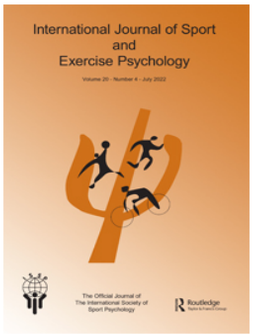

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RESEARCH ARTICLE

Adult-oriented coaching practices are positively associated with quality sport experience criteria

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ABSTRACT

The Adult-Oriented Sport Coaching Survey (AOSCS; [Rathwell, S., Young, B. W., Callary, B., Motz, D., Currie, C., & Hoffmann, M. D. (2020). The adult-oriented sport coaching survey: A measurement tool designed to assess coaching behaviours tailored for adult athletes. Journal of Sport & Exercise Psychology, 42(5), 5]) reliably assesses coaching practices tailored to Masters athletes (MAs). It recognises the uniqueness of coaching adults [Callary, B., Young, B. W., & Rathwell, S. (2021a). Coaching Masters athletes: Advancing Research and Practice in adult sport. Taylor & Francis; Callary, B., Young, B. W., & Rathwell, S. (2021b). Adult learning in sport: Implications for psycho-social coaching competencies. In B. Callary, B. Young, & S. Rathwell (Eds.), Coaching Masters Athletes: Advancing Research and Practice in adult sport (pp. 15–30). Routledge] and has good face validity and factorial validity. We tested the construct validity of the AOSCS by determining whether adult-oriented practices were associated with criteria indicative of quality sport experiences. MAs ($N = 402$, M age = 55.91, $SD = 10.41$) completed the AOSCS, the Coach-Athlete Relationship Questionnaire [Jowett, S., & Ntoumanis, N. (2004). The coach–athlete relationship questionnaire (CART-Q): Development and initial validation. Scandinavian Journal of Medicine & Science in Sports, 14(4), 245–257], and items measuring practice-liking, sport commitment, investment, and enjoyment. We analyzed relationships using structural equation modelling, separately for overall use of AOSCS practices, and for five specific practices within the AOSCS. Overall, when MAs experienced more adult-oriented practices, they reported greater commitment ($\beta = .79$), complementarity ($\beta = .64$), and closeness ($\beta = .63$) with their coach, greater investment ($\beta = .60$) and practice-liking ($\beta = .52$) because of their coach, and greater enjoyment ($\beta = .22$) and sport commitment ($\beta = .22$). Regarding specific practices, "creating personalised programming", "respecting preferences for effort, accountability and feedback", and "considering individuality" were positively associated with aspects of the coach-athlete relationship. "Respecting preferences" was also related to practice-liking, and "framing learning" was related to sport investment. The findings support the specific and collective use of adult-oriented practices

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to strengthen coach-athlete relationships for MAs and create enhanced Masters sport experiences. The results demonstrate the criterion validity of the AOSCS, further positioning it as a coach development tool in competitive adult sport.

Introduction

Masters athletes (MAs) are adult sportspersons registered in competitive sport organised for people beyond the normative age of peak performance. Most MAs are 35 years of age, though this depends on the sport. Notably, MAs regularly practice in preparation for competitive events (Young, 2011). MAs have been recognised as one of the fastest-growing sports cohorts in Westernised countries (Baker et al., 2010). For instance, the 2017 World Masters Games saw approximately 28,000 participants (International Masters Games Association, n.d.), and the 2022 edition in Kansai, Japan is expected to draw 50,000 (World Masters Games, n.d.). The growth of Masters sports has been driven by large-scale events, but recent focus has emphasised resources, capacity, and support for adult athletes at local and community levels (Dionigi, 2016; Jenkin et al., 2018; Young, Rathwell, et al., 2021). Within this dialogue, there has been increasing questions about the roles of trained personnel, and particularly coaches (Callary et al., 2021a), especially in supporting and enriching "quality masters sport experiences" (QMSE; Young, Callary, et al., 2021, p. 1). For example, Young, Callary, et al. contended there were eight hallmarks of a QMSE that could be fulfilled were coaches to adopt an adult-oriented approach to practice/programming with their MAs. Further, they proposed that one hallmark – athletes' "feeling validated", could be achieved when MAs felt their investments and commitment to sport were understood by their coach, and were being reciprocated by quality coaching. Adult-oriented coaching contributed to such validation. Another hallmark, "quality relationships", described how MAs are motivated to search for, and benefit from, social connections, and a sense of belonging. One attractive feature for MAs was a quality dyadic relationship with a relatable coach.

Substantial research has established the value of coaches in the Masters sport context. Callary et al. (2015) presented coaches of MAs as a key source of support for, and validation of, MAs' investment in sport. Moreover, survey research by Medick et al. (2012) with North American track and field MAs led concluded that having a personal coach improved athletes' self-determined motives for sport. Additionally, Hoffmann et al. (2019) showed coached MAs' basic psychological needs were more satisfied than non-coached MAs; they also reported greater competency in sport-related skills and felt more connected to their sporting environment.

Over reliance on models from youth and adolescent contexts

Notably, interviews with MAs and their coaches show that adult athletes have particular needs and preferences that, when accommodated by coaches, are associated with a range of important outcomes, including greater skill acquisition, sport-confidence, and performance (Callary et al., 2015; 2017; Ferrari et al., 2016; MacLellan et al., 2018). Importantly, both MAs and coaches have noted that MAs' various coaching preferences

implicate distinctly nuanced coaching approaches from those used with youth athletes (Callary et al., 2017; Ferrari et al., 2016; MacLellan et al., 2018; 2019). Based on qualitative studies of MAs' preferences, Callary et al. (2017; 2018) recommended that coaches of MAs use adult-tailored coaching practices. Specifically, these practices adopt a shared leadership approach that capitalises on adults' expertise and lived experiences and that respects their matured self-concept. It includes bi-directional communication, explaining rational for why adults are being asked to perform a task, or providing flexible scheduling that accounts for work and family obligations, in a manner that supports adult athletes' needs (also see Dionigi et al., 2021).

Unfortunately, the majority of coaching models derive from youth, adolescent, and younger adult athlete data (e.g., Chelladurai, 2007; Coté et al., 1995). Similarly, coach education programming relies heavily on lessons from young athletes. This is problematic because effective, contextually sensitive coaching practices are associated with enriched sport experiences, motivation, and retention among sport participants (ICCE et al., 2013). Due to the overreliance on youth-based information, coaches of MAs commonly report that coach pedagogy lacks relevance for their context (Callary et al., 2018). Moreover, MAs report wanting and needing coaching that is age appropriate (Callary et al., 2015). As the number of MAs and Masters coaches increases, it is imperative to (a) understand their distinct needs and (b) validate commensurate assessment tools.

Callary et al. (2018) advocated for more formal coach education strategies for coaches of Masters sport, after noting that coaches who invested in improving their coaching craft with adults, did so in experimental and trial-and-error ways. These coaches also described an eagerness to use Masters-tailored evidence-based information but admitted having trouble find such resources. To develop evidence-based coach education resources and tools for coaches of MAs, researchers must uncover the nuances specific to adult athletes and translate these understandings to strategic interventions with coaches. One such intervention is the development of a coach diagnostic tool for coaches to self-assess their adult-oriented practices that is informed by adult learning theories (Young et al., 2020).

