



An Analysis of Desirable Attributes for Strength and Conditioning Coaches as Perceived by Male and Female Population of Collegiate Athletes



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DOI: <https://doi.org/10.34256/ijpefs2023>

Received: 16-04-2020, Accepted: 15-05-2020

Abstract: The present study aimed to suggest desirable attributes and characteristics for strength and conditioning coaches as perceived by the male and female population of collegiate athletes and statistically evaluate differences of perception between genders. Participants were 99 NCAA division I student-athletes (Male=56, Female=43) aged between 18-22 years of age, with a mean of 2.98 S&C sessions per week. Participants completed an electronic questionnaire to rank the importance of 17 research-based attributes through a 5-point Likert-type-scale. Descriptive statistics revealed that overall, “knowledgeable” and “communicative” were considered the most important attributes, whereas “overall size/muscularity” and “male gender” were the least desirable. With regards to perceived importance, attributes were ranked in the following order: knowledgeable, communicative, motivator, trustworthy, give positive feedback, approachable, organised, supportive, positive, honest, confident, role model, intense, physical fitness, sense of humour, overall size/muscularity, male gender. “Male gender” as an attribute was identified as the only significant difference in perception between genders ($p = .017$). The observed results are consistent with previous research that highlighted how several attributes and characteristics are important for strength and conditioning coaches. Thus, these results might foster reflection and guide personal and professional development of strength and conditioning coaches.

Keywords: Coaching, Coach attributes, Coach development, Coaching effectiveness, Coach knowledge



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1. Introduction and Overview

In the last 50 years, coaching science has become the subject of extensive discussion in scientific literature [1-3]. Historically, until the early nineteenth century, coaching knowledge was transmitted verbally by local experts, who formulated their training methods exclusively on anecdotal experience [1]. However, in the second half of the nineteenth century, with the formation of governing bodies for sport, the opposing argument was that coaches should have developed and followed mainly theoretical principles to construct their training methods [1]. This inevitably ignited the debate between theory and practice, knowledge and experience [4, 5]. Currently, sports coaching has been described as a complex discipline that focuses on the guided improvement of an individual's or team's sporting performance by manipulating and coordinating performance variables within an intervention programme in which the coach leads and manages the process towards the accomplishment of set performance objectives [6]. This develops within coaching practice and can refer to a wide spectrum of behaviours, activities and human interactions [6]. In contrast with the historical proclivity towards either oral transmission of coaching knowledge solely based on experience or the implementation of training methods predominantly based on theoretical principles; recently, it has been proposed that a coaching schematic model is effective to inform coaching development and coaching practice, where both theory and experience are indissolubly linked and of equal importance [1,7]. Supporting this, it has been reported that a professional practitioner is defined by theoretical and practical expertise resulting in effective practice [8]. The aforementioned coaching schematic model fundamentally encapsulates three broad areas of knowledge associated with expertise in coaching, as sport-specific, pedagogic (coach behaviour and critical thinking), and individual – what are referred to as the "...ologies" (e.g., exercise physiology), all linked to practical applications within an informed and effective coaching practice.

Interestingly, sports coaching and strength and conditioning coaching share similar definition and history; after all, in the majority of cases, the strength and conditioning (S&C) coaching profession shares the commonality of the word "coach", suggesting that coaching competencies and skills are arguably required [9, 10]. Early history of S&C was characterised by practitioners whose knowledge was solely experiential and anecdotal [11, 12]. Subsequently, in the mid-

1970s, with the rise of S&C coaching as a profession and the formation of a research-focused association, The National Strength & Conditioning Association (NSCA), there was a gradual shift towards theory-based knowledge [11, 12]. Additionally, with regards to its definition, it has been reported that the S&C coach is an individual who works directly with athletes to develop and optimise physical abilities to achieve the best athletic performance and reduce injuries in a given sport [13]. Interestingly, this definition suggests comparable elements with that of sports coaching suggested in the current literature [6]. Therefore, on one hand there are intrinsic differences between the two roles, where the sports coach is more orientated towards the development of technical and tactical skills, whereas the S&C coach aims to develop the athletes' physical abilities; but on the other hand arguably, given the complexity of the role of the coach, these professional figures, both classified as "coach", appear to be connected, at least from the perspective of coaching competencies and skills in the process of coaching delivery [6, 9, 10, 13].

