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A Survey Exploring Strength and Conditioning Coaches' Preferences and Perceptions on Weightlifting-Based Training for Enhancing High-Intensity Actions in Team Sports

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ABSTRACT

This study investigated strength and conditioning coaches (SCCs) preferences and perceptions on the use of weightlifting (WL) based training for enhancing performance of high-intensity actions (HIAs) including vertical jumping (VJ), linear sprinting (LS) and change of direction (COD) in team sport athletes. Thirty-three SCCs (30 males, 3 females) with 15±9 years' experience volunteered to participate. The survey consisted of three sections: 1) SCC demographics, 2) SCCs' views on WL-based training to prepare team sport athletes for HIAs and 3) exercise selection and preferences for enhancing HIAs in team sport athletes. A series of open-ended (n = 7), multiple-choice (n = 9), Likert scale (n = 9) and open rank order (n = 3) questions were asked. Fixed responses were analysed using frequency analysis and open-ended questions by thematic analysis. More SCCs rated full WL movements as low compared to high importance for VJ (42% vs. 16%), LS (50% vs. 16%) and COD (62% vs. 19%). For WL derivatives, more SCCs rated pulling derivatives as high importance for VJ (47% high vs. 12% low) and LS (35% high vs. 24% low), however, for COD, more rated it as low importance (34% low vs. 19% high). SCCs valued catching derivatives more for COD (35% high vs. 34% low) and VJ (31% high vs. 20% low) than LS (35% low vs. 27% high). SCCs' main justifications for WL-based training were for power (46%) and strength (38%) development, with overarching reasons for not using it being due to the time taken to learn technical demands (69%) and the physical limitations of athletes (31%). To best develop HIAs SCCs prefer specific methods that prioritises training the HIAs themselves. Further research comparing the effectiveness of WL-based training to alternative training methods is required to reach a clearer consensus within the SCC profession on the importance of WL-based training for enhancing HIA.

Keywords: Weightlifting, Olympic weightlifting, Team sport, Survey.

INTRODUCTION

Weightlifting (WL) based training comprising the full lifts (i.e., snatch and clean and jerk), or

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derivatives of these (i.e., pulling and catching), are modes of resistance training commonly used and advocated for enhancing performance of high-intensity actions (HIA) in team sport athletes (Clark et al., 2010; Comfort et al., 2023; Haff & Triplett, 2015; Lloyd et al., 2014; Ratamess, 2021). Literature supporting the use of WL-based training to develop power for general training purposes, not specific to competitive weightlifters is widespread and long-standing (Enoka, 1979; Hori et al., 2005; Suchomel et al., 2015; Suchomel et al., 2017). WL derivative exercises that focus on pulling (i.e., barbell is accelerated ballistically from below the athlete's centre of mass upwards), and catching, (i.e., athlete receives the barbell on the shoulders or overhead), are commonly used to develop propulsive or deceleration-related physical qualities (Moolyk et al., 2013; Suchomel et al., 2015; Suchomel & Comfort 2022). Whilst originally developed to improve performance of the full competitive WL movements (Morris et al., 2020; Stone et al., 2006; Storey & Smith, 2012), pulling and catching derivatives have since been applied and recommended for enhancing HIA including vertical jumping (VJ), linear sprinting (LS) and change of direction (COD) performance (Comfort et al., 2018; Dos' Santos et al., 2018; Hori et al., 2008; Suchomel et al., 2015; Suchomel et al., 2017; Suchomel et al., 2017; Suchomel et al., 2020; Suchomel et al., 2021; Suchomel et al., 2022).

Survey data has shown that WL-based training is widely adopted within team sport strength and conditioning, with a high percentage of strength and conditioning coaches (SCCs) prescribing WL-based training to their athletes including: 97% in United States (U.S.) high schools (Durell et al., 2003), 85% in U.S. college team sports (Duehring et al., 2009), 88% in the National Football League (NFL) (Ebben & Blackard, 2001), 91% in the National Hockey League (NHL) (Ebben et al., 2004), 95% in the National Basketball Association (NBA) (Simenz et al., 2005), 88% in rugby union (Jones et al., 2017), 67% in soccer (Weldon et al., 2021) and 88% in cricket (Weldon et al., 2021). None of these studies however, explore why such a high percentage of SCCs use WL-based exercises specifically for their athletes or why they select these exercises over other modes of power training for enhancing performance of HIAs. Such information could provide useful insights that may enhance exercise prescription for team sport athletes. In sprinting, for example, Healy et al. (2021) investigated why sprint coaches prescribe resistance training for sprint athletes, what exercises they select and what factors are involved in their selection. Healy et al. (2021) reported that sprint coaches prescribe a wide variety of traditional, ballistic, and plyometric exercises, selecting exercises most commonly based on desired performance adaptations, practicality and to target specific muscles/muscle groups; prioritising exercises that developed strength, power, and reactive strength. Making similar information available around why SCCs prescribe WL-based exercises for team sport athletes would be valuable to industry practice.