Adult learning theories and Masters sport

In recent years, a growing body of qualitative research (e.g., Callary et al., 2017; MacLellan et al., 2018, 2019; Young & Callary, 2018) has shown that coaching MAs is enhanced by an understanding of adult learning principles (Knowles et al., 2012). Knowles et al. (2012) andragogy in practice model posits that adults learn best in environments that foster the six andragogic learning principles: (a) the learners' need to know, (b) self-concept of the learner, (c) prior experiences of the learner, (d) readiness to learn, (e) orientation to learning, and (f) motivation to learn. Need to know emphasises adults' desire to know why they are learning something before they learn it. The self-concept of the learner refers to adults' desire to make their own choices. Prior experience posits that adults approach learning with much more accumulated experiences as compared to youth, and a different quality of experience. Readiness to learn states adults are more ready to learn things that can relate to real-life situations. Adults' orientation to learning is life-centred, task-centred, or problem-centred. Adults' motivation to learn becomes more internalised and self-determined as they get older. Taken together, Knowles and

colleagues' (2012) suggest that adult learning will result in the most optimal development when it is self-directed, relies on adults' prior experiences as a basis for learning, creates opportunities for reflection, and allow for collaborative problem solving appears.

In their 2017 study, Callary et al. found that Masters coaches used practices that aligned with andragogy. These coaches engaged in relational coaching that was more suited to adults by enabling MAs' to self-direct their own learning, explaining why they were asking MAs to perform skills, drills, or activities, (c) accounting for MAs' prior experiences when making decisions in and out of sport, (d) used a problem-oriented approach, (e) made concerted efforts to ready their MAs to learn new skills, and (f) created intrinsically motivating environments. MacLellan et al. (2018, 2019) extended these findings, by comparing a single coach's use of adult-oriented coaching practices when working with a group of 12 MAs and a group of nine youth athletes in the same sport. They found MAs desired and were given many opportunities for self-directed decisions making regarding their training and competition. Conversely, the youth athletes under the same coach were seldom afforded the same opportunities for self-direction. From the coaches' perspective, the MAs were granted more opportunities for self-direction because they had more experience and knowledge than the youth athletes (which is consistent with adult learning theories). Similarly, the coach noted how MAs need to know why they were doing drills, while their youth athletes did not express the same desire to reflect upon why they were being asked to do certain drills. Together, MacLellan and colleagues work suggests that adult oriented coaching practices may be more desirable and effective when working with MAs.

The AOSCS: a coaching assessment tool

Until recently, it was difficult to confirm qualitative findings on coaching MAs (MacLellan et al., 2018, 2019), and to determine which adult-oriented coaching practices were most effective when working with MAs, because no quantitative coach assessment tool existed (Rathwell et al., 2020). Rathwell and colleagues addressed this gap by creating a valid and reliable survey that measures adult-oriented practices used when coaching MAs. The items of the survey were faithfully derived from prior qualitative findings in the Masters sport context (Callary et al., 2015; 2017), and informed by prominent adult learning theories (Knowles et al., 2012). The face validity of items was vetted with a sample of Masters coaches, and the factorial validity of the tool was supported using data from large samples of Masters coaches and MAs.[1] Consequently, Rathwell et al. (2020) created the Adult-Oriented Sport Coaching Survey (AOSCS).

The AOSCS measures five identifiable practices specific to MAs (Rathwell et al., 2020). *Considering the individuality of athletes* (CIA) is when the coach plans, organises and delivers practices that are tailored to each adult athlete's motives and past experiences (e.g., individualising the coaching for each adult based on what they have been able to do in prior experiences). *Framing learning situations* (FLS) is when the coach presents learning situations for their adult athletes through self-discovery, problem-based scenarios, modelling, and assessments (e.g., using performance assessments to help your adults understand why they need to learn a skill/tactic). *Imparting coaching knowledge* (ICK) is when the coach overtly shares their relevant experiences, knowledge, and coaching development with their adult athletes (e.g., disclosing information from one's professional

coaching development with your adults). *Respecting preferences for effort, accountability, and feedback* (RPE) describes how the coach accommodates their adults' preferences in terms of how they wish to be held to account for finishing aspects of training and for giving effort and approaches to tailoring feedback to their athletes' preferences (e.g., considering different athletes' preferences for being held responsible for working hard). *Creating personalised programming* (CPP) is when the coach considers and integrates their adults' needs/abilities into scheduling, long-term programming, and supporting their athletes during competition (e.g., considering how to tailor practice or competitive scheduling to athletes' availabilities).

To establish the value of the AOSCS more fully as a coach assessment tool, more work on construct validity is required. Indeed, many complementary avenues exist for establishing construct validity (Drost, 2011). Accordingly, the present study examined the *criterion validity* of the tool, in terms of how MAs' scores on the AOSCS (i.e., MAs' perceptions of their coaches' use of adult-oriented coaching practices) are associated with key criterion outcomes that MAs might expect to receive to fulfil a quality sporting experience. To this end, we identified several criterion themes from the literature that indicate a quality sport experience for MAs.

Criterion variables characterising quality outcomes in a coached sport context

We wished to test how each coaching practice in the AOSCS, as well as coaches' *overall* use of AOSCS practices, related to prominent psychosocial sport constructs used to assess the quality of athletes' sport experiences. In Masters sport, quality sport experiences are marked by quality relationships and connectedness to one's coach (Callary et al., 2020; Currie et al., 2021; Young, Callary, et al., 2021). In broader sport literature, enhanced coach-athlete relationships are central to enriched sport experiences, especially those epitomising facets of Jowett's (2005; 2007) 3 + 1C Model (also see Jowett & Ntoumanis, 2004).

The relational emphasis of the 3 + 1C Model makes it well suited to understanding the coach-athlete relationship in adult sport (see Callary et al., 2020). The model proposes that the constructs of closeness, commitment, complementarity, and co-orientation represent the emotional and behavioural contract between a coach and athlete (Jowett & Chaundy, 2004). Closeness refers to emotions that the coach and athlete share in their relationship (e.g., liking, trust, and respect). Commitment is understood as the coach's and athlete's intentions to maintain their relationship. Complementarity describes mutually responsive and cooperative behaviours between the coach and the athlete. Together, these 3Cs embody aspects of co-orientation or mature forms of interconnectivity in the coach-athlete relationship. Within younger sport cohorts, the 3 + 1C Model is important because of the 3Cs' positive associations with a host of desirable outcomes, including athletes having more self-determined motives (Riley & Smith, 2011), higher task orientation (Rottensteiner et al., 2015), greater prosocial behaviour (Vierimaa et al., 2018), reduced risk of burnout (Isoard-Gautheur et al., 2016), increased engagement across a season (McGee & DeFreese, 2019), and enhanced group cohesion (Olympiou et al., 2008).

In both Masters (Young & Weir, 2015) and younger sport cohorts (Scanlan et al., 2016), athletes' desire and resolve to continue sport (i.e., sport commitment) is another important indicator of a quality sport experience. Typically, an athlete's sport commitment

represents an adaptive index of sport participation. For example, sport commitment has been viewed as a consequence of sport enjoyment (Weiss et al., 2001) and a determinant of behavioural persistence from season to season in young athletes (Weiss & Weiss, 2006). In adult sport, sport commitment results from attractive involvement opportunities provided by coaches and programming (Young & Callary, 2018), is a determinant of participation frequency (Casper et al., 2007), as well as individual and social motivations for continued training (Santi et al., 2014). Finally, evidence from classic studies of coaching interventions and sport participation (Smith et al., 1979) hold that liking for a coach, athlete's liking of sport, and intention to return the following season, and whether these outcomes result from coach behaviours, are critical to infer a quality sport experience. In the Masters sport literature, intentions to invest in one sport are seen as a determinant of sport commitment and a proxy for continuous sport participation (Young & Weir, 2015). Thus, we considered continued investment, especially if it could be attributed to one's coach, as an important criterion to assess. In sum, we assessed facets of the 3 + 1C Model of the coach-athlete relationship, sport commitment, liking practice because of one's coach, and personal investment because of one's coach as criterion variables from which we could infer the value of AOSCS practices in furthering a quality Masters sport experience.

