



Preferred strength and conditioning coaching leadership behaviours of NCAA Division I and II Collegiate student-athletes based on sex



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Abstract: The present study aimed to examine collegiate student-athletes' preferences of leadership behaviours in strength and conditioning (S&C) coaching and evaluate differences between athletes' preferred leadership behaviours based on participants' sex. 145 (male = 80, female = 65) National Collegiate Athletic Association (NCAA) Division I and II student-athletes aged between 18-25 years, with a mean of 3 (SD = ± 1) strength and conditioning sessions per week participated in the study. Participants completed an electronic questionnaire involving the athletes' preference version of the Revised Leadership Scale for Strength and Conditioning (RLSSC). Summary statistics revealed that the most preferred behaviour was 'training and instruction', median of 4.5 (IQR = 1.0), and the least preferred was 'autocratic', median of 2.0 (IQR = 0.5). Similar results were observed for both groups. Males preferred autocratic behaviour more than females (male = 2.5, female = 2.0). Statistically significant difference was identified between groups for autocratic behaviour ($p = .001$). Effect sizes indicated that the magnitude of differences between groups was small or moderate, with the highest value for autocratic behaviour ($d = 0.5$). The observation of marginal statistically significant difference aligns with previous research, suggesting sex-related differences. However, small and moderate effect sizes indicate that differences are not practically significant enough to encourage distinct coaching approaches. This study sheds light on the preferences of coaching behaviours among student-athletes in strength and conditioning coaching. The findings emphasise the importance of positive psychosocial behaviours such as training and instruction, positive feedback, situational considerations and social support. While there were slight differences between the sexes, results suggested that both groups valued positive coaching behaviours. These findings provide implications for coaching practice and offer a basis for further research to explore leadership coaching behaviours in strength and conditioning.

Keywords: Coaching, Coaching Behaviour, Leadership, Coaching Effectiveness, Strength and Conditioning

1. Introduction

The terms 'coach' and 'strength and conditioning' are most frequently used in strength and conditioning job titles. Deconstructing the job title suggests that the strength and conditioning coaching discipline combines broad areas of knowledge related to strength, conditioning, and coaching. The aforementioned job title is a relatively young discipline, and since its recognition as a profession in 1978, when the National Strength and Conditioning Association was founded (Kraemer *et al.*, 2017), most studies have been conducted on what can be referred to as the profession's -ologies (e.g., anatomy, physiology,

biology, biomechanics, training science). This development occurred organically and logically, as multiple authors in strength and conditioning coaching and other coaching disciplines identified how specialist knowledge is required for specific coaching roles. For instance, executive coaches may have a background in business or social sciences (Brooks & Wright, 2007; Salter & Gannon, 2015), most coaching psychologists are qualified psychologists (Law, 2013; Salter & Gannon, 2015), and sports coaches possess sport-specific, pedagogical and scientific knowledge (Abraham *et al.*, 2006; Nash & Collins, 2008). Therefore, strength and conditioning coaches are

expected to know the aforementioned -ologies (Hartshorn *et al.*, 2016). Since all four disciplines include 'coach' in their title, it raises the question of whether there is a link between these coaching disciplines or if they have inappropriately adopted the term.

Although not free from limitations, coaching can be defined as a human development process involving focused interaction and strategies to foster desirable and sustainable change for the benefit of the coachee (Bachkirova *et al.*, 2018). Consequently, authors in executive coaching, coaching psychologists, sports coaching, and strength and conditioning coaching have suggested that in addition to specialist knowledge, there are crossovers across disciplines, where behaviours, interpersonal skills, and quality of relationships may be valuable elements (Gilbert & Trudel, 2004; Whybrow, 2008; Baron *et al.*, 2011; Boyce *et al.*, 2010; Critchley, 2010; Passmore, 2010; Berg & Karlsen, 2012, Gilbert & Baldis, 2014; Griffo *et al.*, 2019; Fraser *et al.*, 2022).