Longitudinal evidence supporting the use of WL-based training in team sport athletes for improving HIAs more effectively than other modes of resistance training is inconclusive (Ciacci & Bartolomei, 2018; Fatouros et al., 2000; Helland et al., 2017; Hoffman et al., 2004; Loturco et al., 2016; Moore et al., 2005; Pichardo et al., 2019; Tricoli et al., 2005). Furthermore, the underpinning rationale for SCC use of WL-based training to enhance HIA in team sport athletes has currently not been explored. Therefore, the aims of the current study were to establish SCC preferences and perceptions on the use of WL-based training for enhancing performance of HIAs in team sport athletes. Results of this research could help to guide future research and SCC education by providing a deeper understanding of the underpinning rationale of current practice.

METHODS

Experimental Approach to the Problem

A cross-sectional explorative survey study was used to investigate the preferences and perceptions of team-sport SCCs on the use of WL-based training for enhancing HIA in team-sport athletes. The survey was developed using online software (Qualtrics, Provo, USA) and piloted by three qualified SCCs. Following feedback, review and adjustment the final survey was distributed via social media (X and LinkedIn) and through purposive sampling by email of known SCC with invitation for those to distribute the survey via email through their own networks. The survey was available online for a period of nine months between October 2024 to June 2025. Forty-five individuals initially responded with twelve failing to complete a full section of the survey therefore being excluded. All responses were anonymous.

Participants

Thirty-three professional SCCs (30 males, 3

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females) with 15 ± 9 years (range 3 to 33 years) experience in coaching strength and conditioning with team sport athletes volunteered to participate. Inclusion criteria required SCC coaches to be in paid employment working with athletes over 18 years of age from team sports including soccer, cricket, basketball, hockey (field or ice), volleyball, baseball, football (American, Australian or Gaelic) or rugby (league or union). All participants gave voluntary informed consent before completing the survey. Ethical approval for the study was granted by the University of Lancashire ethics committee (REF: HEALTH 01157) in line with the principles of the Helsinki Declaration (2013).

Survey Design

The survey consisted of three sections: 1) SCCs demographics, 2) SCCs views on WL-based training to prepare team sport athletes for HIA and 3) exercise selection and preference for preparing team sport athletes for HIA. The average completion time of the survey was 17 minutes and 32 seconds. When answering questions in sections 2 and 3 WL derivative exercises were subdivided into pulling and catching derivatives (Table 1), modified from the National Strength and Conditioning Association (NSCA) position statement on weightlifting for sports performance (Comfort et al., 2023). Accordingly, coaches were informed the term 'full WL exercises' referred to the full snatch and the full clean and jerk and WL derivative exercises were subdivided into pulling and catching derivatives.

A series of open-ended (n = 7), multiple-choice (n = 9), Likert scale (n = 9) and open rank order (n = 3) questions were asked. Multiple-choice questions served to assess coach background information and exercise prescription influences, six-point unipolar Likert scales were used to assess importance of WL exercises for HIA, rank order questions were used to reveal coaches' perceptions of the importance of WL-based training to developing HIA and open-ended questions were used to allow space for coaches to provide greater detail and justification for their answers. This methodological approach was adopted to meet the aims of the study in identifying the gap between science and practice (Thompson, 2020). A full copy of the survey is provided as appendix 1.

Statistical Analysis

In line with previous survey studies exploring perceptions of coaches (Healy et al., 2021; Weldon et al., 2022; Weldon et al., 2024) fixed response questions were assessed using a frequency analysis and open-ended questions were assessed by the lead author using a six-stage thematic analysis process by (1) familiarisation with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report (Braun & Clarke, 2006). Likert scale responses were analysed by combining the two lowest importance responses, two middle responses and two highest importance responses for each question to provide three categories of response (low importance, neutral and high importance) for enhanced clarity (Joshi et al., 2015).