Purpose and hypotheses

This study aimed to examine the relationships, based on self-reports by MAs, between adult-oriented coaching practices and criterion variables indicative of quality sport experiences in a coached Master sport context. Qualitative research suggests that MAs associate adult-oriented coaching with an improved sport experience (e.g., Callary et al., 2017; MacLellan et al., 2018; 2019) and better relations with their coach (Callary et al., 2020). Based on these works, and the qualitative studies that informed the advent of the AOSCS (see Rathwell et al., 2020 which explains the entire process of content validity), we hypothesised that there would be positive associations between each of the five AOSCS practices and the criterion variables. We also expected a positive association between the overall AOSCS score and each criterion variable (closeness, commitment, complementarity; practice-liking because of one's coach, and investment because of one's coach; sport commitment; sport enjoyment). We did not make any *a priori* specific hypotheses beyond this and were interested in exploring relative strengths of associations between individual AOSCS practices and each criterion variable.

Methods

A cross-sectional design was implemented to investigate associations between MAs' perceptions of adult-oriented coaching practices and our criterion variables. Ethical clearance was obtained from the lead researcher's institutional Research Ethics Board. The participants' consent was obtained before data collection. Participants were recruited from various publicly available online sources including, but not limited to social media, team/club websites, and provincial/national sport governing bodies. Further, MAs were recruited on-site at local Masters competitions and practices in Australia and Canada. Additional participants were also invited from a roster of former research participants

(MAs who had consented to be contacted again in the future for research purposes). All recruited participants were sent a private email invitation to participate in an online survey.

Participants

A total of 1041 participants responded to the invitation. Participants were screened and removed based on inclusion criteria pertaining to whether they were coached.

Participants were excluded for not having a coach ($n = 311$), not having a coach present during practice/training sessions ($n = 75$), and for judging their interactions with a coach to be unimportant (i.e., scoring below neutral on a 7-point Likert Scale when asked how important they find their interactions to be with their coach; $n = 64$). Further, participants were screened and removed based on how they met the operational definition for MAs (see Young, 2011). Participants were removed if they failed to report training (i.e., practiced/trained zero times/hours per week; $n = 16$), failed to compete in any Masters events in the past year ($n = 116$), or were under the 35 years of age ($n = 57$).

An overview of the demographic information for the final sample of MAs ($N = 402$) is outlined in Table 1. Notably, these data indicate that on average in this sample coaches were present for approximately 65% of MAs' practice/training time in a given week.

Measures

Adult-oriented coaching practices

The athlete self-report version of the AOSCS (Rathwell et al., 2020) was used to assess adult-oriented coaching practices. The AOSCS is a 22-item, five-factor (CIA, FLS, ICK, RPE, CPP) scale that asks MAs how frequently their coach uses various practices. In response to the preface ("My coach/instructor … "), MAs responded to items on a 7-point scale from 1 (never) to 7 (always), with the middle anchor being "sometimes". The athlete version of the five-factor AOSCS has shown excellent model fit, χ^2 (131) = 234.8, $p < .001$, CFI = .97, SRMR = .01, RMSEA = .04 [90% CI = .03, .05], when tested in the past (Rathwell et al., 2020). In the current study, we used latent factor scores representing each of the five *specific* practices, and a single latent factor to represent an *overall* AOSCS score, which was composed of all AOSCS items.

Criterion variables

Coach-Athlete relationship. The Coach-Athlete Relationship Questionnaire (CART-Q; Jowett & Ntoumanis, 2004) assessed MAs' beliefs about the quality of their coach-athlete relationship. The CART-Q is an 11-item, three-factor tool that assesses three domains: closeness, commitment, and complementarity. The MAs responded to items on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). The CART-Q has established internal consistency and convergent validity among factors, with a very good model fit in large heterogeneous samples of athletes from both individual and team sports (see Rhind et al., 2012).

Table 1. An overview of MAs demographic self-reported information.

Variable	$N = 402$	%
Gender		
Female	239	59.9
Male	160	39.8
Other/Unspecified	3	.80
Ethnicity		
Caucasian/White	375	93.2
Asian	9	2.2
African American/Black	5	1.2
Hispanic	5	1.2
Other/Unspecified	3	.75
Education		
Graduate Degree	178	44.2
Undergraduate Degree	139	34.5
College Diploma	61	15.1
High School	23	5.7
Elementary School	1	.20
Country of Residence		
Canada	261	64.9
USA	82	20.4
Australia	27	6.7
UK	14	3.5
Others ($n = 12$)	18	4.5
Primary Sport		
Swimming	156	38.8
Athletics	90	22.4
Rowing	62	15.4
Triathlon	24	6.0
Skiing	14	3.5
Weightlifting	10	2.5
Others ($n = 15$)	46	11.4
	M	***SD***
Age	55.9	10.4
Masters sport participation		
Events (last 12 months)	6.13	5.73
Months per year	10.92	2.13
Times per week	4.69	2.11
Hours per week	7.96	4.74
Coach present (times per week)	3.00	1.53

Additional criterion variables. Four single items were used to assess alternative outcomes. "I am committed to keep doing my sport" assessed sport commitment (Young & Medick, 2011). "I find participating in sport to be very enjoyable" measured sport enjoyment (Bennett, 2014). The use of a single item is appropriate when additional items on a unidimensional construct do not show at least half of the variance in every continuous indicator can be explained by the latent variable (Gogol et al., 2014; Kline, 2016). Prior research shows this to be the case, and notes there is substantial precedent for using single items for both sport commitment and enjoyment (Larson et al., 2020). The final items, "Because of my coach, I like to go to practice" and "Because of my coach, I want to invest more in my sport" were adapted from Smith et al. (1979) who attributed athlete liking to a youth sport coach. Responses for *sport commitment* and *enjoyment* ranged from 1 (strongly disagree) to 7 (strongly agree); for *practice-liking* and *investment*, they ranged from 1 (not at all true for me) to 7 (very true for me).

Data analyses

Preliminary analyses

SPSS Statistics 25 was used to calculate and treat missing values and to calculate descriptive statistics. Only 0.64% missing values were evident and were treated with multiple imputations using an expectation-maximisation method (Tabachnick & Fidell, 2019). Confirmatory factor analyses (CFA) and structural equation modelling (SEM) were performed with a Maximum Likelihood (MLM) estimator using Mplus Version 8 (Muthén & Muthén, 2017) to ensure factorial validity of the AOSCS and the CART-Q. The chi-squared statistic (χ^2), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardised root mean square residual (SRMR) indices were used to evaluate model fit. CFI values > 0.90, RMSEA values < .06, and SRMR values < .08 were used as indicators of good fit (Kelloway, 2014; Tabachnick & Fidell, 2019). Good fit was assumed if two or more fit indices fell within their recommended values (Hu & Bentler, 1999). In our results, we report standardised beta weights (β) and R^2, which can be interpreted as small ($\beta = .10$; $R^2 = .01$), medium, ($\beta = .30$; $R^2 = .09$), or large effect sizes ($\beta = .50$; $R^2 = .25$; Cohen, 1988).