The proposed commonalities across coaching disciplines is further supported by the interconnections reported between leadership, coaching effectiveness, and coaching behaviour (Cummins *et al.*, 2018). Cummins *et al.* (2018) suggested that the underlying assumption of coaching effectiveness research is that coaches' behaviour can significantly impact (either positively or negatively) an athlete's performance and psychological and emotional well-being, and most importantly, coaching effectiveness relates to coaches' leadership skills and behaviours. Therefore, because of the links between coaching disciplines and between leadership, coaching effectiveness, and coaching behaviour, in the last 50 years of sports coaching research, coaching behaviours and preferred leadership styles for successful coaching are some of the leading researched subjects (Gilbert & Trudel, 2004; Griffo *et al.*, 2019), with over 300 studies published between 1998 and 2015.

The evolution of research methods and paradigms in strength and conditioning coaching research, particularly concerning coaching behaviours, has mirrored the trend observed in sports coaching. Over time, there has been a transition from a predominantly quantitative to a qualitative approach, leading to a balance between the two. This pattern is also reflected in the proportion of studies embracing these different research avenues in strength and conditioning coaching (Brooks *et al.*, 2000; Fraser *et al.*, 2022). Nonetheless, despite the commonalities

between coaching disciplines and the amount of attention dedicated to the study of coaching behaviours and leadership styles in sports coaching research, the number of studies devoted to the study of coaching behaviours in strength and conditioning coaching from 2000 to 2023 is limited indicating an evident lack of strength and conditioning coaching research concerning the study of these topics.

Historically, a good fit for studying leadership behaviours in sports contexts has been the multidimensional model of leadership (MDML) (Chelladurai, 1978, as cited in Chelladurai & Saleh, 1980; Chelladurai, 1993, 2007). The MDML, extensively used for the past 40 years (Arthur & Bastardo, 2020), was developed by incorporating previous leadership theories that were prominent in organisational and psychology literature (Fiedler *et al.*, 1963; Fiedler, 1967, as cited in Chelladurai & Kim, 2023; Yukl, 1971). The MDML depicts a pathway that indicates antecedents of behaviour (situational, leader, and member characteristics), central mechanisms (required, actual, and preferred leader behaviour), and outcomes (satisfaction and performance). Central mechanisms mediate the link between characteristics and outcome, where the congruence between actual leader behaviours and the followers' preferred and required behaviours will determine member satisfaction and group performance (Chelladurai, 1993, 2007; Arthur & Bastardo, 2020).

Based on the MDML, Chelladurai and Saleh (1980) developed the leadership scale for sport (LSS) widely used in sports leadership research (Chelladurai & Carron, 1981; Yenen *et al.*, 2023); a 40-item scale with five behavioural dimensions to measure leadership behaviours in sports, including training and instructions, democratic and autocratic behaviour, social support, and positive feedback. Three scale versions have been developed: athlete-reported coach behaviour, athlete-reported preferred leader behaviour, and leader self-reported behaviour. However, according to Zhang *et al.* (1997), LSS lacks a dimension for situational considerations. To address this, they produced the revised leadership scale for sport (RLSS), a 60-item scale with the same quantification and measurement versions as the LSS but with the additional dimension of situational considerations.

Although strength and conditioning coaching is under-researched, studies have adopted various methodologies that reflect a shift in sports coaching research, including the use of scales (Chesters, 2013;

Lee *et al.*, 2013; Radcliffe *et al.*, 2013; Eisner *et al.*, 2014; Greenslade & Williams, 2019; LaPlaca & Schempp, 2020; Tiberi & Moody, 2020; Quartiroli *et al.*, 2022), observations (Massey *et al.*, 2002; Gallo & DeMarco, 2008), reviews (Gilbert & Baldis, 2014; Fraser *et al.*, 2022; Jones & Newland, 2022), interviews (Dorgo, 2009; Szedlak *et al.*, 2015; Gillham *et al.*, 2016; Shuman & Appleby, 2016; Gillham *et al.*, 2017; Radcliffe *et al.*, 2018; Foulds *et al.*, 2019; Gillham *et al.*, 2019; Szedlak *et al.*, 2022), and original methods (Szedlak *et al.*, 2018), investigating both the coaches' and athletes' perspectives of effective strength and conditioning coaching behaviours.