Table 1. Weightlifting pulling and catching derivatives.

Pulling derivatives	Catching derivatives
Pull to the knee	Clean from thigh
Jump shrug (thigh)	Clean from knee/hang
Clean pull (thigh)	Power clean (knee)
Jump shrug (hang/knee)	Power clean
Clean pull (hang/knee)	Power clean (thigh)
Snatch-grip pull to the knee	Snatch from thigh
Snatch-grip jump shrug (thigh)	Snatch from knee/hang
Snatch pull (thigh)	Power snatch (knee)
Snatch-grip jump shrug (hang/knee)	Power snatch
	Snatch balance
	Power snatch (thigh)
	Behind-the-neck push jerk
	Push jerk
	Behind-the-neck jerk

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RESULTS

Coach Demographics

Almost one-third (27%, n = 9) of SCC reported having more than one employer. Areas of employment included working for professional sports teams (61%, n = 20), private strength and conditioning contractors (36%, n = 12), national sporting bodies (24%, n = 8), educational institutions (21%, n = 7), self-employment (3%, n = 1), semi-professional sports team (3 %, n = 1) and business owner (3%, n = 1). Job roles involved coaching athletes from team sports including: soccer (48%, n = 16), rugby union (33%, n = 11), basketball (21%, n = 7), cricket (18%, n = 6), volleyball (18%, n = 6), ice hockey (12%, n = 4), Gaelic football (9%, n = 3), rugby league (9%, n = 3), American football (6%, n = 2), field hockey (3%, n = 1) and baseball (3%, n = 1), with 39% (n = 13) coaching athletes from more than one team-sport. Almost half (45%, n = 14) of SCC worked with team sport athletes competing in tier one professional domestic leagues in their respective sports, with 18% (n = 6) working with national representative athletes competing in international competition (18%, n = 6) and 6% (n = 2) with academy athletes. Most SCCs worked with either male only athletes (45%, n = 15), or both male and female athletes (42%, n = 14) with only 12% (n = 4) exclusively coaching female athletes.

In total, 97% (n = 32) of SCCs were university graduates, most (55%, n = 18) educated to master's level, with 24% (n = 8) holding a bachelor's degree and 18% (n = 6) holding a doctorate qualification. Almost all (94%, n = 31) SCCs held a recognised strength and conditioning certification with 15% (n = 5) holding more than one certification in strength and conditioning. The most commonly held certifications included: NSCA Certified Strength and Conditioning Specialist (CSCS) (39%, n = 13), United Kingdom Strength and Conditioning Association (UKSCA) Accredited Strength and Conditioning Coach (ASCC) (30%, n = 10), Australian Strength and Conditioning Association (ASCA) certifications (21%, n = 7), International University Strength and Conditioning Association (IUSCA) Master Coach (3%, n = 1), World Rugby Strength and Conditioning L2 (3%, n = 1) and Pakistan Strength and Conditioning Association certifications (3%, n = 1). Over a third (39%, n=13) of SCCs also held a team-sport coaching qualification in soccer (12%, n = 4), rugby union (9%, n = 3), cricket (6%, n = 2), Gaelic football (3%, n = 1), rugby league (3%, n = 1), and basketball (3%, n = 1).

Coaches' Perceptions on the Importance of Weightlifting for Performance of High-intensity Actions in Team-sport Athletes

The perceptions of SCCs on the importance of WL exercises for enhancing performance of HIA in team-sport athletes are illustrated in Figure 1 (VJ), Figure 2 (LS) and Figure 3 (COD). A higher proportion of SCCs rated the full WL movements as low importance compared to high importance for developing VJ (42 vs 16%), LS (50 vs 16%) and COD (62 vs 19%) abilities. More SCCs viewed WL pulling derivatives as of high importance than low importance for developing VJ (47% vs 12%)

