non-existent Czech version, as with The Coach Athlete Relationship Questionnaire, a Czech translation was made, which was subsequently translated back into the original version by another person. Subsequently, the versions were compared and any differences adjusted.

Before starting the research, the comprehensibility of the items was verified qualitatively with the help of 2 people for each version (English and Czech). Subsequent data collection took place in the period from September 2022 to January 2023 in the online form. Clubs, academies, coaches and the athletes themselves were approached using the personal contact, social networks and the subsequent snowball method. At the beginning of the questionnaire, the content and the aim of the study were explained, and the informed consent and assurance about the anonymity of the respondents was also attached. The conditions of the participation in the research were also mentioned. The questionnaire battery

was intended for the elite tennis players, junior representatives aged 16-18, who compete at least at the national level and work with a coach. Participation in the research was voluntary and respondents could withdraw at any time. No time limit was set. At the end of the introduction, a contact for possible questions was attached. The collected data first needed to be checked and cleaned. Due to the online collection, a trained person was not present during the filling, and despite the introductory information explaining who the questionnaire is intended for, a relatively large sample of those who did not meet the conditions of the research appeared among the respondents. The most common reason was too young age or insufficient competition level. From the total sample of 278 people, 42 had to be eliminated. The resulting sample consisted of 236 elite tennis players.

Descriptive statistical analyses were used to describe the data. Cross-cultural, gender, and competition differences were analyzed using the independent samples t-tests. Correlation analysis between the analyzed constructs was expressed by Pearson's correlation coefficient, and relationships of a predictive nature were sought using the linear regression. In this context, we worked with the term predictor because it is named so in the general terminology, but we are aware that in this case the causality cannot be inferred. The internal reliability of the instruments was verified using the Cronbach's coefficient alpha and McDonald's omega. We used confirmatory factor analysis to verify the proposed factor structure of The Coach Athlete Relationship Questionnaire (CART-Q) and Sport Confidence Inventory (SCI).

4. Results and Discussion

4.1. Descriptive statistics

The research sample consisted of a total of 236 elite tennis players who competed at the national or international level. The more numerous sample was the international level represented by 149 (63.1%) athletes. 87 (36.8%) athletes competed at the national level. The total sample consisted of 122 (51.7%) men and 114 (48.3%) women. Average age was 17.2 years, median 16.9 years.

The Czech version of the questionnaire was filled out by 29 (12.3%) Czech athletes from the total sample. The English language version was completed by 207 (87.7%) foreign athletes. The largest sample consisted of athletes from the following countries: Egypt (N=12), Belgium (N=12), Slovakia (N=7), Germany (N=9), Spain (N=12), Italy (N=8), USA (N=12), Japan (N=10) and Russia (N=8). The other category includes countries with 3 or fewer respondents (N=117).

The total number of training hours per week for the complete sample ranged from 2-35 (M = 14.5; SD = 7.9). 8 respondents did not answer the question. The most numerous sample of athletes were those who trained every day (N=157). This was followed by the sample 3-4 times a week (N=36), 5-6 times a week (N=33) and 1-2 times a week (N=2).

4.2. Verification of the Psychometric Characteristics of the Used Methods

The methods were verified using Cronbach's alpha and McDonald's omega coefficients separately for the Czech and English versions. A confirmatory factor analysis was performed for the questionnaire methods The Coach Athlete Relationship Questionnaire (CART-Q) and the Sport Confidence Inventory (SCI).

