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Investigating Effects from a Non-Formal Coach Education Program Based on Mentorship

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Abstract

The current study investigates effects from a non-formal coach education program based on mentorship on the coach–athlete working alliance (CAWA), perceived coach performance (PCP), coaches' perceptions of self (CPS), and social resources in sport (SRS). Fifty-four elite coaches from a variety of sports who participated in a non-formal coach education program based on mentorship over a period of 18 months, and 21 coaches from a control group, completed data collection at both the pre- and post-test. The results from regression analyses show that the group variable significantly explained the variance in the PCP and SRS at the post-test, whereas the group variable did not significantly explain any variance in CAWA and CPS at the post-test. Thus, the results in the current study indicate positive results from the coach education program on PCP and SRS. The current results are discussed based on the effect mentorship might have on coaches' self-reflections based on their own experiences, and the importance of building social networks among their peer coaches.

Keywords: coach education; elite sports; coach performance; coach–athlete relationship

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1. Introduction

The coach–athlete relationship is pivotal for fostering an optimal environment for athletic development in sport. Relationships characterized by trust, communication, respect, and mutual understanding have been linked to athletes' commitment, satisfaction, and performance (Jowett & Cockerill, 2003; McShan & Moore, 2023). Effective coaching can enhance athletes' mental resilience and emotional well-being (Breslin et al., 2017; Fletcher & Sarkar, 2016). The dynamic nature of this relationship is influenced by both parties' attitudes, behaviors, and the coaching context (Davis & Jowett, 2014; Jowett et al., 2023). Thus, coaches are key for athlete development in sport.

Mentor-based education programs have the potential to enhance the quality of the coach–athlete relationship (Haugan et al., 2021; McQuade et al., 2015). Mentorship in sport implies professional guidance and facilitation of personal and psychological growth for coaches (Fraina & Hodge, 2020; Jones et al., 2009). These programs aim to enhance coaches' skills, knowledge, and their interpersonal relationships with their athletes. The effectiveness of mentor-based education programs has attracted significant research attention in sport psychology in recent years (Leeder & Sawiuk, 2020; Trudel et al., 2020).

Recent studies emphasize the importance of structured educational frameworks that promote coaches' interpersonal and intrapersonal competencies (Côté & Turnnidge, 2023; Erikstad et al., 2023). Transformational coaching behaviors, such as individualized consideration and inspirational motivation, have shown promise in fostering effective coach–athlete relationships. A growing body of literature highlights how non-formal and learner-centered approaches facilitate these developmental processes (Milistetd et al., 2021; Paquette et al., 2019), particularly when embedded in long-term initiatives that value reflective dialogue and mentor support. Furthermore, Barz et al. (2022) identified key gaps and opportunities in coach development research, urging more integration of mentorship strategies and evidence-informed practices in coach education.

Coaches who participated in mentorship programs reported improved communication skills and a deeper understanding of their athletes' needs and motivations (Haugan et al., 2021; Langan et al., 2013). Thus, these coaches are better equipped to develop trust and foster a supportive environment, which is essential for athletes' psychological safety and performance enhancement. Mentorship frameworks promoting relational coaching practices positively affect both athletes' and coaches' experiences (Mallett et al., 2009; Moen et al., 2016). These findings collectively underscore the potential of transformational and mentorship-based education programs to strengthen the professional growth of coaches while improving their capacity to support athlete development.

1.1. Systematic Reviews of Mentorship-Based Coach Education Programs

Building upon the established benefits of mentorship in coach development, systematic reviews and meta-analyses offer a broader and more structured understanding of how mentorship-based coach education affects coach performance, reflection, and social integration. Recent systematic reviews and meta-analyses highlight the increasing relevance and documented impact of mentorship-based coach education programs in sport. These programs are typically characterized by experiential learning, reflective practice, and relational development between the mentor and coaches (McQuade et al., 2015; Jones et al., 2009). Evans et al. (2015) conducted a systematic review using the RE-AIM (reach-effectiveness-adaption-implementation-maintenance) framework to evaluate coach development programs focused on interpersonal behavior change. The findings support the view that programs incorporating mentoring elements foster reflective practice, self-efficacy, and interpersonal competence among coaches. Similarly, Silva et al. (2020) synthesized evidence from intrapersonal coach development programs and emphasized that structured mentorship is a key mechanism for promoting coach reflection and ongoing learning. Leeder and Sawiuk (2020) conducted a review of coach mentoring literature, concluding that mentoring not only contributes to individual coach learning but also strengthens communities of practice. In a related study, Sawiuk et al. (2016) examined elite coach mentoring programs in the UK and found that despite structural challenges, mentoring encouraged reciprocal learning and enhanced role identity development among coaches.

Furthermore, Langan et al. (2013) provided a meta-analytic review of interpersonal coach education programs and demonstrated small-to-moderate positive effects on athlete outcomes when coaches engaged in relationship-focused learning, such as mentoring. Jones et al. (2009), in their foundational review, emphasized mentoring as a multifaceted developmental process that goes beyond skill transmission, involving psychosocial and identity-related support. Haugan et al. (2021), in a more recent empirical study with a quasi-experimental design, confirmed that participation in a structured mentor program significantly strengthened the coach–athlete working alliance. Collectively, these studies suggest that mentorship-based coach education—especially in non-formal settings—holds promise for enhancing not only coach performance and self-perception, but also the broader

social resources coaches draw upon. This is particularly important in elite sport environments where coaching is often conducted in relative isolation.