Main analyses

We were interested in the relationships between MAs' perceptions of their coaches' use of *specific* adult-oriented coaching practices and the criterion variables. In our first structural model, the independent variables were the specific AOSCS factors (i.e., CIA, FLS, ICK, RPE, CPP) and the dependent variables were the criterion variables (i.e., commitment, closeness, and complementarity from the CART-Q, and the items for sport commitment, enjoyment, practice-liking, and investment). In the second structural model, the independent variable was a single *overall* AOSCS factor representing all 22 items of the AOSCS, and the dependent variables were the same criterion variables listed above.

Results

Preliminary analyses

Table 2 displays descriptive statistics for the independent and dependent variables, as well as bivariate correlations between variables. The initial CFA results indicated good model fit for the AOSCS, χ^2 (199) = 346.11, $p < .001$, CFI = .962, SRMR = .038, RMSEA = .043 (90% CI = .035, .050), and CART-Q, χ^2 (41) = 114.95, $p < .001$, CFI = .952, SRMR = .039, RMSEA = .067 (90% CI = .053, .082). The AOSCS (CIA = .87, FLS = .83, ICK = .82, RPE = .82, CPP = .88) and CART-Q scales had strong McDonald's omega values demonstrating strong internal consistency reliability, surpassing Feißt et al.'s (2019) level of .80 for good reliability. Further, Table 3 outlines factor loading ranges and averages, as well as composite reliability scores for the measured scales for all criterion variables that relied on multiple items.

Main analyses

Relationships between specific adult-oriented coaching practices and criterion variables

The model testing the relationships between MAs' perceptions of *specific* adult-oriented coaching practices and criterion variables showed good fit: χ^2 (567) = 911.14, $p < .001$, CFI

Table 2. Descriptive statistics and bivariate correlations for independent (i.e., AOSCS) and dependent (i.e., criterion) variables.

			M	*SD*	Skewness	Kurtosis	1	2	3	4	5	6	7	8	9	10	11	12	13
1	AOSCS	CIA	5.0	6.1	−.58	−.47	1												
2		FLS	4.6	8.7	−.14	−.52	.70**	1											
3		ICK	5.3	4.4	−.80	−.13	.54**	.60**	1										
4		RPE	5.2	4.0	−.71	.05	.67**	.67**	.56**	1									
5		CPP	4.9	7.5	−.53	−.34	.71**	.68**	.57**	.74**	1								
6		AOSCS	4.9	26.4	−.45	−.13	.86**	.89**	.74**	.83**	.89**	1							
7	CART-Q	Commitment	5.8	3.6	−1.1	.91	.61**	.59**	.52**	.62**	.67**	.71**	1						
8		Closeness	6.4	3.5	−2.0	5.5	.53**	.50**	.46**	.54**	.55**	.61**	.81**	1					
9		Complementarity	6.3	3.4	−1.5	3.2	.51**	.47**	.39**	.53**	.52**	.57**	.79**	.78**	1				
10	Additional	Practice-Liking	6.1	1.3	−1.6	2.1	.45**	.43**	.36**	.49**	.46**	.51**	.75**	.72**	.79**	1			
11		Investment	5.8	1.5	−1.1	.45	.48**	.52**	.42**	.52**	.54**	.59**	.74**	.66**	.66**	.68**	1		
12		Sport Commit	6.8	0.6	−3.6	15.7	.18**	.20**	.15**	.20**	.19**	.22**	.34**	.33**	.37**	.31**	.22**	1	
13		Sport Enjoyment	6.7	0.7	−3.1	11.9	.16**	.19**	.16**	.22**	.20**	.22**	.33**	.32**	.42**	.33**	.26**	.69**	1

Note: **$p < .01$ (two-tailed); CIA = considering the individuality of athletes; FLS = framing learning situations; ICK = imparting coaching knowledge; RPE = respecting preferences for effort, accountability, and feedback; CPP = creating personalised programming; AOSCS = overall adult-oriented coaching practices; CART-Q = Coach-athlete relationship questionnaire.

Table 3. Reliability statistics for MAs' adult-oriented coaching practices and coach-athlete relationships scores.

							Factor loading range		
		McDonald's Omega	Composite reliability	AVE	MSV	ASV	Min.	Max.	Avg.
AOSCS	CIA	.880	.878	.644	.686	.594	.788	.816	.802
	FLS	.833	.831	.415	.686	.629	.555	.723	.642
	ICK	.828	.826	.613	.524	.467	.752	.839	.782
	RPE	.823	.840	.602	.767	.643	.721	.845	.774
	CPP	.888	.889	.616	.767	.625	.698	.820	.783
CART-Q	Closeness	.865	.882	.655	.837	.807	.640	.903	.804
	Commitment	.855	.835	.629	.876	.857	.753	.854	.792
	Complementarity	.868	.857	.601	.876	.826	.674	.830	.764

Note: AVE = average variance extracted; MSV = maximum shared variance; ASV = average shared variance; CIA = considering the individuality of athletes; FLS = framing learning situations; ICK = imparting coaching knowledge; RPE = respecting preferences for effort, accountability, and feedback; CPP = creating personalised programming; AOSCS = overall adult-oriented coaching practices; CART-Q = Coach-athlete relationship questionnaire.

= .953, SRMR = .042, RMSEA = .039 [90% CI = .034, .043]. The structural model predicted the following variances: commitment ($R^2 = 63\%$), complementarity ($R^2 = 43\%$), closeness ($R^2 = 42\%$), sport investment ($R^2 = 37\%$), practice-liking ($R^2 = 30\%$), sport enjoyment ($R^2 = 6\%$), and sport commitment ($R^2 = 5\%$). Table 4 displays standardised beta coefficients for this model. For the coach-athlete relationship, coaches' use of CPP was positively related to commitment ($\beta = .404$, $p < .001$; $R^2 = .163$), and RPE ($\beta = .368$, $p = .011$, $R^2 = .135$; $\beta = .388$, $p = .007$, $R^2 = .151$) and CIA ($\beta = .318$, $p = .002$, $R^2 = .101$; $\beta = .230$, $p = .024$, $R^2 = .053$) were positively related to closeness and complementarity, respectively. No relationships were found between FLS and ICK and either commitment, complementarity, or closeness. For the other criterion variables, RPE ($\beta = .464$, $p = .004$; $R^2 = .215$) was positively related to liking practice because of their coach. CPP ($\beta = .279$, $p = .018$, $R^2 = .078$) and FLS ($\beta = .277$, $p = .024$, $R^2 = .076$) scores were positively related to wanting to invest more in sport because of their coach. There were no significant relationships between CIA and ICK and any of additional criterion outcomes (see Table 4).

Table 4. Standardised beta coefficients between adult-oriented coaching practices and criterion variables.