Only two articles adopted the LSS and the RLSS in strength and conditioning coaching research (Brooks *et al.*, 2000; Magnusen, 2010); however, these studies had low internal consistency in the modified version of the LSS used by Brooks *et al.* (2000) and unvalidated language modifications in the RLSS used by Magnusen (2010). Additionally, both studies used the self-reported leader behaviour version capturing coaches' evaluations and not athletes' preferences. These limitations were addressed by Gearity (2003), who introduced the Revised Leadership Scale for Strength and Conditioning (RLSSC).

Following the MDML pathway (Chelladurai 1993; Arthur & Bastardo, 2020), it was indicated how individual members' characteristics like sex, personality, age and ability level, and situational characteristics like sport type, organisational goals and culture could determine preferred leadership behaviours, and within sports coaching research, Arthur and Bastardo (2020) reported how, historically, these variables have been studied to suggest differences in preferred leadership behaviours. When looking at individual members' characteristics as determinants of preferred leadership behaviours, although some strength and conditioning studies have reported on the members' sex, it was either not of primary interest (Chesters, 2013; Szedlak *et al.*, 2015; Foulds *et al.*, 2019), or to address a different study aim (Magnusen & Rhea, 2009; Eisner *et al.*, 2014; Shuman & Appleby, 2016), with two studies measuring differences between sexes (Lee *et al.*, 2013; Tiberi & Moody, 2020). However, none of the conducted studies used the RLSSC to explore members' preferences towards leadership behaviours in strength and conditioning coaching nor assessed potential variations between sexes using data from the preference version of the RLSSC.

The present study aims to investigate members' preferences of leadership behaviours in strength and conditioning coaching using the preference version of the RLSSC (Gearity, 2003). Additionally, differences between members' preferred leadership behaviours in strength and conditioning coaching based on members' sex were examined for each of the six behavioural dimensions of the RLSSC.

2. Methods

2.1 Participants

A total of $n = 145$ (male = 80, female = 65) National Collegiate Athletic Association (NCAA) Division I and II student-athletes participated in the study. Participants represented a wide range of sports: American football ($n = 18$), baseball ($n=9$), basketball ($n=12$), bowling ($n=1$), cross country ($n=3$), fencing ($n=6$), football ($n=10$), golf ($n=1$), hockey ($n=1$), lacrosse ($n=16$), rowing ($n=12$), softball ($n=8$), swimming ($n=15$), synchronised skating ($n=2$), tennis ($n=5$), track and field ($n=17$), and volleyball ($n=9$). The participants were between 18-25 years of age, and average weekly strength and conditioning sessions over one academic year (9 months) were 3 per week ($SD = \pm 1$). There were three main criteria for participant inclusion: i) each participant had to be an NCAA DI or DII student-athlete; ii) each participant had trained at least one academic year (9 months) under the supervision of a strength and conditioning coach; iii) each participant had trained on average at least two times per week in that academic year to ensure participants had sufficient experience. These criteria reduced the original sample from 236 total responses to 162, with 74 participants not meeting all inclusion criteria. The sample was further reduced to 145 since 17 participants only provided partial responses.

2.1 Ethical considerations

The Cardiff School of Sport & Health Sciences approved the study. In line with recent ethical considerations (Thomas *et al.*, 2023), openness and honesty were addressed by providing an information sheet describing the voluntary nature of the study, where participants had the right to withdraw at any point during the survey completion. Contacted institutions and participants were informed that consent was provided by completing the questionnaire and that collected data was strictly confidential and anonymised. Furthermore, all data was stored on an

encrypted cloud storage (OneDrive) and on a password-protected computer to ensure data security.

2.2 Instrumentation

The current research used an online questionnaire created on SurveyMonkey software (Momentive); the questionnaire comprised demographic and strength and conditioning questions to confirm inclusion criteria and the athlete preference

version of the RLSCC (Gearity, 2003). The RLSCC is an instrument based on the LSS and RLSS (Chelladurai & Saleh, 1980; Zhang *et al.*, 1997) developed and validated to measure strength and conditioning coaching leadership behaviours in sports contexts. Three versions are available - athlete preference, athlete perception, and coach self-evaluation. Given the exploratory nature and aims of the present study, the athlete preference version was used.