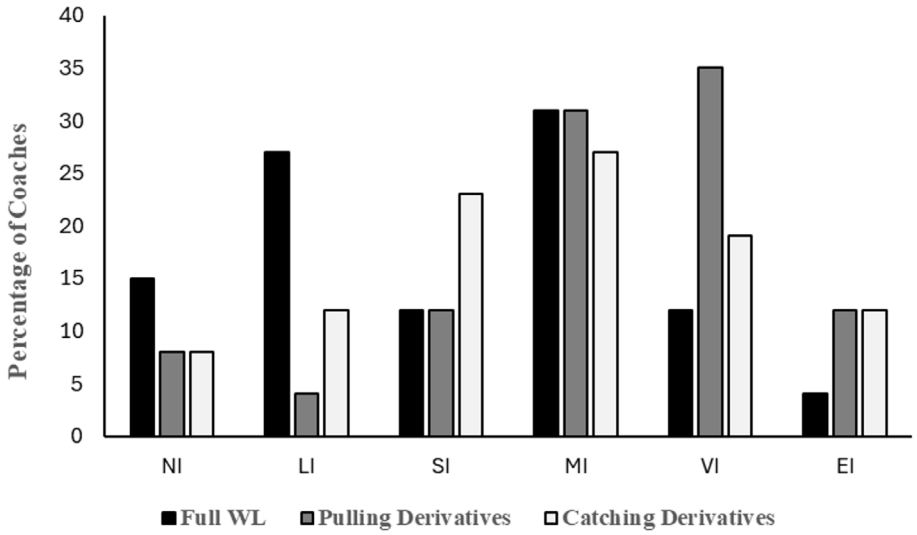


Figure 1. Coach perceptions (n = 26) on the importance of weightlifting exercises for developing vertical jumping ability in team-sport athletes. NI = not important, LI = low importance, SI = slightly important, MI = moderately important, VI = very important, EI = extremely important.

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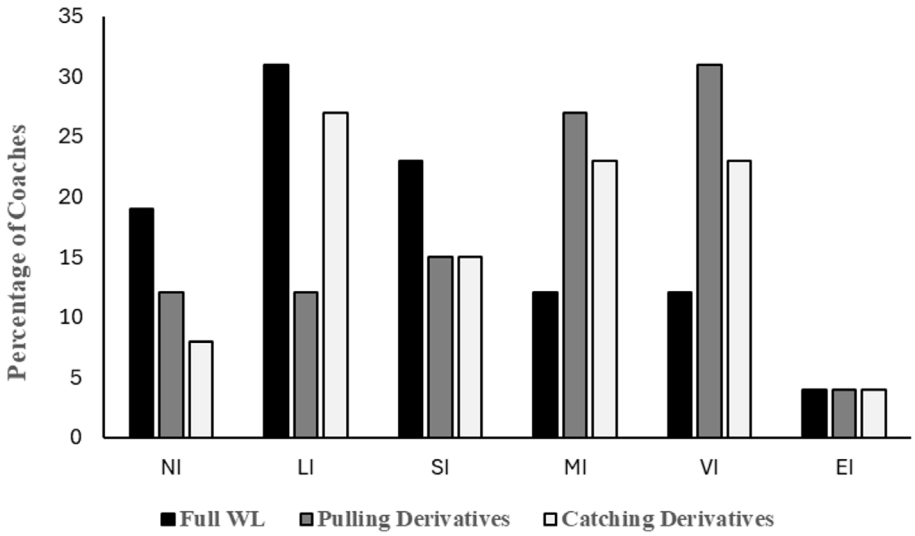


Figure 2. Coach perceptions (n = 26) of the importance on weightlifting exercises for developing linear sprinting ability in team-sport athletes. NI = not important, LI = low importance, SI = slightly important, MI = moderately important, VI = very important, EI = extremely important.