- **Internal consistency of the CART-Q questionnaire:**
  - Cronbach's alpha and McDonald's omega coefficients achieved a sufficiently high level of the internal consistency for the total score of the questionnaire measuring the quality of the relationship between the player and the coach (CART-Q). The lowest values were measured for the complementarity subscale (0.77-0.78), but even then, the tool can be considered sufficiently reliable.
- **Confirmatory factor analysis of CART-Q - English version:**
  - All values of the factor load reached sufficient values and are statistically significant ($p<0.001$).
  - The values of the correlations of the latent variables reached too high values, which may indicate a problem of discriminant validity. In particular, the commitment and proximity factors were likely to have high overlap.
  - The tightness of the relationships between the factors was in the range from 0.717 to 0.837, which, like the correlations of latent variables, were alarmingly high values.
  - Pearson's chi-square (χ^2) test was statistically significant ($p<001$). The incremental fit index CFI was at the limit of the recommended minimum value, the SRMR met the acceptable limit. The remaining TLI and RMSEA indices did not reach optimal values.
- **Confirmatory factor analysis of CART-Q - Czech version**
  - Even in the Czech version, the values of the factor charges reached sufficient values ($p<0.001$). Factor loads were lower for several indicators than in the English version. However, all items were still above the recommended limit of 0.3.

- The values of the correlations of the latent variables reached too high values, similar to the English version.
- Correlations between individual factors ranged between 0.691 – 0.856. High values were associated with higher values of latent variable correlations.
- Pearson's chi-square ($\chi 2$) test was statistically significant ($p<0.008$). The incremental fit indexes CFI=0.941 and TLI=0.921 reached acceptable values, as does the SRMR value. The RMSEA index was well above the generally acceptable limit (0.8).

- **Internal consistency of SCI**
  - The internal consistency of the SCI questionnaire reached sufficient values for both versions. The lowest value was achieved by the Resilience factor (0.76) in the English version. The biggest difference can be seen in the Physical Skills and Training component, where the value of the English version (0.78) was slightly lower than the Czech version (0.83).
- **Confirmatory factor analysis of SCI - English version**
  - All values of factor load reached sufficient values and were statistically significant ($p< 0.001$).
  - Correlations at the latent level reached ideal values. The value of 0.832 between the factors of resilience and cognitive efficiency may appear alarming, which may indicate that some items of the factors overlap.
  - Correlations ranged from 0.450 to 0.722 and all became significant at the $p <0.001$ level.
  - Pearson's chi-square (χ^2) test was statistically significant ($p<0.001$), which would indicate a mismatch between the model and the data. The incremental fit indexes CFI=0.886 and TLI=0.862 did not reach optimal values above the recommended minimum value of 0.9. The value of RMSEA (0.0874) and SRMR (0.0838) was above the value of 0.08, which also did not meet the acceptable limit.

Table 1 shows the item residuals. Based on this table, we can observe possible reasons why the values of the fit model did not reach optimal values. The darkest colored numbers indicate the highest values of residuals between items. Ideally, values higher than 0.1 should not occur. For example, for items #1 and #5, this recommendation is highly violated. This may be due to the similar wording of the items, even though they measure different factors.

Table 1. Residuals of SCI items - English version

	SCI_1	SCI_4	SCI_7	SCI_10	SCI_14	SCI_2	SCI_5	SCI_8	SCI_11	SCI_12	SCI_3	SCI_6	SCI_9	SCI_13	SCI_15
SCI_1	0														
SCI_4	0.13	0													
SCI_7	0.03	0.06	0												
SCI_10	0.07	0.01	0.05	0											
SCI_14	0.01	0.01	0.04	0.01	0										
SCI_2	0.01	0.00	0.10	0.07	0.04	0									
SCI_5	0.27	0.26	0.14	0.19	0.10	0.01	0								
SCI_8	0.10	0.08	0.04	0.10	0.04	0.05	0	0							
SCI_11	0.00	0.02	0.15	0.04	0.07	0.03	0.06	0.02	0						
SCI_12	0.09	0.22	0.02	0.17	0.08	0.08	0.03	0.01	0.04	0					
SCI_3	0.16	0.16	0.01	0.08	0.01	0.20	0.17	0.03	0.10	0.01	0				
SCI_6	0.04	0.12	0.11	0.18	0.10	0.03	0.19	0.08	0.00	0.07	0.05	0			
SCI_9	0.10	0.08	0.20	0.04	0.04	0.04	0.07	0.01	0.02	0.01	0.06	0.01	0		
SCI_13	0.12	0.14	0.02	0.08	0.05	0.02	0.13	0.03	0.03	0.04	0.08	0.09	0.03	0	
SCI_15	0.08	0.05	0.17	0.01	0.10	0.05	0.05	0.09	0.07	0.24	0.10	0.01	0.03	0.01	0