Nonetheless, it has been described that sports coaches come from a wide variety of backgrounds [14], compared to S&C coaching, where this diversity is likely to be lower [9]. This argument is supported by studies aimed to generate S&C coaches' profiles with regards to educational background and knowledge required to be prepared as practitioners [15-21]. Questionnaire-based studies conducted in the United States on different populations of collegiate S&C coaches highlighted how there was heterogeneity with regards to academic preparation and background [16, 18-21]. Although minor differences have been reported across studies, a rather clear predominance of higher-education degrees in exercise science or physical education was reported, complemented by additional professional certifications [16, 18-21] such as the Certified Strength and Conditioning Specialist (CSCS) from the NSCA. It should be noted that the NSCA reported that a bachelor's degree should be considered a minimum requirement leading to that certification [10], suggesting that the relationship between knowledge and S&C coaches has been somewhat administered to a degree. Similarly, Gee *et al.*, (2011) conducted a study in the UK reporting comparable results with regards to academic preparation, in line with studies conducted in the USA [15, 16, 18-21]. Additionally, the findings of those studies are aligned to the suggestions proposed by a group of renowned coaches and scientists in the S&C field, who advocated that a solid preparation through higher education

studies in physical education or sports science is required for practitioners [22]. Additionally, more recently the NSCA (2017) released an updated version of professional standards and guidelines for the S&C coaching profession, suggesting that scientific foundations, and practical/applied elements are necessary domains [10]. Nevertheless, as highlighted previously, it has been suggested that coaching skills and competencies represent arguably important elements in the scope of practice of the S&C coach. Not only does this profession shares similar definition and history with sports coaching, but it has been outlined that the profession of the S&C coach involves an extensive and versatile knowledge supported by a combination of theoretical and practical competencies [10, 23, 24]. Moreover, it has been indicated how important it is for an S&C coach to possess a solid understanding of the 'art of coaching', in addition to the science behind the discipline [22]. More recently, Dorgo (2009) suggested that coaching elements such as, professional readiness, coaching responsibility, coach-athlete relationship and coaching philosophy were part of practical knowledge of an expert S&C coach [25].

In the light of this, it can be argued that S&C coaching can be aligned to the coaching schematic model proposed previously [7], in which sport-specific knowledge is given by the needs analysis of the sport, recommended for a judicious S&C coach [26]; pedagogy is paired with coaching science; and the "...ologies" correspond to higher-education studies, but of course, will always be open to speculation and further debate.

Related to the proposed coaching schematic model is the concept of coaching effectiveness, a topic that received considerable interest in coaching science [27]. Coaching effectiveness has been defined as "the consistent application of integrated professional, interpersonal, and intrapersonal knowledge to improve athletes' competence, confidence, connection, and character in specific coaching contexts" [27]. Untangling this definition, there would appear to be three components of coaching effectiveness that are identifiable, these being coaches' knowledge (professional, interpersonal and intrapersonal), athletes' outcomes, and coaching context. The coaching schematic model proposed by Abraham *et al.*, (2006) with its "...ologies", sport-specific knowledge and pedagogy [7], only refers to what has been defined as professional knowledge [28]; thus, although it might be considered a valuable model to inform

coaching practice and development, arguably it may be considered reductive as it does not elaborate on the important interpersonal and intrapersonal dimensions of coaching effectiveness, where it has been proposed that in addition to professional knowledge, effective coaches are also characterised by creating and maintaining relationships (interpersonal knowledge) and apply own reflective practice (intrapersonal knowledge) [29-31], which might be both classified as the "soft" skills of coaching [9]. Furthermore, related to the aforementioned definition of coaching effectiveness, athletes' outcomes can be described as positive changes in the athletes' competence, confidence, connection and character, while coaching context refers to the unique environment in which all coach-athlete actions occur [27]. More specifically, it was proposed that effective coaches should not only develop athletes' competence, defined as "sport-specific technical and tactical skills, performance skills, improved health and fitness, and healthy training habits" [27], but should also develop the athlete's confidence, connection and character in order to elicit positive changes and consequently, make progress [27].

Côté and Gilbert (2009) [27] developed a definition of coaching effectiveness which is based mainly on sports coaching and sport psychology literature [32, 33], but since some similarities between sports coaching and S&C coaching have been discussed previously, it is not surprising that more recently, the same definition along with its variables, has been applied to the S&C field [34]. Very interestingly, it has been suggested that factors potentially affecting the effectiveness of S&C coaches are exactly the same as the those proposed previously by Côté and Gilbert (2009) [27]. Indeed, authors reported that effective S&C coaches should develop professional, interpersonal and intrapersonal knowledge, improve athletes' outcomes in specific coaching contexts, where particular attention should be given to the latter point as it has also been highlighted that effectiveness is context specific [27, 34]. Analogously, another study on coaching effectiveness in S&C proposed similar variables for coaching effectiveness being coaches' knowledge and athletes' outcomes; additionally, the author stated that the S&C coach has the responsibility "to develop good people-as well as good athletes" [35], further supporting the concept of coaching effectiveness. Similarly, Jeffreys (2014) attempted to provide new insights into S&C coaching effectiveness by applying the Gardner's "five minds" [31, 36]. Although Gardner (2008) [36] did not