		AOSCS					
		CIA	FLS	ICK	RPE	CPP	Overall
CART-Q	Commitment	.160	.054	.109	.136	.404***	.796***
	Closeness	.318**	-.130	.135	.368*	.006	.631***
	Complementarity	.230*	.012	−.012	.388**	.069	.643***
Additional	Because of my coach, I like to go to practice	.138	−.011	.023	.464**	-.044	.528***
	Because of my coach, I want to invest more in my sport	−.048	.277*	.013	.125	.279*	.605***
	I am committed to keep doing my sport	.011	.104	.001	.125	−.003	.223***
	I find participating in my sport to be very enjoyable	−.107	.119	.010	.145	.075	.225***

Note: One model for the specific themes of the AOSCS and one model for the overall AOSCS scores; *$p < .05$, **$p < .01$, ***$p < .001$. CIA = considering the individuality of athletes; FLS = framing learning situations; ICK = imparting coaching knowledge; RPE = respecting preferences for effort, accountability, and feedback; CPP = creating personalised programming; AOSCS = overall adult-oriented coaching practices.

Overall adult-oriented coaching practices and criterion variables

The second model for relationships between MAs' perceptions of their coaches' *overall* use of adult-oriented coaching practices and criterion variables showed good fit: χ^2 (605) = 1349.27, $p < .001$, CFI = .898, SRMR = .050, RMSEA = .055 [90% CI = .051, .059]. The structural model predicted the following variances: commitment ($R^2 = 63\%$), complementarity ($R^2 = 41\%$), closeness ($R^2 = 40\%$), sport investment ($R^2 = 37\%$), practice-liking ($R^2 = 28\%$), sport enjoyment ($R^2 = 5\%$), and sport commitment ($R^2 = 5\%$). Table 4 displays standardised beta coefficients for this model. Overall use of adult-oriented coaching practices was positively related to commitment ($\beta = .796$, $p < .001$; $R^2 = .633$), complementarity ($\beta = .643$, $p < .001$; $R^2 = .413$), and closeness ($\beta = .631$, $p < .001$; $R^2 = .398$) in the coach-athlete relationship. Furthermore, coaches' overall use of adult-oriented coaching practices was positively related to MAs' wanting to invest more in their sport because of their coach ($\beta = .605$, $p < .001$; $R^2 = .366$), liking practice because of their coach ($\beta = .528$, $p < .001$; $R^2 = .279$), sport enjoyment ($\beta = .225$, $p < .001$; $R^2 = .065$) and sport investment ($\beta = .223$, $p < .001$; $R^2 = .050$).

Discussion

The aim of this study was to test the relationships between adult-oriented coaching practices, as assessed by the AOSCS, and indicators of a quality sport experience for MAs. The results provide support for the criterion validity for the AOSCS as a *specific* measure of adult-oriented coaching practices, as well as an *overall* measure of adult-oriented practices.

Our statistical approach to treat overall and specific adult-oriented coaching practices provides a nuanced understanding for coaches who are thinking through how to use adult-oriented coaching practices. The results pertaining to the specific themes in the AOSCS revealed no associations with MAs' sport commitment and enjoyment, meaning that no adult-oriented coaching practice on their own appeared responsible for an increase in these variables. The implication is that coaches can instead consider implementing all of the adult-oriented coaching practices in tandem, whereby different practices may be used consistently and synergistically, in order to see positive benefits to adult athletes' sport commitment and enjoyment. One of the merits of the AOSCS is it affords both an overall score and scores for specific themes, from both a measurement and coach development perspective. Indeed, should the AOSCS be used as a coach development tool (Callary et al., 2021b; Rathwell et al., 2020), then overall scores can be considered, while also working on the constituent, specific adult-oriented approaches in line with identified coaching challenges or athletes' needs (Belalcazar et al., under review).

Specific adult-oriented coaching practices and criterion outcomes

Our findings demonstrated the value of knowing scores for specific adult-oriented coaching practices since many had associations with different criterion variables.

Creating personalised programming (CPP)

How a coach creates personalised programming for their adult athletes appears to have a medium sized effect on how committed MAs feel towards their relationship with their

coach. Similarly, in Callary et al.'s (2015) study, Masters swimmers wanted coaches who considered and accounted for flexible individualised programming. Ferrari et al. (2016) found Masters coaches' organisation of their programming, was paramount to MAs' weekly and yearly development. Further, they noted that coaches needed to adapt to each MA's abilities and life demands outside of sport to effectively individualise programming. Our results indicate that when athletes believe their coach tailors support to them during practice/competition, and personalises aspects of season-long programming, they report more attachment and intentions to sustain their coach-athlete relationship.

The frequency with which the MAs believed their coach individualised season-long programming and support had a significant, though small effect, on the extent to which they would continue to invest in sport "because of their coach". In previous literature, coaches of MAs indicated they should be accommodating when planning for individual MAs' goals and schedules, and competitiveness, while also supporting their MAs during practice and competition (Callary et al., 2015; 2017; MacLellan et al., 2018). Given the plethora of ways coaches may influence their MAs' sport investment, our findings show how it is important for coaches to specifically support MAs around competitions and help structure their short- and long-term plans/goals.

Respecting athletes' preferences for effort, accountability and feedback (RPE)

When the MAs judged that their coaches accounted for their preferences for effort and feedback, they also felt there was greater trust, respect, (i.e., closeness) and cooperation (i.e., complementarity) with their coach. These medium sized associations are consistent with qualitative research (Callary et al., 2015), which found Masters swimmers valued the structure and integrity that coaches contributed to their workouts. Some Masters swimmers have described an appreciation for how a coach's presence, and a coach's communication around practice integrity, helped motivate them to complete the workout (Callary et al., 2015). We also found a positive association between RPE and the item "because of my coach, I like to go to practice". This means that when coaches catered to the preferences of MAs' for feedback and accountability, MAs enjoyed going to practices. Importantly, the stem on this item – "because of my coach", implies when coaches respect their athletes' preferences, MAs attribute liking practice to their coaches. To our knowledge, previous literature has not examined practice-liking in reference to one's coach with the exception of seminal research from Smith et al. (1979), who found that youth baseball players attributed practice-liking to their coach. These novel findings suggest that specific adult-oriented coaching practice may help explain a medium sized portion of MAs' enjoyment of practice/training, while simultaneously strengthening the coach-athlete relationship.

Considering individuality of athletes (CIA)

Our results suggest when MAs believe their coach considers their individuality, it relates to feelings of mutual trust and respect and cooperation in the coach-athlete relationship (small and medium effect sizes respectively). Young and colleagues (2014) noted that MAs require "a training plan that reflects personalised life demands" (p. 89) due to MAs' obligations outside of sport. Callary et al. (2017) found that coaches need to be familiar with the wealth and variety of experiences that MAs may have as compared to younger cohorts. As such, coaches in their study indicated that delivering practices and scenarios

in a variety of ways helped resonate with MAs' varied life experiences inside and/or outside of sport. Further, they found that catering to the individuals' experiences fostered enhanced feelings of respect with MAs (i.e., the closeness of the coach-athlete relationship). Taken together, these results suggest when coaches take time to consider the individual differences among their adult athletes, the athletes will feel their relationship with their coach is emotionally and behaviourally strengthened.

Framing learning situations (FLS)

When the MAs judged that their coaches provide learning situations through self-discovery, problem-based scenarios, modelling, and assessments, they reported greater intentions to invest more into their sport because of their coach (medium effect size). In previous literature, Callary et al. (2017) described how when coaches went out of their way to model intensive sport engagement for their adult athletes, this resulted in reciprocal immersion, attention, effort, and motivation from many of the MAs. Additionally, Young et al. (2014) suggested that coaches could use age-graded tables, baseline performance measures, and recent competitive results/scenarios to present learning opportunities to their adult athletes. Our findings based on the AOSCS suggest that coaches can frame learning for their athletes in various ways to keep them more invested in sport.