- **Confirmatory factor analysis of SCI - Czech version**
  - All values of factor load reached sufficient values and were statistically significant ($p<0.001$).
  - In the case of the SCI Factor Covariance – Czech version, it is necessary to pause above the value of 0.929 between the factors of resilience and the cognitive efficiency. The correlation was also high with the English version and it increased even more with the Czech version. It is likely that some items overlap between factors.
  - Correlations ranged from 0.444 to 0.801. A strong relationship was found between resilience factors and cognitive efficiency.

- Pearson's chi-square (χ^2) test was statistically significant (p<0.001). The CFI and TLI indexes also did not meet the recommended value, nor did the SRMR and RMSEA reach the optimal values. Similar to the English version, it was indicated that the model has not match the data. However, in relation to the size of the sample, this was not so surprising and would be further discussed in the study limits chapter.
- Finally, we discussed the inadequate values of the model using table (Table 2), in which the residuals of the SCI items were displayed. In the table, it is possible to notice one of the possible variants because the fit index values did not reach the optimal values. Similar to the English version, we can observe high values of residuals between some items. In 7 cases, the recommended value (0.1) is exceeded by up to two times.

Table 2. Residuals of SCI items - Czech version

	SCI_1	SCI_4	SCI_7	SCI_10	SCI_14	SCI_12	SCI_11	SCI_8	SCI_5	SCI_2	SCI_3	SCI_6	SCI_9	SCI_13	SCI_15
SCI_1	0														
SCI_4	0.03	0													
SCI_7	0.06	0.02	0												
SCI_10	0	0.09	0.04	0											
SCI_14	0.09	0.23	0.01	0.1	0										
SCI_12	0.03	0.19	0.14	0.15	0.01	0									
SCI_11	0.13	0.04	0.09	0.06	0.03	0.01	0								
SCI_8	0.17	0.01	0.08	0.03	0.04	0.02	0	0							
SCI_5	0.28	0.15	0.09	0.09	0.08	0.03	0.13	0.04	0						
SCI_2	0.21	0.11	0.11	0.03	0.12	0.01	0.07	0.05	0.05	0					
SCI_3	0.11	0.04	0.06	0.04	0.17	0.04	0.07	0.04	0.13	0.01	0				
SCI_6	0.08	0.04	0.08	0.07	0.22	0.02	0.17	0.07	0.27	0.02	0.15	0			
SCI_9	0.11	0.06	0.05	0.04	0.17	0.12	0.03	0.07	0.15	0.03	0.12	0.04	0		
SCI_13	0.14	0.24	0.02	0.01	0.22	0.14	0.03	0.12	0.01	0.03	0.12	0.01	0.05	0	
SCI_15	0.05	0.13	0.08	0.12	0.05	0.02	0.05	0.04	0.06	0	0.06	0.09	0.02	0.01	0

4.3. Validation of Research Question and Hypotheses

The research question was RQ: Is there a difference in the length of training between foreign and Czech athletes? We used the t-test method to answer this question.

The results showed that there was a significant difference between the number of hours trained between the samples (t(207) = 4.33; p < 0.001). This is also evidenced by the high values of Cohen's d (d=0.77). The difference in mean between the two samples is over five and a half hours of training per week. It is therefore evident that Czech athletes really train less than foreign athletes.

Furthermore, the relationship between the number of training hours and the factor of movement skills and training, which is one of the factors of sports self-confidence, was investigated. The relationship found was measured using Pearson's chi-square (χ^2) and the test was statistically significant (r=0.33, 95% CI [0.18;0.48] p < 0.001). There is therefore a positive relationship between the number of training hours and the component of sports confidence (physical skills and training).

H1: There are cross-cultural differences in the level of the elite tennis player player-coach relationship.