propose these “minds” for the coaching context and they do not belong to the scope of the present study, by reviewing them, Jeffreys (2014) [31] fundamentally suggested that coaches’ knowledge (professional, interpersonal, intrapersonal), athletes’ outcomes, and coaching context are the variables that might impact coaching effectiveness. Interestingly, they appear to be aligned with the definition of coaching effectiveness proposed previously by Côté and Gilbert (2009) and more recently by Gilbert and Baldis (2014) [27, 34]. Thus, it can be argued that the nature of coaching effectiveness is complex, and involved components are interconnected and equally important within coaching practice, not only in a sports coaching context, but in S&C also. Curiously, even though there appears to be a reasonable consensus on the constituents of coaching effectiveness, the interpersonal and intrapersonal constructs of coaching effectiveness are rarely covered in the education of S&C coaches, with predominance of professional knowledge [9, 11, 27, 31, 37].

Specifically referring to factors that may impact on the “soft” skills of coaching, it has been proposed that coaches’ attributes and behaviours could be key elements for coaching effectiveness and success [29, 38-40]. Although some diversities are arguably inevitable, within an elite sports coaching context, similarities have been observed in the literature with regards to effective coaches’ attributes and behaviours, from both the coaches’ and the athletes’ perspective; knowledge, communication, empathy, support, trustworthiness, positivity, honesty and professionalism have been outlined as common attributes of coaching effectiveness across the reviewed studies and literature [29, 38-42]. With regards to S&C coaching, few studies have been conducted aiming to determine leadership and coaching behaviours within an elite sport context. Massey *et al.*, (2002) investigated S&C coaching behaviours through observations and video-recording of six elite S&C coaches [43]. They proposed that “silent monitoring”, “management” and “hustle” were the most frequent observed behaviours. Furthermore, Brooks, Ziatz, Johnson and Hollander (2000) [44] surveyed 53 S&C coaches at NCAA division I level investigating leadership behaviours, suggesting how athletes preferred increased level of social support and democratic behaviour. Additionally, Magnusen (2010) [45] surveyed three S&C coaches’ populations (NBA, NCAA division I, NCAA division II), suggesting that leadership behaviours might be influenced by the potential differences in athletes, their sport and their level. Although these studies might be beneficial in guiding S&C coaching behaviour, contrastingly they do

not suggest specific coaching behaviours or particular attributes as the ones proposed in the aforementioned sports coaching literature [29, 38-42].

More recently, Greener, Petersen and Pinske (2013) [46] proposed more specific traits of successful S&C coaches as perceived by three NCAA S&C coaches listing knowledge, effective feedback, work ethic, humility, care for the athlete as some of the characteristics; nevertheless, research in S&C coaching conducted so far has investigated effective coaching behaviours and traits only from the perspective of the coach themselves [43-46], and arguably, it is also important to identify the athletes’ perceptions of the leaders’ behaviours within the sport context [47]. Recently, Szedlak *et al.* (2015) conducted an interview-based research in which eight elite international level university athletes were questioned on their perception of S&C coaches’ effective behaviours [3]. Interestingly, the study revealed comparable attributes with the ones highlighted in sports coaching literature, observed from the athletes’ perspective [29, 38, 39]. Szedlak *et al.*, (2015) proposed that trustworthiness, support, approachability, sense of humour, authenticity, positivity, role modelling, communication, effective instructions and feedback, knowledge, organisation, motivation and intrinsic confidence were the most desirable attributes for an S&C coach as perceived by athletes [3]. Similar results were reported in a descriptive questionnaire-based study by Chesters (2013) [48] highlighting how knowledge, trustworthiness, approachability, positivity and honesty were part of the important attributes for an S&C coach as perceived by a population primarily composed of professional and semi-professional athletes. Lastly, Shuman and Appleby (2016) [49] interviewed 10 collegiate student-athletes on gender preference for S&C coaches and although it was not the purpose of their study, they highlighted comparable findings indicating professionalism, trust and respect, support, dependability, and positive relationships as preferred coaching attributes. To the authors’ knowledge, these are the only studies that investigated and reported effective S&C coaches’ behaviours and attributes as perceived by athletes.

Additionally, deemed relevant for the present study, research regarding the impact and importance of coaches’ physical attributes has been limited in the field of S&C, but noteworthy in other areas such as physical education. Whitley, Sage and Butcher (1988) proposed that physical education teachers should possess a high level of cardiorespiratory fitness to