Table 1. Revised Leadership Scale for Strength and Conditioning Behaviour Dimensions

Coaching Behaviour Dimension	Behaviour aimed at	Sample item from the RLSCC Preference Scale
		"I prefer my strength and conditioning coach to..."
Autocratic	Making independent decisions, stressing personal authority, using commands and punishment, acting without considering the feelings and thinking of the athletes, and prescribing the ways to get work done.	Disregard athletes' fears and/or dissatisfactions.
Democratic	Allowing participation by the athlete in decisions about group goals, practice methods and strategies, respecting and accepting the athletes' rights, encouraging the athletes' involvement in personnel selection and performance evaluation, admitting mistakes and confronting problems.	Let the athletes decide on strength and conditioning exercises to be used in a workout.
Positive Feedback	Reinforcing the athletes by recognising and rewarding good performance, encouraging an athlete after making a mistake, correcting the behaviour rather than blaming the athletes, and appropriately complimenting the athletes and using body language.	Express appreciation when the athlete performs well during workouts.
Situational Considerations	Considering situational factors, such as time, game, environment, individual, sex, skill level, and health condition, setting individual goals and clarifying ways to reach the goals, differentiating coaching methods at different maturity stages and skill levels.	Adapt coaching style to suit the situation.
Social Support	Providing the athletes with psychological support, which is indirectly related to athletic training or competition, helping the athletes with personal problems, providing for the welfare of the athletes, establishing a friendship, positive group atmosphere, and warm interpersonal relations with the athletes, making sports part of the enjoyment of an athlete's life, protecting the athletes from any outside harm.	Stay interested in the personal well-being of the athletes.
Training and Instruction	Improving the athlete's performance by emphasising and facilitating hard and strenuous training, instructing the athletes in the skills, techniques of the sport, providing the athletes with facilities, equipment, and practice methods that allow for the safety of the athletes, planning training practices and evaluating the athlete's performance, having knowledge and being responsible.	Possess good knowledge of strength and conditioning.

Sixty leadership items in the RLSSC are distributed randomly among six dimensions of coaching leadership behaviour: autocratic (8), democratic (12), positive feedback (12), situational considerations (10), social support (8), and training and instruction leader behaviour (10). Definitions and examples are provided in Table 1. The individual items contained in this 5-point Likert scale represent the athletes' preferences of the frequencies of specific behaviours that a strength and conditioning coach may exhibit where 1 is 'never' 0% of the time, 2 is 'seldom' 25% of the time, 3 is 'occasionally' 50% of the time, 4 is 'often' 75% of the time, and 5 is 'always' 100% of the time. Each item is preceded by the phrase 'I prefer my strength and conditioning coach to...'

2.3 Procedures

Participants were recruited *via* e-mail communication. All NCAA institutions (Division I, II, and III) were identified using the NCAA website (NCAA Directory, 2023) and the e-mail addresses for the Athletic Directors, Compliance Officers, and Administrative Assistants were gained from each institution's website. On occasion, only one of the e-mail addresses was available on the institution's website; however, 1,118 institutions were identified, and 2,839 e-mails were sent. The e-mail requested that the athletic department of each institution disseminate the questionnaire on behalf of the researcher to reach and protect student-athletes from any potential power relationships with coaches and safeguard their privacy while offering them the opportunity to participate in the study. The e-mail described the study and provided the information sheet and a link to complete the questionnaire *via* Survey Monkey. Reminder e-mails were sent every week for four weeks. The survey was closed after the fifth week. A multi-modal approach was selected by contacting one, two or three people as intermediaries at each institution to increase the likelihood of dissemination and maximise participant response rate. No Division III institutions were included due to a lack of responses.