It is generally accepted that culture precedes human behavior and thinking [81]. Rules, norms, expectations and mutual understanding in relationships are all defined and transmitted by the culture [82]. The relationship between the coach and the athlete is no different. The sociocultural factor precedes the quality of the relationship between the athlete and the coach [81]. There are mean differences in all components of the player-coach relationship (closeness, commitment, complementarity) across seven states [22]. We were interested in whether the differences between Czech and foreign athletes will be found in our sample as well.

This hypothesis assumes that the differences in the perceptions of the player-coach relationship will be found between the two samples of elite tennis players for whom data collection took place. In the first sample there were only Czech athletes who filled out the Czech version. In the second sample, we included all foreign athletes who filled out the English version. A t-test for independent samples was used to test the hypothesis.

Based on the average values of the foreign and Czech samples, we could notice that in all cases the foreign sample scored higher. A significant difference between the samples was found for the complementarity component (t(207)=2.29, p<0.024, d=0.40) and subsequently for the total CART-Q score (t(207)=2.22, p<0.028 , d=0.39). It is therefore possible to confirm hypothesis H1.

H2: Men score higher on The Coach Athlete Relationship Questionnaire (CART) than women.

From the theoretical findings, e.g., Hays et al. (2007) [83] or Guinoubi et al. (2022) [84] flows that the coaching support plays a more important role for women than for men. If the coach is able to demonstrate the qualities of his skills needed for the specifics of the given sport, he has won for the most part in the men's category. In the case of women, it is necessary to supplement his expert skills with interpersonal skills. The main reason for an early termination of a sports career for women was a problematic relationship with a coach [84, 85]. It is necessary to differentiate the coaching practices according to the gender. The frequent positive encouragement and establishing a personal relationship is particularly effective for women [86]. There are gender differences between player-coach dyads, namely female athlete and female coach achieved higher scores and higher satisfaction than the other dyads [28].

Due to higher demands on the position of coach from the women and the prevalence of male coaches, we assume that women will score lower than men in the questionnaire measuring the relationship between the player and the coach. To verify the hypothesis, we again chose the t-test method for independent samples. First, we worked with the complete sample, then we performed the same analysis only with Czech tennis players. Although men scored higher, the difference was not statistically significant in either case.

In Czech athletes, statistically significant differences appeared, more precisely in the commitment item ($t(29)=2.02$, $p<0.05$, $d=0.56$) and in the total CART-Q score ($t(29)=2.11$, $p<0.04$, $d=0.58$). Hypothesis H2 can thus be confirmed only among Czech athletes.

H3: Tennis players competing at the international level show higher values in the area of sports self-confidence.

Tennis players competing at the international level are mainly part of the national teams, which are sent to various events of European or world format during the season. Through this lens, we evaluate the international level as the highest possible level achieved, which is associated with the highest performance. The successful athletes experience the championship mastery very often, they achieve the repeated success, and thereby their sports self-confidence is increasing [87, 88]. Similar to previous analyses, the t-test method for independent samples was used. Statistical analysis was performed not only between the total score of the questionnaire, but also between its individual components.

Our analysis shows that there are significant differences between all types of sports self-confidence and competition level. The most significant difference is shown by the total SCI score ($t(149)=3.62$, $p<0.001$, $d=0.62$). Athletes competing at the international level ($M=78.72$; $SD=11.37$) achieve higher sports self-confidence than athletes at the national level ($M=71.72$; $SD=11.30$). Tennis players who compete at the international level show higher level not only in terms of physical skills, but also of resistance, maintaining concentration, the ability to make important decisions, etc., which is indicated by significantly higher scores of the components of cognitive efficiency and resilience. We confirm hypothesis H3.

H4: The elite tennis player-coach relationship and sports self-confidence are positively correlated with each other.