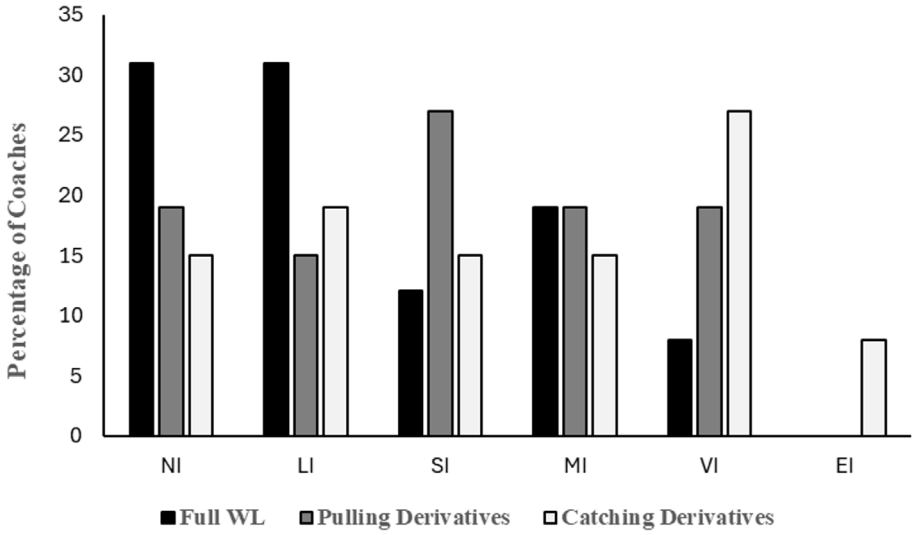


Figure 3. Coach perceptions (n = 26) on the importance of weightlifting exercises for developing change of direction ability in team-sport athletes. NI = not important, LI = low importance, SI = slightly important, MI = moderately important, VI = very important, EI = extremely important.

and LS (35% vs 24%), however this was not the case for COD where more coaches viewed pulling derivatives as low importance than high importance (34% vs 19%). For catching derivatives coaches value those more for developing COD (35% high importance vs 34% low importance) and VJ (31% high importance vs 20% low importance) than for LS (35% low importance vs 27% high importance).

The key themes arising from SCCs justification for using WL and WL derivatives in their strength and conditioning programmes are summarised with exemplar responses in Table 2. The strongest theme to emerge was to develop power production ability with the athletes, with the word "power" used by 12 of 26 respondents. Strength enhancement was the second ranked theme (38%) with many SCCs listing strength and power together in responses, suggesting a belief that WL-based training can be time-efficient in developing strength and power qualities simultaneously.

The key themes arising from SCCs justification for not using WL and WL derivatives in their strength and conditioning programmes are summarised with exemplar responses in Table 3. The strongest theme, present in 18 of 26 responses was the time required to develop technical competency in the full WL and WL derivative exercises. Of note in response to this question was the third ranked theme where five SCCs expressed a strong belief that at least some form of WL derivatives is essential

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Table 2. Strength and conditioning coach responses to their justifications for team-sport athletes using weightlifting and/or weightlifting derivative exercises in their strength and conditioning programmes.

Rank	Theme	Exemplar responses	Percentage of coaches
1	Power enhancement	"Using weightlifting derivatives really helps my athletes in getting powerful"	46
2	Strength enhancement	"Weightlifting and its derivatives are highly effective for team-sport athletes as they enhance explosive power, strength, and co-ordination"	38
3	Co-ordination	"Intramuscular coordination- dynamic correspondence in sequencing of joint actions"	35
4	Triple extension	"Developing force-velocity characteristics across loads, specifically around triple extension, which can have some impact on the athletic tasks"	19
5	Rate of force development	"Rate of force development x time to learn"	15
6	Catch phase relates to COD	"Catching for deceleration/CoD"	12
6	Specificity	"At times kinematically similar positions to key positions found in the sport"	12
8	General physical preparation	"General preparation"	8
8	Conditional to competency	"Only in very well-trained players who have reached a level where little improvements are shown from less complex similar exercises"	8
10	Reduces injury risk factors	"Avoid the downside - reduce injury risk factors"	4
10	Athlete preference	"They feel it adds value and enhances their training experience"	4
10	Supported by research	"Research showing the power production of such movements"	4
10	Speed-strength	"Triple extension, speed strength, ROM"	4

Table 3. Strength and conditioning coach responses to their justifications for team-sport athletes not using weightlifting and/or weightlifting derivative exercises in their strength and conditioning programmes.

Rank	Theme	Exemplar responses	Percentage of coaches
1	Time to learn/technical demands	"Not enough time for technical proficiency before entering a competition phase"	69
2	Athlete limitations (mobility/ injury history)	"Some players have hand/wrist mobility issues"	31
3	No justification not to use at least some WLDs (strong belief in WLDs)	"I personally feel weightlifting and it's derivatives are essential " and "There's no reason why anyone can't hang clean a decent weight with some good coaching. Most people who say you shouldn't include them probably can't coach them"	19
4	More suitable alternatives	"More time effective ways to develop force/RFD"	15
5	Non-essential to develop any physical quality	"I can coach without touching this method"	12
5	Injury risk	"Injury risk where the risk-reward is not balanced or favourable"	12
5	Athlete preference	"Personal preference"	12
8	Time available in sessions	"They are time consuming. It takes longer to warm up for this work and longer to carry out each set."	8
9	Lack of specificity	"I would say sports specific training, athletes in the past do not use traditional weightlifting but still managed to win"	4

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Table 4. Strength and conditioning coaches (n=15) exercise preferences for developing high-intensity actions in team-sport athletes.