2.4 Data Analyses

Results from various sports and sexes were pooled together to provide summary data. The non-dependent variable was sex, with two independent groups: 1) male and 2) female. The dependent variables were the six dimensions of coaching leadership behaviour: autocratic, democratic, positive

feedback, situational considerations, social support, training and instruction. Summary statistics were used to indicate the preferences concerning strength and conditioning coaching leadership behaviours of the total pool of student-athletes and describe differences between the two independent groups (male and female). Median scores, interquartile ranges (IQRs), mean scores, standard deviations (SD) and effect sizes were used in describing the data. For all participants, preference scores were calculated by summing the scores of all the items in a specific coaching dimension and dividing by the number of items in that dimension (Chelladurai & Saleh, 1980; Zhang *et al.*, 1997; Gearity, 2003). Because of the ordinal nature of the RLSSC, median scores were used to estimate central tendencies (excluding the calculation of effect sizes, where means were used). We used Cohen's *d* as the effect size statistic to indicate the practical significance of group differences for each coaching dimension; where $d = \bar{x}_A / s_p$, \bar{x}_A = difference between the male and female sample means, s_p = the pooled SD = $\sqrt{[(s_1^2(n_1-1) + (s_2^2(n_2-1)))/(n_1+n_2-2)]}$, s_1 = SD for males, s_2 = SD for females, n_1 = sample size for males, and n_2 = sample size for females (Cohen, 1988). To provide a more easily understood framework, and given the study's exploratory nature, median scores calculated for each participant were categorised as either 'preferred' or 'not preferred' and interpreted according to values, where median scores ≤ 2.59 indicated 'not preferred' behaviours (never and seldom), and scores ≥ 3.40 indicated 'preferred' behaviours (often and always). While the response 'occasionally' (median score between 2.60 to 3.39) could be considered in either category, it was not included in either of the two preference groups. Because of the assumptions of comparing two independent groups, and the ordinal nature of the data, the median differences between groups (male and female) were tested for each of the six dependent variables (coaching leadership behaviour dimensions) using a Mann-Whitney U test (Corder & Foreman, 2014; Abbott, 2017). The level of statistical significance was accepted at $p < .05$ throughout the analyses.

2.5 Validity and Reliability

The RLSSC underwent minor linguistic adjustments by its author (Gearity, 2003) to enhance its applicability to strength and conditioning coaching. These alterations may have influenced the scale's validity. However, Gearity (2003) submitted the modified scale to review by Dr. Zhang, the lead author

of the RLSS (Zhang *et al.*, 1997), who affirmed that changes made were deemed insignificant to compromise the instrument's validity.

The reliability of the RLSSC was considered acceptable after Cronbach's alpha coefficients were reported (Gearity, 2003). However, this widely used measure of reliability for scales that describes the inter-relatedness of the items within the test is a property of the scores on a test from a specific sample of testees (Tavakol & Dennick, 2011). Therefore, within the present project, values of Cronbach's alpha were calculated to address the reliability of each coaching behaviour dimension, where values in the range of 0.60 and 0.90 were considered acceptable (Taber, 2018).

3. Results

3.1 Coaching preferences of the total pooled sample

Preferences of coaching behaviour of the total pooled sample of student-athletes are reported in Table 2. The participants' most preferred behaviour was training and instruction, median = 4.5, followed by situational considerations and positive feedback, median = 4.0, social support behaviour, median = 3.5, democratic behaviour, median = 3.0, and autocratic behaviour, median = 2.0. The variability of responses appears similar for the six coaching dimensions. The highest variability, reflected by the SDs, was recorded for positive feedback behaviour (SD = ± 0.6) and the smallest variability was for situational considerations behaviour (SD = ± 0.4), suggesting a small difference

in standard deviations for all six coaching dimensions. The interquartile ranges also indicated a small to moderate variability, with the highest being for positive feedback behaviour (IQR = 1.5), and the smallest for autocratic behaviour (IQR = 0.5).

3.2 Coaching preferences based on sex

The median scores for male and female participants were similar (Table 3). Females and males responded with the same preference for the six coaching dimensions, expressing identical median scores. Autocratic behaviour indicated a difference of 0.5 of a scale unit difference, where males preferred this behaviour more so than females (female median = 2.0, male median = 2.5). Effect sizes indicated that the magnitude of difference between the preference scores of female and male participants was small or moderately small for all six coaching behaviour dimensions, where autocratic showed the highest effect size (Table 3). The variability indicated by interquartile ranges appears to be small to moderate for both males and females, with positive feedback for females showing the highest value of 1.5.