Sports self-confidence is considered to be one of the main components of performance [89, 90] and the relationship between the athlete and the coach has the potential to optimize this performance [1, 91], as well as the self-confidence [92] and well-being [93, 94]. Correlations between the relationship and the sports self-confidence were found in Turkish wrestlers [95]. The theoretical findings and the research studies by other authors confirm that the coach plays an important role in this area [96, 97] and, depending on the quality of the relationship, can either develop or suppress the self-confidence in athletes. Self-confidence is an inherent component of a satisfied and successful life [98] and is considered to be one of the main predictors of the mental well-being [99]. Correlations between these constructs are high [100], so we expected the same results for our sample. We tested the hypothesis using Pearson's correlation coefficient. This relationship was not found. Hypothesis H4 was not confirmed.

H5: There are stronger correlations between the elite tennis player-coach relationship and the sports self-confidence in women.

From the theoretical starting points, it follows that gender plays a significant role in the context of the analysed variables. It seems that, especially for women, the personal relationship with the coach is important [101] and its importance can further influence the development of a construct such as self-confidence. For these reasons, we expected closer relationships for women compared to men. Again, we used the Pearson´s correlation coefficient method. Gender differences were commented only on the basis of the point estimate of the correlation coefficient. On the basis of found values, it can be concluded that the relationships between all constructs were closer in women than in men. It can be observed that in women, the correlation between the quality of the relationship between the player and the coach and the sports self-confidence reached higher values compared to men. However, the relationships were very weak. Based on the point estimates, we can confirm hypothesis H5.

4.4. Discussion

The aim of the research was to map the possible correlations between the quality of the elite tennis player-coach relationship and the sports self-confidence in a specific group of top junior tennis players. The coach plays one of the most important roles in the field of sports training, and the quality of the relationship is considered to be the main factor supporting the physical and the psychosocial skills of the athlete [102]. In tennis, the importance of the relationship increases even more, mainly for the reason that tennis is such a complex sport that the coach is a necessary part of almost all components of the preparation. The coach's presence is usual throughout the competition season both in the training process and during the competition events. It is not uncommon for a coach to accompany an athlete from the youth to adult category and to work with the athlete for several years [24, 103]. The effort was therefore to theoretically highlight and empirically demonstrate how important a role of the quality of the relationship between the player and the coach plays, especially in tennis, in connection with the analyzed variables that represented the components of performance and mental health. In addition, we were interested in differences in gender and competition category, just as we tried to explore the differences between the Czech and foreign athletes.

We came to the interesting finding that Czech tennis players train more than five and a half hours less per week than foreign tennis players. Even though it was not the main focus of this paper, it is a big difference that can affect the different performance. After all, the number of training hours per week fed the component of physical skills and training, which is an important part of the sports self-confidence model.

Sports self-confidence is one of the most stable elements of the performance that distinguish the successful athletes from less successful ones [104-106]. In addition to the physical skills and training component, cognitive efficiency and resilience also fall into this model. In a sports context, under the use of these components, we can imagine an athlete who does not get distracted easily and trusts in his abilities. In connection with our results, we can discuss whether Czech tennis players would also achieve lower levels of sports self-confidence or whether they compensate for the smaller number of training hours with higher scores in the area of the resilience and the cognitive efficiency. However, in a sport like tennis, training volume is very important.

It was confirmed that there were cross-cultural differences in the perception of the relationship between the player and the coach. This is related to the results of previous studies by the authors Yang and Jowett (2012) [29], who found differences in average score values across seven countries. The way of leadership, the coach's power, closeness, complementary behavior, all of this can be culturally conditioned [22]. The results showed that Czech tennis players considered the current relationship with the coach for lower quality compared to the foreign tennis players.

These results need to be interpreted with caution, mainly because the sample of foreign tennis players is very broad and it was not possible to collect a large enough country-specific sample to further subdivide the sample between specific nationalities. This fact will be discussed further in the study limits section. There may be several reasons why Czech tennis players scored lower. One of them is the fact that the financial situation of clubs and academies may not be sufficient to provide a quality training for coaches. Also, the trend of a still prevailing autocratic approach and a focus on rigid procedures with goals to increase performance can be seen, but without an individual treatment and an orientation to the psychosocial aspects.