HIA	Rank	Exercise	First most important exercise (%)	Second most important exercise (%)
Vertical jump	1	Unloaded vertical jump variant	60%	20%
	2	Loaded vertical jump variant	13%	40%
	3	Loaded squat variant	27%	7%
	4	Weightlifting derivative		27%
	5	Calf raises		7%
Linear sprinting	1	Sprinting	60%	7%
	2	Resisted sprinting	20%	40%
	3	Horizontal plyometrics		33%
	4	Loaded squat variant	13%	
	5	Unloaded vertical jump variant		13%
	6	Sprint warm-up drills	7%	
	7	Romanian deadlifts		7%
Change of Direction	1	Multiplanar plyometrics	27%	20%
	2	Deceleration drills	27%	13%
	3	Reactive agility drills	20%	13%
	4	Change of direction drills	13%	13%
	5	Loaded squat variant	7%	
	5	Unloaded vertical jump variant	7%	
	7	Eccentric strength exercise		7%
	7	Curvilinear running		7%
	7	Weightlifting derivative		7%
	7	Hip mobility exercise		7%
	7	SL Romanian deadlifts		7%
	7	Core (trunk) strength exercise		7%

in their training prescription.

Coaches' Exercise Selections and Preferences for Developing High-intensity Actions in Team Sport Athletes

The exercise preferences of SCCs for developing HIAs are illustrated in table 4. For both VJ and LS the most important exercise (60% of respondents) valued by SCCs was to perform the actual exercise (i.e., unloaded VJ and LS). This was not the case for COD, with the first most important exercises being mutliplanar plyometrics (27% of respondents) and deceleration drills (27% of respondents). No SCCs ranked WL or derivative exercises as their most important exercise for developing VJ ability although 27% of respondents ranked a WL derivative exercise second for developing VJ ability. No SCCs ranked WL or derivative exercises in their top three preferences for developing LS, 7% ranked a WL derivative exercise second for developing COD.

DISCUSSION

The aim of the study was to investigate SCC preferences and perceptions on the importance of WL-based training for enhancing performance of HIAs in team-sport athletes. The key findings were 1) a greater percentage of SCCs rated full WL movements to be of low compared to high importance for enhancing performance of HIAs in team sport athletes, 2) for pulling derivatives more SCCs rated them as high than low importance for VJ and LS, yet for COD this was the opposite, 3) for catching derivative's, a greater percentage of SCCs rated them as high compared to low importance for COD and VJ, however this was the opposite for LS, 4) SCCs main justification for using WL-based training was for power and strength development, with the main reasons for not using WL-based training due to time to learn technical demands and physical limitations of their athletes and 5) to best develop HIAs SCCs prefer specific training methods that prioritise training the HIA themselves.

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The use of WL-based training for enhancing HIA have been justified and discussed in the NSCA 2023 position statement on WL for sports performance (Comfort et al., 2023). A key finding from the current study, however, was that a greater percentage of SCCs rated the full WL exercises (i.e., snatch or clean and jerk) to be of low compared to high importance for developing HIA in team sport athletes. One of the main reasons for this, highlighted in the current study, could be due to SCCs concerns around the time required to learn technical demands in addition to physical limitations of athletes. Such considerations are more problematic with the full WL exercises than derivatives. Other potential explanations may be coaches preferring "more suitable alternatives", which emerged as a theme for 15% of SCCs potentially avoiding WL-based training. Healy et al. (2021) classified WL-based training within a sub-category of resistance training exercise of ballistic exercises, distinct from traditional exercises and plyometric/unweighted jump exercise categories in a survey relating resistance training practices to speed development. The top three ballistic exercises reported by sprint coaches for importance to speed development were jump squats (61%), kettlebell swings (43.9%) and power cleans (39%). Kettlebells (Manocchia et al., 2013) and loaded jumping (Teo et al., 2016) have been proposed as technically simpler alternative power training modalities than WL-based training with the suggestion being the movements are easier to perform with true ballistic intent and derive the intended power benefits. This reasoning may explain why full-WL exercises were viewed as low importance by team sport SCCs as they may view other exercises as more effective ballistic exercises for developing HIAs, like the sprint coaches in the Healy et al. (2021) study.