Table 4 reports the results of the comparative analyses between females and males for coaching leadership behaviours. The results show that there were non-statistically significant differences between groups for training and instruction ($p = .482$), situational considerations ($p = .647$), social support ($p = .288$), positive feedback ($p = .145$), and democratic behaviour ($p = .206$). Statistically significant difference was identified between groups for autocratic behaviour ($p = .001$).

Table 2. Overall summary statistics for the coaching preferences of the total pool of athletes

Coaching Behaviour Dimension	<i>n</i>	<i>Mean</i>	<i>SD</i>	<i>Median</i>	<i>IQR</i>
Training and Instruction Behaviour	145	4.3	0.4	4.5	1.0
Positive Feedback Behaviour	145	3.9	0.6	4.0	1.5
Situational Considerations Behaviour	145	3.9	0.4	4.0	1.0
Social Support Behaviour	145	3.3	0.5	3.5	1.0
Democratic Behaviour	145	3.3	0.6	3.0	1.0
Autocratic Behaviour	145	2.5	0.5	2.0	0.5

1 = never; 2 = seldom; 3 = occasionally; 4 = often; 5 = always

Table 3. Summary statistics and effect sizes for coaching preferences of the total pooled sample grouped by athletes' sex.

Coaching Behaviour Dimension	<i>n</i>	<i>Mean</i>	<i>SD</i>	<i>Cohen's d</i>	<i>Median</i>	<i>IQR</i>
Training and Instruction Behaviour						
Female	65	4.3	0.4	0.1	4.5	1.0
Male	80	4.3	0.5		4.5	1.0
Positive Feedback Behaviour						
Female	65	3.8	0.6	0.2	4.0	1.5
Male	80	3.9	0.6		4.0	1.0
Situational Considerations Behaviour						
Female	65	3.9	0.3	0.0	4.0	1.0
Male	80	3.9	0.4		4.0	0.5
Social Support Behaviour						
Female	65	3.2	0.5	0.2	3.5	1.0
Male	80	3.4	0.5		3.5	1.0
Democratic Behaviour						
Female	65	3.1	0.6	0.3	3.0	1.0
Male	80	3.4	0.6		3.0	1.0
Autocratic Behaviour						
Female	65	2.3	0.5	0.5	2.0	0.5
Male	80	2.6	0.6		2.5	1.0

1 = never; 2 = seldom; 3 = occasionally; 4 = often; 5 = always

Cohen's *d* – small effect size 0.2 to 0.5; medium effect size 0.5 to 0.8; large effect size >0.8

Table 4. Differences between males and females in coaching leadership behaviour preferences

Coaching Behaviour Dimension	Male			Female			<i>p</i>
	<i>n</i>	<i>Median</i>	<i>IQR</i>	<i>n</i>	<i>Median</i>	<i>IQR</i>	
Autocratic	80	2.5	1.0	65	2.0	0.5	.001
Democratic	80	3.0	1.0	65	3.0	1.0	.206
Positive Feedback	80	4.0	1.0	65	4.0	1.5	.145
Social Support	80	3.5	1.0	65	3.5	1.0	.288
Situational Considerations	80	4.0	0.5	65	4.0	1.0	.647
Training and Instruction	80	4.5	1.0	65	4.5	1.0	.482

Statistical significance: $p < .05$

3.3 Reliability scores of the RLSCC

Table 5 reports Cronbach's alpha coefficients for the current and previous studies measured for all six coaching dimensions. Subscale scores were similar to previous studies and indicated acceptable reliability scores. Autocratic behaviour showed a higher value ($\alpha = .74$), and situational considerations reported a lower value ($\alpha = .62$) than previously used scales.

4. Discussion

The present study aimed to investigate members' preferences of leadership behaviours in strength and conditioning coaching using the preference version of the RLSCC. Potential disparities were explored in preferred leadership behaviours based on members' sex across the six behavioural coaching dimensions outlined in the RLSCC: autocratic behaviour, democratic behaviour, positive feedback behaviour, situational considerations, social support, and training and instruction behaviour.