positively impact and influence their students [50]. Further supporting this argument, it has been reported more recently that students scored higher in fitness tests if their teachers were perceived as fit [51]. Fundamentally, as indicated by Gold, Petrella, Angle, Ennis and Wolley (2012) [52], physical education teachers should have the responsibility to provide students with role models by practicing health and fitness habits themselves; habits that would arguably generate a fit physique. Recently, this argument found further consensus from the National Association for Sport and Physical Education (2010, p. 1) [53] proposing that "participating in regular physical activity at a level sufficient to promote health-related physical fitness is an important behaviour for professionals in all fields of physical activity at all levels", which does include S&C. Studies that investigated the importance of physical attributes from both the coaches' and the athletes' perspective in S&C, indicated similar considerations, reporting how physical fitness, generally described as a set of attributes consisting of motor dimensions (e.g., strength, power, speed) [54], was a desirable physical attribute for S&C coaches; whilst the coaches' overall size/muscularity were not deemed as important [20, 48]. This argument is further supported by Greener *et al.*, (2013) [46] who advocated that S&C coaches that "practice what they preach" may enhance credibility, thus build trust and potentially influence positively interpersonal dimensions, ultimately affecting coaching effectiveness. As a consequence of these propositions, it might be argued that S&C coaches should exhibit health and fitness habits themselves; after all, S&C coaches by definition, should develop and optimise athletes' physical abilities and athletic performance [13], therefore, a certain degree of coherence is arguably necessary with this definition.

Furthermore, an interesting consideration for the purposes of the present study regarding physical attributes in S&C coaching is gender related. Several studies and reports conducted in a division I, II and III NCAA context across a wide timespan highlighted how S&C coaching can be considered a male-dominated profession [16, 18, 19, 21], with the latest report indicating how in division I of the NCAA the percentage of male S&C coaches was 86% [55]. As a consequence of this distribution disparity shown within the last 30 years, research studies have been conducted to investigate whether there was a gender preference towards S&C coaches from the athletes' perspective. Magnusen and Rhea (2009) [56] reported that collegiate American football male athletes were less

comfortable with a female S&C coach; and likewise, Laskowski and Ebben (2016) [57] identified that within a division I NCAA working environment, mainly with American football, there was a lack of respect from players toward female S&C coaches, who were not allowed to work with men's teams as a concern. Conversely, additional studies that investigated gender preference for S&C coaches within different sport settings, reported that in general surveyed athletes did not have a specific preference for their S&C coach; they were willing to work with either a male or a female coach providing that other desirable and effective attributes mentioned in previous sections were shown [48, 49].

In conclusion, a plethora of points related to the present study have been discussed. Although sports coaching and S&C coaching can be considered two different professions, arguably they present similarities in terms of definition, history, knowledge and competencies [6, 9, 10, 18, 22, 23]. It appears that the professional knowledge required to be S&C practitioners is well established [10, 15-23], and a valuable coaching schematic model, which can be aligned to S&C, has been proposed to inform coaching development [7] however, interpersonal and intrapersonal dimensions, the "soft" skills of S&C coaching, fundamental constituents of coaching effectiveness are rarely scrutinised and covered in the education of S&C coaches [9, 11, 27, 31, 37]. It has been suggested that coaches' attributes might have an impact on coaching effectiveness [27, 29, 39, 40], but research in S&C is limited and studies conducted previously only focused on the perspective of the coach [43-46]. More recently, studies that investigated S&C coaches' effective attributes from the athletes' perspective suggested valuable results [3, 48, 49]; however, the qualitative studies [3, 49] were restricted to eight and 10 participants, and the quantitative study [48] was only descriptive in nature without providing values of statistical significance that might contribute to an enhanced understanding of this topic. Additionally, reports that suggested desirable physical attributes and gender preference for S&C coaches from the athletes' perspective highlighted interesting results [48, 49, 56]; however, research appears to be limited and conspicuous by its absence, with areas that arguably should be further explored.

For these reasons, the present study, which will focus on the "soft" skills of S&C coaching, will aim to evaluate and compare findings to previous research, by suggesting the most desirable attributes for S&C

coaches as perceived by male and female collegiate athletes in a specific coaching context, including personality traits, physical attributes and gender; and describing differences of perception between males and females. Moreover, the current study will expand previous research as reported differences will be analysed to provide potential statistical significance. Based on the findings from previous research, where in the majority of cases no emblematic differences were observed between males and females, the formulated hypothesis of the present study will be that in the majority of cases there will not be significant differences of perception between male athletes and female athletes regarding the most desirable attributes for S&C coaches.

2. Method

2.1 Participants

Prior to commencement of the study, Cardiff School of Sport and Health Sciences under Cardiff Metropolitan University Ethics Framework approved the research procedure. Participants were 99 NCAA division I student-athletes (Male=56, Female=43) aged between 18-22 years of age, with a mean of 2.98 S&C sessions per week, enrolled at a division I school, United States of America. Participants were informed about the confidentiality, anonymity, informed consent and voluntary nature of the study. Participants represented a wide variety of team and individual sports including baseball, basketball, cross country, fencing, lacrosse, soccer, swimming, tennis, track & field, and volleyball. Depending on the sport, each participant worked consistently with either the head or the assistant S&C coach at their school. There were three inclusion criteria for participants taking part in the study; 1) each athlete worked with a coach with a minimum of three years full-time coaching experience; 2) each athlete had a certified S&C coach (CSCS or SCCC); 3) each athlete worked with the coach for one academic year (nine months) or more. These criteria were pre-determined to ensure that the participants had sufficient experience to provide well-founded data. Inclusion criteria reduced the number from 153 initial total responses to 100, where one extra participant was excluded due to incomplete data.