The greater preferences of SCCs for using WL derivative exercises over the full WL exercises for developing HIAs is consistent with the NSCA's core text for SCC certification that includes six WL derivative exercises as recommended "power" exercises with no recommendations to use full WL exercises (Haff & Triplett, 2015). Studies investigating WL-based training for non-weightlifting athletes have focused on using WL derivatives and not full WL exercises (Ciacci & Bartolomei, 2018; Comfort et al., 2018; Dos' Santos et al., 2018; Fatouros et al., 2000; Helland et al., 2017; Hoffman et al., 2004; Hori et al., 2008; Loturco et al., 2016; Moore et al., 2005; Pichardo et al., 2019; Suchomel et al., 2015; Suchomel et al., 2017; Suchomel et al., 2017; Suchomel et al., 2020; Suchomel et al., 2021; Suchomel et al., 2022; Tricoli et al., 2005) likely further explaining SCC preferences in the current study for using WL derivative exercises to enhance HIA.

Another interesting finding of the current study was SCCs perceptions on the importance of WL-derivatives for enhancing performance of HIA. With regards to pulling derivatives, SCCs rated these as more important for VJ (47%) and LS (35%), but not for COD (19%). The importance of pulling derivatives for enhancing VJ is largely consistent with recommendations in the peer-reviewed literature (Hori et al., 2005; Suchomel et al., 2015; Suchomel et al., 2020). Hori et al. (2005) identified biomechanical similarity between the second pull of WL exercises and VJ stating "the kinematics and kinetics are remarkably similar to jumping" and recommended WL-based training to develop VJ. Later Suchomel et al. (2015) extended that rationale specifically to pulling derivatives stating pulling derivatives "may provide a training stimulus for whole body triple extension that is as good, if not better than weightlifting movements that include the catch phase". Suchomel et al. (2015) further suggest that training triple extension such as with pulling derivatives will develop LS and COD. In 2020 Suchomel et al. (2020) concluded that training with weightlifting pulling derivatives may produce greater vertical jump adaptations compared to training with catching derivatives despite the intervention study groups not demonstrating significant improvements in jump height after 10 weeks. This is a further example of intervention studies failing to fully support pro-WL derivative narratives over the timescales studied.

Alternatively, for the catching derivatives the highest percentage of SCCs (35%) perceived these to be of high importance for developing COD ability, with pulling derivatives perceived to be of a lower importance. Hori et al. (2005) suggested that catching the bar is beneficial to training deceleration qualities. In the current study, 12% of SCCs additionally provided justification that catching relates to deceleration and COD qualities. Contrary to the perceptions identified in the current study, Suchomel et al. (2017, 2021) concluded pulling derivatives may be used as effective training stimuli for load absorption during impact tasks over catching derivatives. This was because pulling derivatives produced greater load absorption demands after the second pull phase. The authors theorised catching derivatives may be less effective than pulling for deceleration training

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as athletes will catch the bar at maximum height before it begins descending, reducing deceleration demands compared to lowering the bar following the second pull phase of a pulling exercise. Further to this, Dos' Santos et al.'s (2018) recommendations specifically for preparing for COD tasks explicitly recommended pulling exercises over catching exercises, suggesting athletes train weightlifting derivatives including: jump shrugs and hang clean pulls. Despite these recommendations when pulling and catching derivatives have been compared directly in comparison trials the results are inconclusive, with Comfort et al. (2018) and Suchomel et al. (2020) reporting no significant difference in VJ outcome measures between pulling and catching intervention groups. It may be argued this lack of clear difference in effectiveness justifies the spread of perceptions seen in the results from SCCs around the importance of WL-derivatives to HIAs.