Table 5. Cronbach's alpha (α) reliability test statistics of coaching behaviour dimensions of leadership scales for the current and previous studies

Coaching Behaviour Dimension	LSS Chelladurai and Saleh (1980) Preference	RLSS Zhang et al. (1997) Preference	SCCLSS Brooks et al. (2000) Self-evaluation	RLSSC Gearity (2003) Preference	RLSS Magnusen (2010) Self-evaluation	RLSCC Tiberi et al. (2023) Preference
<i>Cronbach's Alpha Coefficients (α)</i>						
Autocratic (8)	.45	.59	.56	.64	.52	.74
Democratic (12)	.75	.96	.48	.83	.81	.86
Positive Feedback (12)	.82	.89	.43	.84	.81	.88
Social Support (8)	.70	.88	.40	.75	.72	.71
Training and Instruction (10)	.83	.87	.45	.90	.83	.78
Situational Considerations (10)	na	.84	na	.76	.74	.62

Based on the MDML, which posits that preferred leadership behaviours are influenced by individual characteristics (Chelladurai 1993, 2007; Arthur & Bastardo, 2020), the hypothesis was that sex-based differences were likely to emerge.

Existing research in strength and conditioning aligns with the results, where training and instruction, positive feedback, situational considerations, and social support were classified as preferred behaviours. Having a positive and approachable relationship with players and staff.

From a quantitative standpoint, Chesters (2013) indicated how highly valued attributes for strength and conditioning coaches include being knowledgeable and Similarly, Tiberi and Moody (2020) highlighted how attributes including being knowledgeable, communicative, providing positive feedback, supportive, honest, organised, and approachable were perceived as necessary by athletes. Furthermore, Lee *et al.* (2013) reported how positive psychosocial behaviours (supportive behaviours) positively influenced the compatibility between strength and conditioning coaches and athletes. According to Greenslade and Williams (2019), student-athletes value coaches who build trust and respect, provide encouragement and support, offer constructive feedback, possess strong communication skills, and are motivational and inspirational while maintaining high-performance expectations.

In qualitative research, comparable results were proposed. Szedlak *et al.* (2015) indicated that elite athletes viewed strength and conditioning coaches as effective when they built solid relations founded on trust and understanding. These coaches were considered proficient in instructional and communication abilities, maintaining high-performance expectations, and inspiring and motivating athletes through their confidence and passion. Shuman and Appleby (2016) reported that most study participants valued qualities like knowledge, personality, professionalism, and support in their relationships with their strength and conditioning coach, while Foulds *et al.* (2019) indicated that athletes value coaches who develop close relationships by building trust and showing care and commitment through a positive outlook that includes planning and mutual goal-setting, display adaptability and role model traits, and adopt effective communication through feedback and openness and understanding of individual needs.

The current results on differences between sexes are similar to previous studies where positive behaviours were deemed relevant from both sexes with only marginal differences (Lee *et al.*, 2013; Walack-Bista, 2019; Tiberi & Moody, 2020). Lee *et al.* (2013) suggested that perceived positive coaching behaviours positively affect the perceived compatibility between strength and conditioning coaches and athletes in male and female athletes, supported by our findings, where positive behaviours were ranked as preferred by both sexes with only small differences.

Walack-Bista (2019) reported differences between sexes in a sports coaching context. However, the practical significance measured with effect size showed that the identified differences were small. Additionally, Tiberi and Moody (2020) reported that in strength and conditioning coaching, there were no differences in desirable attributes between athletes' sexes. Supporting the current findings, a recent review on strength and conditioning coaching by Fraser *et al.* (2022) highlighted the significance of positive psychosocial behaviours, building trust, care, effective teaching skills, and adapting leadership styles in fostering positive coach-athlete relationships, which contribute to athlete performance and well-being. Arguably, this could be advocated for both sexes with no emblematic difference in coaching leadership behaviour preferences.

Given the lack of strength and conditioning coaching research, the current findings offer valuable insight, suggesting student-athletes' preferred coaching behaviours, like training and instructions, positive feedback, adaptability, and social support, and least preferred coaching behaviours, like democratic and autocratic. These align with existing research, emphasising the importance of positive psychosocial behaviours in strength and conditioning coaching (Fraser *et al.*, 2022). The slight gender-based differences suggest that positive coaching traits are valued across both sexes, arguably indicating the importance of fostering strong coach-athlete relationships. The ranking of preferred behaviours, such as training and instruction, positive feedback, situational considerations, and social support, provides insight into the areas athletes value the most in their coaching interactions. Surprisingly, democratic behaviour ranked lower in preference and was not classified as preferred using the proposed framework, suggesting that athletes might not prioritise participative decision-making from their coach.