2.2 Procedure

An online electronic questionnaire was created using Survey Monkey (Copyright © 1999-2020) and was selected for time-efficiency, cost effectiveness,

geographical accessibility and potential increased response rate [58, 59]. No limit was placed to sample size to maximise responses. The questionnaire was based on findings from previous research in the domain [3, 48]. A pilot study was conducted at Cardiff Metropolitan University (CMU) prior to the official data collection. 27 responses from CMU athletes (Female=17, Male=10) assisted in the confirmation of the research questionnaire structure.

The questionnaire was composed of four sections; demographics, S&C experience, personality traits, and physical attributes. Demographics section was relevant to make a distinction between genders for the purpose of the present study. S&C experience section was important to verify inclusion criteria. Sections of personality traits and physical attributes were structured with a 5-point Likert-type-scale where participants were asked to rank the importance of the presented attributes, from absolutely non-important being 1, to absolutely important being 5. Presented attributes were; knowledgeable, role model, intense, motivator, positive feedback, communicative, trustworthy, supportive, honest, organised, approachable, confident, positive, sense of humour, overall size/muscularity, physical fitness and male gender, being in total 17. An odd number was selected so that the majority of cases of potentially significant differences of perception between males and females could be identified to either confirm or reject the research hypothesis. Questions were predominantly close ended except from question seven, where participants were asked to suggest any other characteristic deemed important for S&C coaches.

The researcher had direct communication with the S&C staff at the division I school due to the completion of an internship within that department. The intentions of the researcher to conduct a study within that working environment were notified by email to the head of the department prior to the official start of the internship. For transparency, an information sheet indicating the nature and aims of the current study was provided, and the permission to obtain the student-athletes' contact list was requested. This was brought to the attention of a senior representative of the school with the authority to provide the requested contact list, that was successfully provided. Firstly, participants were contacted by email, with the aforementioned information sheet and the questionnaire's link. Following this, two follow-up messages were sent to maximise responses.

2.3 Data analysis

Two independent samples being male and female student-athletes generated ordinal data, as a Likert-type-scale was used to rank the importance of each attribute [58, 60, 61]. Descriptive statistics aimed to identify mean scores and medians of the ranked importance for each attribute, as perceived by male and female population through the 1-to-5 Likert scale. Subsequently, for all 17 attributes, each sample's dataset was tested for normality using four indicators that were z -score for kurtosis; z -score for skewness, where both these values had to fall between ± 1.96 to pass the normality assumption for $\alpha = 0.05$ [61]; Kolmogorov-Smirnov test; and Shapiro-Wilk test, where results had to be non-significant ($p > .05$) for the data to be considered normally distributed [60].

13 attributes out of 17 met all four criteria to be considered not normally distributed. Four attributes however (intense, sense of humour, overall size/muscularity, physical fitness), although kurtotic and skewed to some extent, presented z -scores for both kurtosis and skewness within a range of normal distribution. Nevertheless, Kolmogorov-Smirnov and Shapiro-Wilk Tests showed significant p values highlighting not normal distribution [60]. In addition to z -scores and normality tests, overall, the samples' data were considered not normally distributed as it has been suggested that the discrete nature of Likert scale is conducive to non-normality [62], and that ordinal scales and data should be analysed with nonparametric statistics [58, 60]. Therefore, Mann-Whitney Test was conducted to statistically evaluate the differences between the two independent samples, in relation to ranked importance for each attribute, analysing and comparing the individual scores obtained through the 1-to-5 Likert scale. Statistical significance value was accepted at ($p < .05$).

3. Results

Figure 1 shows the attributes ranked by importance with mean scores obtained from the whole sample. This provides an indication of the most desirable attributes for S&C coaches as perceived by athletes within the present study. It can be seen that personality traits are considered more important than physical attributes reported in the lower portion of the graph.

Figure 2 reports the mean scores of ranked importance for each attribute as perceived by male and female population, providing the differences of

perception between the two samples. Perceptions of importance for each attribute appear to be rather similar between the two samples. It can be observed that "sense of humour" and "male gender" show the most notable differences.

4. Discussion

The present study focused on the "soft" skills of S&C coaching, aimed to evaluate and compare findings to previous research in the domain, by suggesting the most desirable attributes for S&C coaches as perceived by male and female population of collegiate athletes. Moreover, as the set hypothesis stated that in the majority of cases there were no significant differences of perception between male and female athletes regarding the most desirable attributes for S&C coaches, the present study also aimed to either confirm or reject this hypothesis.