To best develop the HIA performed during team sports the findings of the current study suggests that SCCs prefer training methods that prioritise training the HIA themselves. The top two choices being unloaded and loaded VJ variant exercises to improve VJ, sprinting and resisted sprinting to develop LS and multiplanar plyometric exercises and deceleration drills to develop COD. The use of WL derivatives only featured as a 2nd most important exercise choice for small proportions of SCCs for developing VJ (27%) and COD (7%). This somewhat contradicts the theme of a strong belief in WL derivatives reported earlier in the survey, however the dominant preferences for developing each HIA were highly specific, and more field-based activities than traditional gym-based activities like WL-based training. It appears that SCCs do not perceive WL-based training as having particularly close dynamic correspondence to HIAs yet perceive WL-based training as a method for developing general underpinning physical qualities of power and strength, with some SCCs having a strong belief in utilising WL-based training to develop those general qualities over other training methods. This viewpoint is consistent with recommendations in articles specifically focused on developing HIAs, such as Dos' Santos et al. (2018), where authors recommend using WL pulling derivatives to prepare athletes for COD, however alongside more specific plyometric and multiplanar training methods similar to those that ranked more highly than WL exercises in SCC preference rankings in the results of this survey.

The existing evidence where team sport athletes have undertaken an intervention that includes WL derivative exercises and performance of an HIA as an outcome measure does not support the theme that WL derivative exercises are too technically demanding to be beneficial in novices to the exercises (Fatouros et al., 2000; Moore et al., 2005; Pichardo et al., 2019; Teo et al., 2016; Tricoli et al., 2005). Of those five studies, however, only one (Tricoli et al., 2005) reported an intervention that included a WL-based training intervention (high pulls, power cleans and clean and jerks) that outperformed the comparison intervention (VJ training group) for VJ and LS outcome measures. The other four studies (Fatouros et al., 2000; Moore et al., 2005; Pichardo et al., 2019; Teo et al., 2016) reported no significant difference between WL-based training and comparison intervention (i.e., plyometric training, conventional weight training, combined plyometric and traditional resistance training, and VJ training) groups for HIA outcome measures. Loturco et al. (2016), Helland et al. (2017) and Ciacci and Bartolomei (2018) all reported comparison non-WL-based intervention groups (jump squat, motorised and free-weight training and half-squat training interventions) out-performed WL-based training intervention groups for performance in HIA outcome measures with team-sport athletes. This very much supports the fourth (i.e., more suitable alternatives) and fifth (i.e., non-essential to develop any physical quality) ranked themes for not using WL-based training with team-sport athletes.

Whilst the current study provides useful information on SCCs preferences and perceptions on the use of WL and WL derivatives for preparing team sport athletes for HIA, there are several limitations. The number of respondents, the range of team-sports, range of levels, mix of athlete sex and range of athlete ages being coached by respondents make it difficult to infer generalisation of results to specific team sport populations. A larger number of respondents may have allowed for sub-classification to identify trends in preferences and perceptions of coaches when working with specific sporting populations. In addition, the methods of this study inherently suffer from response bias and self-selection bias as respondents may be inclined to give aspirational answers that they consider may impress peers rather than reflect their more common practices, and individuals with strong opinions in this area may be more likely to volunteer to participate. Future research with more focus on preferences and perceptions of SCCs when preparing specific athlete groups for specific sports and using

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methods allowing for greater contextual analysis are recommended. Whilst SCCs' perceptions trend towards WL pulling being valuable for developing underpinning physical qualities related to VJ and LS, and WL catching for qualities related to COD, future research is needed to investigate which derivative exercises relate most strongly to which HIA and whether technically simpler and therefore more accessible non-WL-based exercises compare favourably with WL-based training in team sport populations for the purposes of enhancing HIA.

CONCLUSION

The aim of this study was to investigate SCC preferences and perceptions on the importance of WL-based training for enhancing HIAs in team-sport athletes. Responses of SCCs surveyed in this study displayed a lack of consensus on the importance of WL-based training for enhancing HIAs in team-sport athletes. Whilst a greater percentage of SCCs perceived full WL exercises as of low importance to developing HIAs, the WL derivative exercises had mixed perspectives around their importance. Specifically, WL catching derivatives were perceived as of higher importance to developing COD and pulling derivatives perceived as of higher importance for developing VJ and LS. The survey highlighted that SCCs working with team-sport athletes use WL-based training for power, and strength development and may avoid WL-based training due to time constraints and technical or physical limitations of their athletes. To develop HIA in team sports SCCs highlighted a preference for highly specific training methods, often prioritising training the HIA themselves. More longitudinal, experimental research comparing the effectiveness of WL-based training to alternative methods when preparing team-sport athletes for HIAs may be required to reach a clearer consensus within the SCC profession on the level of importance of WL-based training for preparing team sport athletes for HIAs.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest that are directly relevant to the context of this manuscript.

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ETHICAL APPROVAL

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