Imparting coaching knowledge (ICK)

Imparting coaching knowledge did not have any significant associations with the criterion variables examined. Nonetheless, it contributed to the overall AOSCS composite score. It bears mentioning that we did not examine all relevant criterion variables indicative of a quality sport experience, and we can foresee ICK being associated with the intellectual stimulation criterion described by Young, Callary et al., (2021), or being tied to teaching ability more specifically, or coaching technique that depends highly on coach credibility. Thus, ICK may yet prove to be associated with other criterion variables indicative of a quality sport experience. Previous literature supports this hypothesis, especially interviews with MAs who advocated for their coaches to share knowledge, whether done to enhance a skill or strategy (Callary et al., 2017; MacLellan et al., 2018, 2019), or to evidence they were receiving top-notch coaching (Young, Callary, et al., 2021).

Overall adult-oriented coaching practices and criterion variables

Overall AOSCS scores were significantly and positively associated with *all* criterion variables. For the coach-athlete relationship, when the MAs reported more frequently receiving adult-oriented coaching overall, they also felt more conviction to maintain an attached relationship with their coach (i.e., commitment to their coach and to their future sport career), reported stronger emotional bonds with their coach (i.e., trust, respect, coach liking and coach appreciation), and felt that their coach's behaviours during cooperative efforts were more responsive to their needs. Importantly, these relationships all surpassed levels representing large effect sizes (Cohen, 1988). In fact, our results show that 63.4%, 41.3%, 39.8% of the variance in MA's responses for commitment, complementarity, and closeness with their coach were explained, respectively, by how often they perceive their coaches' overall use of AOSCS practices. Callary et al. (2020) suggested that understanding the relational aspects of coaching MAs, in parallel with

advancing adult-oriented coaching practices, could further advance knowledge in appropriate Masters-specific approaches, and in this study, we have shown the usefulness of merging these conceptualisations.

Regarding our four additional criterion variables, when the stems attributed MAs' judgments explicitly to the coach, the associations of overall AOSCS scores to liking practice and investing more into one's sport activity were strong. Our findings in terms of practice-liking and sport investment affirm recent literature which suggests the coach can be considered as an important agent for ensuring a quality sport experience among adult athletes (Appleby & Dieffenbach, 2016; Callary et al., 2020; Hoffmann et al., 2019). When the coach was not included in the stem (i.e., "because of my coach"), the associations with sport commitment and enjoyment were significant albeit weaker than our findings related to practice-liking and investment. Nevertheless, these findings are still notable as sport enjoyment is a large predictor of functional sport commitment among MAs (Young & Weir, 2015). Together, these findings suggest that when MAs perceive that adult-oriented coaching practices are used more often overall, the coach becomes an asset for attracting athletes to invest in their sport, enhancing liking for practice, and sustaining athlete commitment by affording enjoyable involvement opportunities.

Limitations & future directions

There are limitations worth acknowledging within the present study. First, we collected data from a sample of MAs, but did not collect data from their coaches. Since the AOSCS and CART-Q have available coach versions, additional coach data would likely provide greater insight into the relationships discussed. In the future, when possible, studies should also incorporate coach measures to determine the congruence of adult-oriented coaching practices and MAs' outcomes. For example, Smoll and Smith (1989) have theorised that the coaches' behaviours, the athletes' perceptions of the coaches' behaviours, and the athletes' reactions to the coaches' behaviours, are intertwined. Future studies should seek to understand whether the extent to which what the coach says they present to athletes is aligned with what their athletes judge they are experiencing, and whether this (in)congruency has an impact on effect sizes.

A second limitation was that MAs who did not have a coach, or felt their coach interactions were unimportant, were excluded from the data analyses. In the current study, the choice was made to exclude these MAs because they may not have had a pre-existing coach-athlete relationship. As a first test of criterion validity, we felt it was important to assess the relationships between adult-oriented coaching practices and criterion variables with a sample of MAs who believes having a coach and interactions with a coach are important. Having a self-selected sample, though important for testing proof of concept with the AOSCS, may have led to inflated relationships (i.e., inflated beta coefficients). Thus, our current findings may be more applicable to MAs who value their coach. Further research should address this limitation by incorporating all coached MAs regardless of how much they value their coach and their coaching interactions. It would also be interesting to examine how coach-athlete relationship length moderates associations with adult-oriented coaching, and how adult-oriented coaching practices relate to affective, normative and continuance facets of sport commitment (Jackson et al., 2014) and multi-facets of enjoyment (Phoenix & Orr, 2014) among MAs.

A final limitation to our study was the potential presence of common methods bias (Podsakoff et al., 2003) due to our data being collected and measured cross-sectionally via a singular online survey. To remedy this bias, we attempted to measure and account for common methods bias using a common latent factor (Podsakoff et al., 2003). However, this retroactive remedy is prone to model misidentification – our model was not an exception. Thus, we were unable to confidently determine and account for common methods bias in this fashion. That said, there are several ways researchers can proactively reduce common methods bias (MacKenzie & Podsakoff, 2012). In our study we (a) ensured participant anonymity, (b) allowed voluntary responses, (c) expressed appreciation for the participants' time, and (d) limited the availability of previous answers by having <13 questions per survey page. These four procedures helped reduce the effect of a bias prior to data collection. Researchers collecting data cross-sectionally using single surveys should attempt to account for common method bias prior to data collection as outlined by MacKenzie and Podsakoff (2012).

Conclusion

Over the past decade, researchers have focused on the impacts of adult-specific coaching on the quality of the sport experience for competitive MAs (Young et al., 2014). Findings from qualitative literature indicate coaches' use of adult-oriented coaching approaches may benefit MAs' sport experience (Callary et al., 2015; MacLellan et al., 2018; 2019). Recently, Rathwell et al. (2020) created the AOSCS to quantitatively assess adult-oriented coaching practices. In their study, they showed evidence for the face validity, reliability, and factorial validity of the AOSCS using samples of MAs and coaches (Rathwell et al., 2020). As Drost (2011) notes, survey validation is an ongoing process and we must test our instruments using multiple types of validity and reliability when measuring human behaviours. The present findings add to the literature by providing support for the criterion-related (i.e., construct) validity of the AOSCS. Specifically, we showed adult-oriented coaching practices are positively related with theoretically grounded concepts that Young, Callary, et al., (2021) outline as being indicative of a quality sport experience (i.e., coach-athlete relationship, sport investment, practice-liking, sport commitment, and sport enjoyment) for MAs. In relation to the construct validity of the AOSCS, future studies should test alternative indicators of quality Master sport experiences, as outlined by Young, Callary, et al. (2021). Moreover, future research would benefit from longitudinal designs to establish the predictive validity of the AOSCS using key criteria of a quality sport experience.

Note

1. MAs also completed a separate version of the survey to confirm the factor structure for the coach AOSCS survey tool.

Data availability statement

Data available on request due to privacy/ethical restrictions.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

Appleby, K., & Dieffenbach, K. (2016). "Older and faster": Exploring elite Masters cyclists' involvement in competitive sport. *The Sport Psychologist*, *30*(1), 13–23. https://doi.org/10.1123/tsp.2014-0110

Baker, J., Fraser-Thomas, J., Dionigi, R. A., & Horton, S. (2010). Sport participation and positive development in older persons. *European Review of Aging & Physical Activity*, *7*(1), 3. https://doi.org/10.1007/s11556-009-0054-9

Belalcazar, C., Hernandez, T., & Callary, B. (under review). Individualized coach development programme for Masters-player coaches in Colombia.