Somewhat surprisingly, no gender differences were found in the elite tennis player-coach relationship for the overall sample. The theoretical knowledge and present studies dealing with this issue indicate that the quality of the relationship between the player and the coach is more important for women [100, 107, 108] and that women require coaching support more than men [109]. For this reason, we hypothesized that women would evaluate the quality of the relationship with the coach more poorly than men due to their criticality. However, the non-confirmation of the results does not mean that gender differences do not exist in this area. It is necessary to take into account that each player in the analyzed sample has an individual personality and the quality of the relationship was measured within their individual coaches. Otherwise, we could look at the results if gender differences were measured in relation to the relationship with the same coach.

However, we encountered gender differences in the group of Czech tennis players. Women scored lower than men. It is thus easy to suggest that it would be worth paying more attention to the quality of the coaching relationship with Czech female athletes. These conclusions cannot be generalized, rather they should serve for deeper reflection. The gender of the coach also has an influence on the quality of the relationship. The female dyads scored the highest in the CART-Q questionnaire compared to other combinations [82]. Unfortunately, it was not possible to verify these connections, as only thirteen of the entire sample of athletes worked with a female coach. The predominance of male coaches may have played a role in why women scored lower on the CART-Q questionnaire than men.

In the context of the above results, it can still be considered interesting that the difference between the perception of the elite tennis player-coach relationship among national and international level athletes was not confirmed. We wanted to confirm the assumption that the relationship between the player and the coach supports the performance, as evidenced by Davis et al. (2018) [44], however, competition level is not a 100% measure of performance in this case. In a sample across different countries, there could be a situation where an athlete's international competitive level matches the national level of another athlete who comes from a country where the competition in tennis is higher. Finding a suitable variable to measure the performance in a sport like tennis is very complicated.

Somewhat more interesting results occurred with the Czech sample of elite junior tennis players, where the differences were far more visible. Although the total score was not statistically significant, the commitment component was statistically significant. However, the differences were in the opposite direction than we expected. Players competing at international level scored lower compared to the national level tennis players. These findings can be explained by the fact that players competing at the national level have more options for choosing a training environment and thus a coach compared to players at the international level, where the national team is often assigned a coach. A commitment that reflects the close and long-term relationship between player and coach is especially important in elite sport.

In connection with the level of the competition, it was further confirmed according to assumptions that athletes who competed at the international level showed higher values of sports self-confidence in all its components (cognitive efficiency, resilience, physical skills and training). Competition at the international level is not only higher, but also the experiences and situations that athletes find themselves in can be more emotionally charged and stressful, both due to the pressure from the environment and internal expectations of themselves. These experiences strengthen the junior tennis players in our sample in all components of the sports self-confidence.

Finally, the interrelationships between the constructs of sports self-confidence and the quality of the relationship between the player and the coach were analyzed. On the basis of theoretical principles, it can be assumed that all constructs have their own effect on the athlete's performance, which is the main goal towards which professional sport is directed. However, it should be mentioned that due to the dynamics of the analyzed variables, it is possible that repeated measurement would bring different results, which is further discussed in the limits of the research.

We additionally measured the relationships between the analyzed variables in a divided sample across gender, where a weak relationship was indicated for women, in contrast to men. This may be related to the theoretical findings that the player-coach relationship plays a more significant role in females [109, 110].

4.5. Limits of Research

The results of this study have several limitations. First of all, it is the size of the sample and its distribution. The target sample of the research was focused very specifically – junior tennis players only at the top level. Two versions were created for the greatest possible reach. A Czech version was prepared for Czech athletes, while all foreign athletes, regardless of nationality and mother tongue, completed the questionnaire in English. Although the time limit was not set and the respondents could translate unknown information if necessary, it cannot be confirmed 100% that there was no distortion due to insufficient language skills. These were not verified in any way; we only worked with the assumption that the junior elite athletes have a sufficient level of English. A foreign language may also reduce motivation to participate in a research study.