This study confirmed that from the proposed personality traits and attributes within the questionnaire; knowledgeable, role model, intense, motivator, positive feedback, communicative, trustworthy, supportive, honest, organised, approachable, confident, and positive, were considered by the entire sample important attributes for S&C coaches, reporting mean scores between 3.93 and 4.89 on the 1-to-5 Likert scale, with "knowledgeable" registering the highest mean score of 4.89. "Overall size/muscularity" registered a mean score of 2.71 being in between "non-important" and "somewhat important", with the majority of responses given for these two categories. It might be argued that this attribute does have some degree of importance, but overall, it did not score high enough to be considered somewhat important. "Male gender" registered the lowest mean score of 1.65, thus being considered non-important as an attribute. "Sense of humour" and "physical fitness" scored 3.65 and 3.67 respectively indicating a level of importance between somewhat important and important.

The responses to the open-ended question on additional desirable attributes for S&C coaches reporting comments such as: "*Everything is ok*", or: "*Just everything mentioned above*", and: "*Those covered most of the attributes*", might be arguably considered a reiteration of the attributes ranked with the Likert scale in the questionnaire.

Reported mean scores of ranked importance for each attribute as perceived by male and female population highlighted comparable data with no

apparent emblematic difference between the two samples. The most “notable” differences were shown by “sense of humour” (males = 3.5 - females = 3.84), and “male gender” (males = 1.8 - females = 1.44).

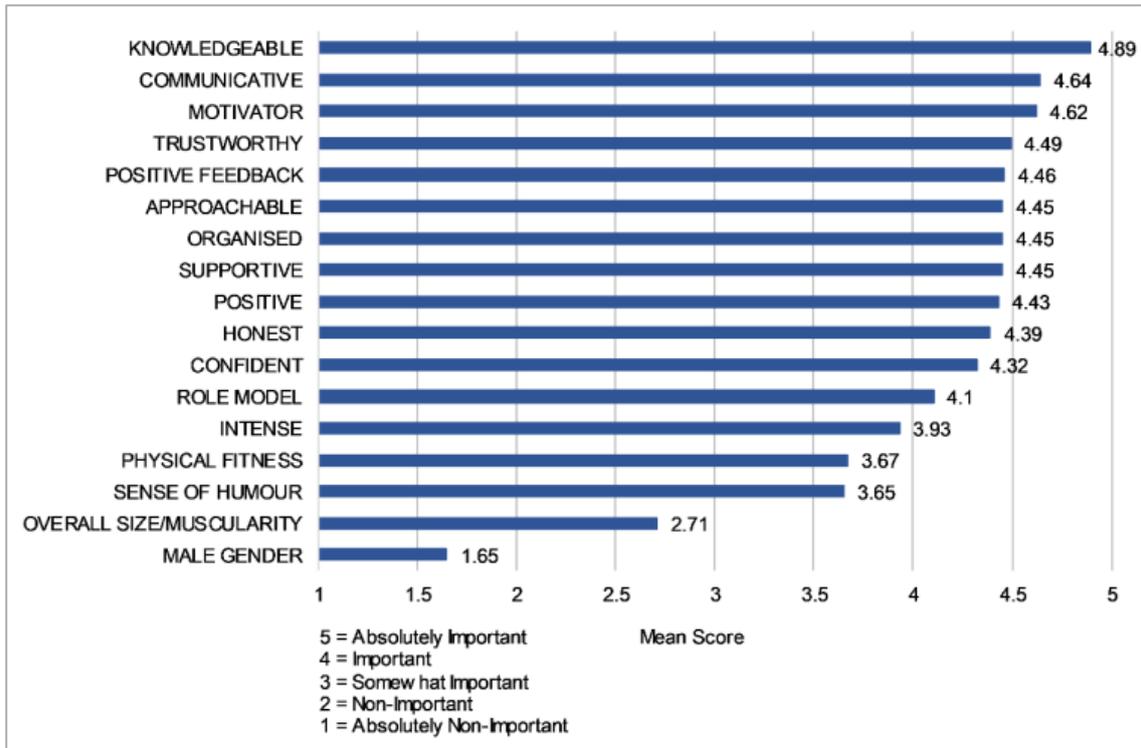


Figure 1 Attributes ranked by importance - mean scores of the 5-point Likert data of the whole sample.