Furthermore, autocratic behaviour ranked the lowest, suggesting that athletes may not value particularly authoritarian coaches. The observation of marginal statistically significant difference between male and female athletes' preferences supports the hypothesis that there would be some sex-based differences. However, results also highlight that this moderate difference is not practically significant enough to suggest distinct coaching approaches for each sex. However, it must be acknowledged that the true randomness of the sample size was challenging to confirm due to potential bias from the survey recipient

or intermediary at each institution. Lastly, the study only addressed one variable of members' characteristics (sex) linked to one of the MDML central mechanisms (preferred behaviours), where several interactions, such as sport type, age, level of competition, and personality dimensions, could be further explored, quantitatively and qualitatively.

This study provides novel data on the preferences of coaching behaviours from a group of NCAA student-athletes in a strength and conditioning coaching context. While the results might apply to similar contexts, caution should be exercised when generalising the findings to other coaching settings, as behaviours are part of a dynamic process that may depend on several other unique factors. The study's findings have practical implications for strength and conditioning coaches, who should be aware of the preferences of their athletes about coaching behaviours, particularly those related to training and instruction, positive feedback, situational considerations, and social support. These behaviours can build positive coach-athlete relationships and enhance athletic performance and well-being. Understanding that male and female athletes might value similar coaching behaviours could guide coaches in creating strategies that adapt to all athletes' needs. Based on the identified limitations, future research could consider different ways of communicating with participants for direct engagement without reliance on an intermediary. Additionally, aiming to address the considerable gap in strength and conditioning coaching research, expanding beyond the athletes' sex, future investigations should explore a wider array of athletes and situational characteristics, allowing for a broader exploration of the MDML applied to strength and conditioning coaching.

5. Conclusions

This study presents preferences of coaching behaviours among NCAA student-athletes in strength and conditioning coaching. The results provide insights into areas that athletes prioritise in their interactions with strength and conditioning coaches. The findings emphasise the importance of behaviours such as training and instruction, positive feedback, situational considerations, and social support, areas that coaches may consider in creating strategies to interact with their athletes to foster positive relationships and enhance athletic performance and well-being. Interestingly, democratic behaviour was not categorised as preferred, indicating that athletes may

not value participative decision-making from their strength and conditioning coach. Furthermore, autocratic behaviour ranked the lowest, suggesting that athletes may not value authoritarian coaches.

While slight differences existed between male and female athletes' preferences, the study highlights that these were small or moderate, not practically significant, suggesting how there may be an underlying common pattern of preferred strength and conditioning coaching leadership behaviours where both sexes value similar coaching leadership dimensions.

These findings have potential implications for coaching practice as strength and conditioning coaches should consider preferences of coaching behaviours with their athletes, specifically training and instruction, positive feedback, situational considerations, and social support. Furthermore, the awareness that both male and female athletes may prioritise similar behaviour dimensions could assist coaches in developing strategies tailored to athletes' needs.

The present study's aim was to contribute to the current gap in strength and conditioning coaching research to provide a basis for future investigations, that might expand beyond the athletes' sex, directing the attention to other antecedents of behaviour; and, consequently, to lead to the adoption of different research avenues to investigate leadership behaviours in strength and conditioning coaching.

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Author Contributions

Mr. Severiano Tiberi - Methodology, Data curation, Formal analysis, Validation, Writing – original draft, Writing – review & editing; **Dr. Jeremy Moody, Dr. Joseph I. Esformes, and Dr. George Jennings** - Study's design, Writing – review & editing. **Dr. Steve Cooper** - Selection of statistics. All the authors read and approved the final version of the manuscript.

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Before the study commencement, the Ethics Committee of the Cardiff School of Sport & Health Sciences at Cardiff Metropolitan University approved the research procedure

Informed Consent

All participants provided informed consent

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Does this article pass screening for similarity?

Yes

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