The original intention of the study was to compare results cross-culturally. We expected a greater return on the questionnaire battery and also a higher frequency of athletes from the same countries so that differences across specific states could be compared. Unfortunately, this did not work out, and therefore only one sample was left, called foreign athletes. Even so, we decided to compare the differences with Czech athletes. We are aware that it would be desirable to verify measurement invariance before the differences detecting, however, given the small sample size, this step would not be informative at all.

In addition to the demographic data and information related to the training process, two questionnaire methods were included in the research battery, while the Coach-Athlete Relationship Questionnaire (CART-Q) and Sport Confidence Inventory (SCI) methods are not so well known yet and are not represented in the Czech Republic. For that reason, the methods for the Czech version were translated using double translation, and both versions (English and Czech) were subsequently subjected to confirmatory factor analysis, the results of which showed rather inadequate values in most cases. The main reason was probably the size of the sample, as the original studies showed acceptable values. In the case of a psychometric study, a much larger sample would be needed. This study was not aimed in this direction, but the results need to be treated with caution in this context.

One of the other possible limits is the sensitivity of the measured constructs. Relationships between the players and the coaches and sports self-confidence (mainly in athletes; see [109, 111]) have a rather dynamic character, which can be influenced by a number of phenomena from the internal and external environment. In addition, all the analyzed variables are related to performance in some way, and elite athletes who are performance-oriented could respond in the context of the current sport form. This is also confirmed by the feedback that some of them voluntarily provided. In it, they reported that they would probably answer a number of questions differently based on whether they had a successful or unsuccessful match. In this context, the one-time data collection in the middle of the competition period appears to be another of the limits of the research.

A final limitation that we are aware of is the risk of self-report scales. Top athletes in particular, used to constantly comparing themselves to someone and something, could unwittingly answer questions based on their wishes and not the way they actually have and perceive it.

5. Conclusion

The relationship between sports self-confidence and the perceived relationship between the elite junior tennis player and the coach was not found. This does not mean that this relationship cannot exist; it is just that it was not confirmed in our study. A summary of the theoretical findings and results of this study is the fact that mental well-being, performance, and the relationship between the player and the coach are related and mutually influenced in different directions. If we want to produce stable and long-term-performing athletes, we need to pay attention not only to the physiological context of a specific sport but also to the psychological ones. The coaching profession carries a huge responsibility in this direction, and building a quality relationship with the player can be a key to achieving great success together. Because, as Jowett & Shanmugam (2016) [20] argue, neither is capable of achieving this alone. These results can lead Czech national team coaches to realize that it is important to focus on building a quality relationship with athletes, perhaps somewhat more intensively than before. The results can motivate coaches and all stakeholders around top tennis to modify the ways of training and working with athletes in order to produce more satisfied, more resilient, and thus more successful individuals who will not end their careers prematurely and will not have to remember their active sports years negatively.

5.1. Recommendations for Future Research

After completing this study and realizing the limits that the choice of the research design brought with it, we suggest considering the possibilities of longitudinal research with a combination of qualitative methods. Qualitative methods can help explore the connections between the player-coach relationship and sports self-confidence in more depth. In addition, there is a greater chance of capturing the intervening variables that may enter the research.

This study is just an introduction to this issue, and future research could continue to try to find and confirm the relationships between the analyzed variables. It is important to continue to point out the role that the quality of the relationship between the player and the coach plays in the performance and mental health of the athlete. Among other things, training procedures and access to players should differ based on gender. There are other constructs that are related to the topic and that would be worth investigating, for example, the leadership of the coach, his communication skills, conflict management, etc.

6. Declarations

6.1. Author Contributions

Conceptualization, D.L. and K.B.; methodology, D.L. and K.B.; investigation, D.L. and K.B.; resources, D.L. and K.B.; writing—original draft preparation, D.L. and K.B.; writing—review and editing, D.L. and K.B. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The research was funded by project VŠDTI No. 005DTI/2021.

6.4. Acknowledgements

The authors gratefully acknowledge DTI University, Slovakia for supporting this work.

6.5. Institutional Review Board Statement

Not applicable.

6.6. Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

6.7. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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