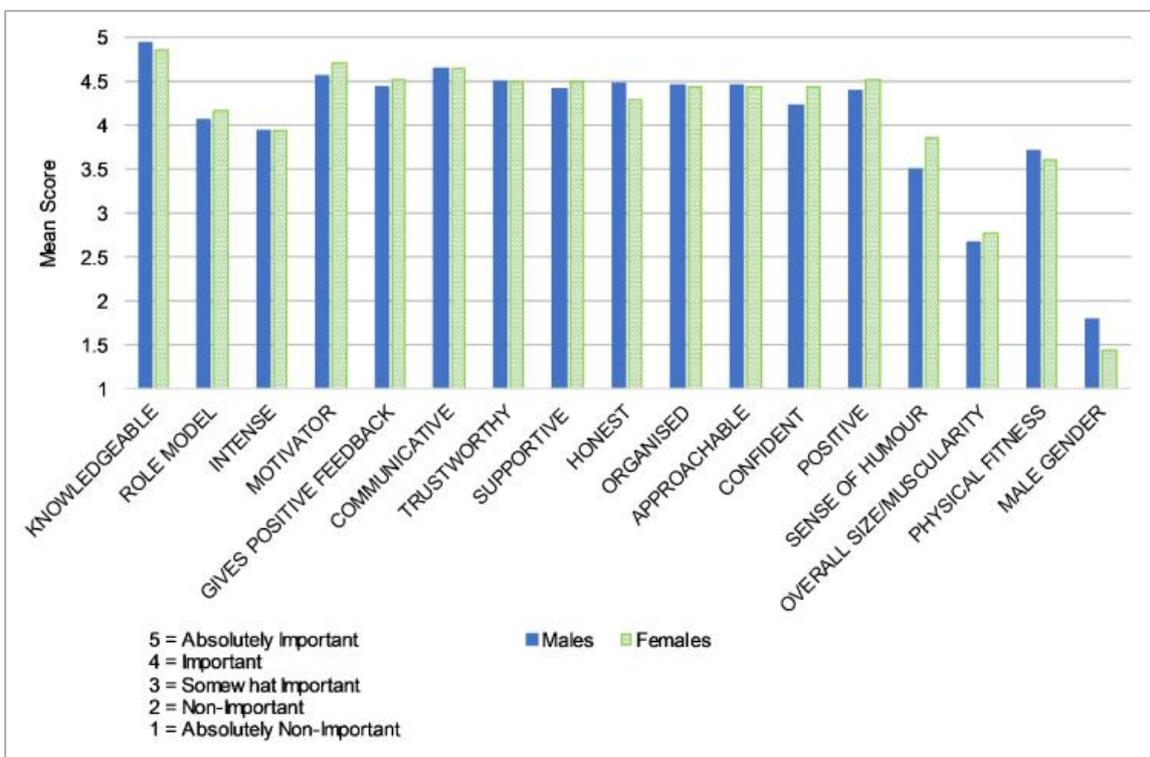


Figure 2 Differences of ranked importance for each attribute between male and female population – mean scores of the 5-point Likert data.

Table 1 reports samples distribution, mean scores, medians and Mann-Whitney p values relative to both samples. Following the description of Figure 2, it can be noted that the most significant p values are associated with "sense of humour" and "male gender".

Table 1 Samples' Distributions of the 5-Point Likert Data (1 Absolutely Non-Important, 2 Non-Important, 3 Somewhat Important, 4 Important, 5 Absolutely Important), Mean Scores, Medians, and Mann-Whitney p value for each Attribute

Attribute	Males (n=56)							Females (n=43)							Mann-Whitney p value
	1	2	3	4	5	Mean	Median	1	2	3	4	5	Mean	Median	
Knowledgeable	0	0	0	4	52	4.93	5	0	0	0	7	36	4.84	5	.154
Role Model	0	3	9	26	18	4.05	4	0	0	9	18	16	4.16	4	.619
Intense	0	3	16	19	18	3.93	4	0	1	11	21	10	3.93	4	.923
Motivator	0	0	4	17	35	4.55	5	0	0	1	11	31	4.70	5	.270
Positive Feedback	0	0	5	22	29	4.43	5	0	0	4	13	26	4.51	5	.458
Communicative	0	0	3	14	39	4.64	5	0	0	2	12	29	4.63	5	.845
Trustworthy	0	0	3	22	31	4.50	5	0	0	3	16	24	4.49	5	.978
Supportive	0	0	6	21	29	4.41	5	0	0	1	20	22	4.49	5	.739
Honest	0	0	4	21	31	4.48	5	0	0	6	19	18	4.28	4	.142
Organised	0	0	7	16	33	4.46	5	0	0	1	22	20	4.44	4	.522
Approachable	0	1	6	15	34	4.46	5	0	0	3	18	22	4.44	5	.560
Confident	0	1	10	20	25	4.23	4	0	0	4	16	23	4.44	5	.227
Positive	0	1	8	16	31	4.38	5	0	0	3	15	25	4.51	5	.532
Sense of Humour	1	9	20	13	13	3.50	3	0	3	10	21	9	3.84	4	.098
Overall Size/Muscularity	4	23	19	8	2	2.66	3	4	10	22	6	1	2.77	3	.381
Physical Fitness	1	2	22	18	13	3.71	4	0	3	17	17	6	3.60	4	.524
Male Gender	21	28	4	3	0	1.8	2	26	15	2	0	0	1.44	1	.017

Inferential statistics, used to confirm or reject the research hypothesis, have shown that for 16 attributes out of 17 in total, there were no statistically significant differences of perception between male and female collegiate athletes regarding the most desirable attributes for S&C coaches; therefore, the hypothesis of the present study was confirmed. The only attribute that presented a significant difference was "male gender" (p value = .017); however, Table 1 indicates that this difference was mainly influenced by the number of responses given by each sample for the "absolutely non-important" and "non-important" categories; thus, although this difference was reported as significant, overall, "male gender" was considered non-important by both samples.