Bennett, A. (2014). Examining how specific involvement opportunities influence the sport commitment type of Masters swimmers: Differences in number, strength, and direction of associations to functional and obligatory commitment, [Doctoral dissertation,, University of Ottawa]. Ottawa, Ontario, Canada. https://ruor.uottawa.ca/bitstream/10393/31861/5/Bennett_Angela_2014_Thesis.pdf

Callary, B., Currie, C., & Young, B. W. (2020). Insights into the importance of relational coaching for Masters sport. *International Sport Coaching Journal*, *7*(3), 390–397. https://doi.org/10.1123/iscj.2019-0021

Callary, B., Rathwell, S., & Young, B. W. (2015). Masters swimmers' experiences with coaches: What they want, what they need, what they get. *SAGE Open*, *5*(2)), https://doi.org/10.1177/2158244015588960

Callary, B., Rathwell, S., & Young, B. W. (2017). Alignment of Masters swim coaches' approaches with the andragogy in practice model. *International Sport Coaching Journal*, *4*(2), 177–190. https://doi.org/10.1123/iscj.2016-0102

Callary, B., Rathwell, S., & Young, B. W. (2018). Coach education and learning sources for coaches of Masters swimmers. *International Sport Coaching Journal*, *5*(1), 47–59. https://doi.org/10.1123/iscj.2017-0056

Callary, B., Young, B. W., & Rathwell, S. (2021a). *Coaching Masters athletes: Advancing research and practice in adult sport*. Taylor & Francis.

Callary, B., Young, B. W., & Rathwell, S. (2021b). Adult learning in sport: Implications for psycho-social coaching competencies. In B. Callary, B. Young, & S. Rathwell (Eds.), *Coaching Masters athletes: Advancing research and practice in adult sport* (pp. 15–30). Routledge.

Casper, J. M., Gray, D. P., & Babkes Stellino, M. (2007). A sport commitment model perspective on adult tennis players' participation frequency and purchase intention. *Sport Management Review*, *10*(3), 253–278. https://doi.org/10.1016/S1441-3523(07)70014-1

Chelladurai, P. (2007). Leadership in sports. In G. Tenenbaum, & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 111–135). John Wiley.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Routledge.

Coté, J., Salmela, J., Trudel, P., Baria, A., & Russel, S. (1995). The coaching model: A grounded assessment of expert gymnastic coaches' knowledge. *Journal of Sport & Exercise Psychology*, *17*(1), 1–17. https://doi.org/10.1123/jsep.17.1.1

Currie, C., Young, B. W., & Callary, B. (2021). Mutuality in a coached adult sport team: The team sport model of interdependence. *Sport Coaching Review*, 1–26. https://doi.org/10.1080/21640629.2021.1952810

Dionigi, R. A. (2016). The competitive older athlete: A review of psychosocial and sociological issues. *Topics in Geriatric Rehabilitation*, *32*(1), 55–62. https://doi.org/10.1097/TGR.0000000000000091

Dionigi, R. A., Eime, R., Young, B. W., Callary, B., & Rathwell, S. (2021). Coaching older adults (aged 55 +). In B. Ives, L. Gale, P. Potrac, & L. Nelson (Eds.), *Community sports coaching*. Routledge.

Drost, E. A. (2011). Validity and reliability in social science research. *Education Research & Perspectives*, *38*, 105–124.

Feißt, M., Hennigs, A., Heil, J., Moosbrugger, H., Kelava, A., Stolpner, I., Kieser, M., & Rauch, G. (2019). Refining scores based on patient reported outcomes - statistical and medical perspectives. *BMC Medical Research Methodology*, *19*(1), 167–167. https://doi.org/10.1186/s12874-019-0806-9

Ferrari, G., Bloom, G., Gilbert, W., & Caron, J. (2016). Experiences of competitive Masters swimmers: Desired coaching characteristics and perceived benefits. *International Journal of Sport & Exercise Psychology*, *15*(4), 409–422. https://doi.org/10.1080/1612197X.2015.1114504

Gogol, K., Brunner, M., Goetz, T., Martin, R., Ugen, S., Keller, U., Fischbach, A., & Preckel, F. (2014). "My questionnaire is too long!" The assessments of motivational-affective constructs with three item and single-item measures. *Contemporary Educational Psychology*, *39*(3), 188–205. https://doi.org/10.1016/j.cedpsych.2014.04.002

Hoffmann, M. D., Young, B. W., Rathwell, S., & Callary, B. (2019). Comparing Masters athletes with varying degrees of coaching for psychological need satisfaction and frustration. *International Journal of Sports Science & Coaching*, *15*(1), 3–8. https://doi.org/10.1177/1747954119887300

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

International Council for Coaching Excellence (ICCE), Association of Summer Olympic International Federations, & Leeds Metropolitan University. (2013). International Sport Coaching Framework (Version 1.2). Retrieved from https://www.icce.ws/_assets/files/iscf-1.2-10-7-15.pdf.

International Masters Games Association. (n.d.). Auckland WMG 2017 Final Report. https://www.imga.ch/assets/Uploads/Reports/Auckland-WMG-2017-Final-Report.pdf

Isoard-Gautheur, S., Trouilloud, D., Gustafsson, H., & Guillet-Descas, E. (2016). Associations between the perceived quality of the coach–athlete relationship and athlete burnout: An examination of the mediating role of achievement goals. *Psychology of Sport & Exercise*, *22*, 210–217. https://doi.org/10.1016/j.psychsport.2015.08.003

Jackson, B., Gucciardi, D. F., & Dimmock, J. A. (2014). Toward a multidimensional model of athletes' commitment to coach-athlete relationships and interdependent sport teams: A substantive-methodological synergy. *Journal of Sport & Exercise Psychology*, *36*(1), 52–68. https://doi.org/10.1123/jsep.2013-0038

Jenkin, C. R., Eime, R. M., Westerbeek, H., & van Uffelen, J. G. Z. (2018). Sport for adults aged 50 + years: Participation benefits and barriers. *Journal of Aging & Physical Activity*, *26*(3), 363–371. https://doi.org/10.1123/japa.2017-0092

Jowett, S. (2005). On repairing and enhancing the coach-athlete relationship. In S. Jowett, & C. Hardwood (Eds.), *The psychology of coaching* (pp. 14–26). British Psychological Association.

Jowett, S. (2007). Closeness, commitment, complementarity and co-orientation in the coach-athlete relationship: An interdependence analysis. In S. Jowette, & D. Lavallee (Eds.), *Social psychology in sport* (pp. 15–27). Human Kinetics.