The outlined results regarding personality traits and attributes appear to be consistent with a previous study where attributes such as knowledge, trustworthiness, approachability, positivity and honesty were reported as important for S&C coaches [48]. Furthermore, these findings concur with a more recent study that highlighted how trustworthiness, support, approachability, sense of humour, authenticity, positivity, role modelling, communication, effective instructions and feedback, knowledge, organisation, motivation and intrinsic confidence were desirable attributes for S&C coaches [3]. Additionally, Szedlak *et al.*, (2015) [3] proposed that effective instructions, communication skills and technical knowledge are interlinked, therefore, within the present study, arguably it is not surprising that "knowledgeable" and "communicative" scored the highest mean scores. Moreover, interestingly, the observations are consistent with other studies in sports coaching literature that showed how knowledge, communication, empathy, support, trustworthiness, positivity, honesty and professionalism were considered important coaches' attributes in the athletes' opinion [29, 38]. With regards to physical attributes, the reported findings are consistent with previous research in S&C that reported how physical fitness was a valuable attribute for S&C coaches as opposed to overall size/muscularity which were considered non-essential [20, 48]. Finally, results on gender are broadly consistent with previous research in S&C highlighting how "male gender" was not considered an important attribute for S&C coaches [48, 49]; however, these findings are in contrast to some reports that highlighted how collegiate American football athletes were less comfortable training with a female S&C coach, showing some concerns [56, 57]; suggesting that this case might be arguably isolated within American football. The current study, however,

did not have collegiate American football athletes within its population.

Although the results presented may provide an indication of desirable attributes for S&C coaches as perceived by collegiate student-athletes, few limitations to the present research have been identified. Firstly, although there was a relatively high response rate, all participants were recruited within the same university, with potential flaws for generalisability. Secondly, caution should be taken when interpreting the results presented because of the nature of the Likert scale, where distance between numbers should not be considered equal and perception may change from individual to individual. In addition, a more structured method of analysis for the open-ended question could have been implemented to potentially capture additional insights, even though arguably there was insufficient data to analyse.

Overall, the importance of a wide and diverse range of S&C coaches' attributes and characteristics in a specific coaching context has been reported. The fact that multiple attributes were considered important in the athletes' perception, further supports the thesis that coaches' attributes and traits might be key elements for coaching effectiveness [29, 38, 40]. Furthermore, the diversity of attributes deemed important by the studied population suggests that coaching practice is not a structured and schematic environment, but rather dynamic and complex, which is more about adaptation and regulated improvisation [63], making the interpersonal and intrapersonal dimensions of coaching effectiveness fundamental within an informed S&C coaching practice [31, 34, 35].

To the authors' knowledge, only two other studies purposefully aimed to provide specific and effective S&C coaches' attributes as perceived by athletes [3, 48]. The present study was the first to attempt a statistical evaluation of differences of perception between male and female collegiate athletes with regards to desirable S&C coaches' attributes, and although in the majority of cases statistically significant differences were not observed, obtained results were compared to previous research in order to be evaluated and confirmed.

5. Conclusion

In conclusion, the present study was conducted within a contained geographical region; however, as results appear to be consistent with previous findings observed in different geographical

locations and similar coaching contexts, it might be suggested that these results provide a useful indication of desirable attributes for S&C coaches in an elite collegiate coaching context.

Nonetheless, this barely starts to investigate the vastness and the complexity of interpersonal and intrapersonal dimensions of S&C coaching effectiveness. Therefore, this area of inquiry should be further explored, and future research might aim to suggest S&C coaches' desirable attributes in addition to potential differences, across a variety of sports, different levels of competition and various coaching contexts. In addition, given the observed complexity of coaching effectiveness, future research might aim to confirm or contrast the findings of the present study.

As practical applications, firstly, these findings provide S&C practitioners with examples of desirable and important attributes as perceived by male and female population of collegiate athletes. Secondly, considering the intrinsic importance of all coaching effectiveness components, the reported results might foster reflection, and guide the professional and personal development of S&C practitioners so that ultimately, they might become more effective with their athletes, within their specific coaching context.

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Funding

This study was not funded by any grant.

Conflict of interest

None of the authors have any conflicts of interest to declare.

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