Jowett, S., & Chaundy, V. (2004). An investigation into the impact of coach leadership and coach-athlete relationship on group cohesion. *Group Dynamics: Theory, Research, & Practice*, *8*(4), 302. https://doi.org/10.1037/1089-2699.8.4.302

Jowett, S., & Ntoumanis, N. (2004). The coach–athlete relationship questionnaire (CART-Q): development and initial validation. *Scandinavian Journal of Medicine & Science in Sports*, *14*(4), 245–257. https://doi.org/10.1111/j.1600-0838.2003.00338.x

Kelloway, E. K. (2014). *Using Mplus for structural equation modeling: A researcher's guide*. Sage Publications.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed). Guilford.
Knowles, M., Holton, E. F., & Swanson, R. A. (2012). *The adult learner* (7th ed). Routledge.
Larson, H. K., Young, B. W., McHugh, T.-L. F., & Rodgers, W. M. (2020). A multi-theoretical investigation of the relative importance of training volume and coach autonomy support for preventing youth swimming attrition. *Current Issues in Sport Science*, *5*, 007. https://doi.org/10.15203/CISS_2020.007
MacKenzie, S. B., & Podsakoff, P. M. (2012). Common method bias in marketing: Causes, mechanisms, and procedural remedies. *Journal of Retailing*, *88*(4), 542–555. https://doi.org/10.1016/j.jretai.2012.08.001
MacLellan, J., Callary, B., & Young, B. W. (2018). Same coach, different approach? How Masters and youth athletes perceive learning opportunities in training. *International Journal of Sports Science & Coaching*, *13*(2), 167–178. https://doi.org/10.1177/1747954117727202
MacLellan, J., Callary, B., & Young, B. W. (2019). Adult learning principles in Masters sport: A coach's perspective. *Canadian Journal for the Study of Adult Education*, *31*, 31–50. https://cjsae.library.dal.ca/index.php/cjsae/article/view/5424
McGee, V., & DeFreese, J. (2019). The coach-athlete relationship and athlete psychological outcomes. *Journal of Clinical Sport Psychology*, *13*(1), 152–174. https://doi.org/10.1123/jcsp.2018-0010
Medic, N., Young, B. W., Starkes, J. L., & Weir, P. L. (2012). Relationship between having a coach and Masters athletes' motivational regulations for sport and achievement goal orientations. *International Journal of Coaching Science*, *6*, 65–79.
Muthén, & Muthén. (2017). *Mplus (version 8)*. Muthén & Muthén.
Olympiou, A., Jowett, S., & Duda, J. L. (2008). The psychological interface between the coach-created motivational climate and the coach-athlete relationship in team sports. *The Sport Psychologist*, *22*(4), 423–438. https://doi.org/10.1123/tsp.22.4.423
Phoenix, C., & Orr, N. (2014). Pleasure: A forgotten dimension of physical activity in older age. *Social Science & Medicine*, *115*, 94–102. https://doi.org/10.1016/j.socscimed.2014.06.013
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879
Rathwell, S., Young, B. W., Callary, B., Motz, D., Currie, C., & Hoffmann, M. D. (2020). The adult-oriented sport coaching survey: A measurement tool designed to assess coaching behaviours tailored for adult athletes. *Journal of Sport & Exercise Psychology*, *42*(5), 5. https://doi.org/10.1123/jsep.2020-0031
Rhind, D. J., Jowett, S., & Yang, S. (2012). A comparison of athletes' perceptions of the coach-athlete relationship in team and individual sports. *Journal of Sport Behavior*, *35(4)*, 433–452.
Riley, A., & Smith, A. L. (2011). Perceived coach-athlete and peer relationships of young athletes and self-determined motivation for sport. *International Journal of Sport Psychology*, *42*, 115–133.
Rottensteiner, C., Konttinen, N., & Laakso, L. (2015). Sustained participation in youth sports related to coach-athlete relationship and coach-created motivational climate. *International Sport Coaching Journal*, *2*(1), 29–38. https://doi.org/10.1123/iscj.2014-0060
Santi, G., Bruton, A., Pietrantoni, L., & Mellalieu, S. (2014). Sport commitment and participation in Masters swimmers: The influence of coach and teammates. *European Journal of Sport Science*, *14*(8), 852–860. https://doi.org/10.1080/17461391.2014.915990
Scanlan, T. K., Chow, G. M., Sousa, C., Scanlan, L. A., & Knifsend, C. A. (2016). The development of the sport commitment questionnaire-2 (English version). *Psychology of Sport & Exercise*, *22*, 233–246. https://doi.org/10.1016/j.psychsport.2015.08.002
Smith, R. E., Smoll, F. L., & Curtis, B. (1979). Coach effectiveness training: A cognitive-behavioral approach to enhancing relationship skills in youth sport coaches. *Journal of Sport & Exercise Psychology*, *1*, 59–75.
Smoll, F. L., & Smith, R. E. (1989). Leadership behaviors in sport: A theoretical model and research paradigm. *Journal of Applied Social Psychology*, *19*(18 Pt. 2), 1522–1551. https://doi.org/10.1111/j.1559-1816.1989.tb01462.x
Tabachnick, B., & Fidell, L. (2019). *Using multivariate statistics* (7th ed). Pearson.

Vierimaa, M., Bruner, M. W., & Côté, J. (2018). Positive youth development and observed athlete behavior in recreational sport. *PLoS One*, *13*(1), e0191936. https://doi.org/10.1371/journal.pone.0191936

Weiss, M. R., Kimmel, L. A., & Smith, A. L. (2001). Determinants of sport commitment among junior tennis players: Enjoyment as a mediating variable. *Pediatric Exercise Science*, *12*(2), 131–144. https://doi.org/10.1123/pes.13.2.131

Weiss, M. W., & Weiss, M. R. (2006). A longitudinal analysis of commitment among competitive female gymnasts. *Psychology of Sport & Exercise*, *7*(3), 306–323. https://doi.org/10.1016/j.psychsport.2005.08.010

World Masters Games. (n.d.). Outline of the games. The Organizing Committee of the Kansai World Masters Games 2021. http://www.wmg2021.jp/en/summary.html

Young, B. W. (2011). Psycho-social perspectives on the motivation and commitment of Masters athletes. In N. Holt, & R. Bailey (Eds.), *Lifelong engagement in sport and physical activity* (pp. 125–138). Routledge and the International Council of Sports Science & Physical Education.

Young, B. W., & Callary, B. (2018). Doing "more for adult sport": promotional and programmatic efforts to offset adults' psychosocial obstacles. In R. Dionigi, & M. Gard (Eds.), *Sport and physical activity across the lifespan: Critical perspectives* (pp. 263–282). Palgrave Macmillan. https://doi.org/10.1057/978-1-137-48562-5_14.

Young, B. W., Callary, B., & Niedre, P. C. (2014). Exploring novel considerations for the coaching of Masters athletes. *International Sport Coaching Journal*, *1*(2), 86–93. https://doi.org/10.1123/iscj.2014-0052

Young, B. W., Callary, B. W., & Rathwell, S. (2021, January). Giving due deliberation to Masters athletes: The time has come. *SIRCuit Magazine* (online). https://sirc.ca/blog/giving-due-deliberation-to-masters-athletes/

Young, B. W., Rathwell, S., & Callary, B. (2020). Testing a coaching assessment tool derived from adult education in adult sport. *Psychology of Sport & Exercise*, *47*, 101632. https://doi.org/10.1016/j.psychsport.2019.101632

Young, B. W., Rathwell, S., & Callary, B. (2021). The emergence of Masters sport and the rising importance of coaches. In B. Callary, B. W. Young, & S. Rathwell (Eds.), *Coaching Masters athletes: Advancing research and practice in adult sport* (pp. 1–14). Taylor & Francis.

Young, B. W., & Weir, P. L. (2015). Maturing with Masters athletes: Tracing the evolution of empirical research on aging and sport expertise. *International Journal of Sport Psychology*, *46*, 689–713. https://doi.org/10.7352/IJSP2015.46.000