1.2. Coaches' Subjective Experiences of Performance

Mentorship programs are found to significantly affect coaches' subjective evaluations of their own performance (Leeder et al., 2021; Sawiuk et al., 2016). Coaches involved in mentorship reported increased confidence and a more positive perception of their coaching effectiveness (Trudel et al., 2020; Silva et al., 2020). The mentors provide structured feedback that helps coaches reassess their practices, enhancing their adaptive skills and decision-making capabilities. Furthermore, mentors can facilitate goal-setting exercises that allow coaches to track their progress over time. This structured approach not only bolstered coaches' motivation but also instilled a greater sense of ownership over their professional growth, leading to improved performance satisfaction and self-perception. Jones et al. (2009) also found that coaches who engaged in reflective practices within mentorship frameworks experienced increased self-awareness. This reflection allowed them to identify their strengths and areas needing improvement, fostering a sustainable approach to professional development.

Interestingly, research claims that sport coaches' subjective experiences of their own performances might influence their coaching effectiveness and overall job satisfaction (Norris et al., 2017; Potts et al., 2023).

1.3. Coaches' Self-Perception

Self-perceptions in sport coaching pertain to how coaches view their roles, competencies, and identity within their profession (Carden et al., 2023; Santos et al., 2010). Mentor-based education programs serve as critical avenues for developing self-perception among coaches (McQuade et al., 2015; Bailey et al., 2019). Coaches who participated in mentorship experienced a shift in their self-concept, moving from a traditional authority model towards a more collaborative and learner-centered perspective (Trudel et al., 2020; Silva et al., 2020). They reported feeling more equipped to handle various challenges, which positively influenced their motivation levels and satisfaction with their coaching roles. Additionally, studies have shown that as coaches develop their skills through mentorship, they often exhibit enhanced self-efficacy and an increased desire to support athletes (Machida-Kosuga et al., 2017). Consequently, educational programs that include mentorship components often lead to transformative changes in how coaches perceive themselves (Trudel et al., 2020; Ciampolini et al., 2019), which mirrors their coaching interactions and effectiveness, and perceptions of social resources at work.

According to Bandura's (1997) Social Cognitive Theory, self-efficacy significantly influences a coach's motivation and approach to practice, and is found to be the most influential variable in sport psychology that predicts performance outcomes (Feltz et al., 2008). Thus, an increased self-perception for coaches can lead to greater engagement with their athletes and improve their coaching outcomes (Jones et al., 2009; Gencer, 2020).

1.4. Social Resources at Work

Mentor-based education programs might be pivotal in expanding social resources for coaches. According to Côté and Gilbert (2009), mentorship enhances networks and fosters connections among coaches, leading to improved collaboration and shared practice. The establishment of a mentor–mentee relationship creates an informal support system that can positively influence coach well-being and effectiveness. Coaches who engaged in mentorship reported increased feelings of social support and belonging (Fraina & Hodge, 2020; Hollweck, 2019). These social resources allowed coaches to access valuable advice and support during challenging situations, thus mitigating stress and enhancing performance.

Furthermore, this increased perception of social support translated positively into their interactions with athletes, leading to enhanced coach–athlete relationships.

Social resources within a coaching context encompass the social support, networks, and collaboration opportunities available to coaches within their environment (Norris et al., 2017; Simpson et al., 2024). Research indicates that these resources are integral to coaches' performance as they foster a professional environment that encourages growth, collaboration, and shared learning (Norris et al., 2020; Olsen et al., 2020). Coaches are more likely to thrive in environments where social resources facilitate knowledge sharing and emotional support (McLean & Mallett, 2012; Norris et al., 2022).

1.5. The Current Study

The current literature review indicates that mentor-based education programs might influence various aspects of coaches' coaching, including the coach–athlete relationship (Haugan et al., 2021; McQuade et al., 2015), subjective experiences of performance (Leeder et al., 2021; Sawiuk et al., 2016), coaches' self-perceptions (Bailey et al., 2019), and the social resources in their sports (Norris et al., 2020; Olsen et al., 2020). Coaches' age (Balogh & Trzaskoma-Bicsérdy, 2020; Callary & Gearity, 2019) and amount of time spent in coaching to gain experience (Trudel et al., 2020; Walker et al., 2018) are also found to influence coaches' coaching. The current study aims to investigate possible effects from a non-formal coach education program that was based on mentorship for elite coaches over a period of 18 months. The following hypotheses were developed in the current study based on the literature review.

H1. *The coach–athlete relationship will be affected positively.*

H2. *The coaches' perception of their own performances will be positively affected.*

H3. *The coaches' self-perception will be positively affected.*

H4. *The coaches' perception of their social resources in their sports will be positively affected.*

2. Materials and Methods

The Norwegian Olympic Sports Center (NOSC), a national organization that is part of the Norwegian Olympic and Paralympic Committee and Confederation of Sports, initiated an 18-month non-formal coach education program. The program was aimed at talented young coaches who were, or had the potential to become, coaches for young and promising future elite athletes. The current study is one of several studies based on data collected from this program.

2.1. Participants

The program was marketed to all the different sport federations in Norway, and the coaches who were motivated to start the program were required to obtain a recommendation from their sport federation that defined them as potential coaches for future elite athletes. A total of 159 coaches from all parts of Norway applied for the program, whereas 73 coaches were selected by the NOSC to start. All the coaches who were selected to start the non-formal coach education program were invited to participate in the current study. Out of the 73 coaches that were invited, 69 of them accepted the invitation to participate in the study.

2.2. Pre-Test/Post-Test Control Group Design

The current study was arranged as an experiment with a control group to investigate possible effects from the coach education program. The 69 coaches who were selected to start the coach education program were assigned to the experimental group and 29 coaches from high schools specialized for elite sports were invited to participate as a control group. A pre-test was given through an online questionnaire that measured the variables in focus for the current study. The non-formal coach education program was then carried out for the coaches in the experimental group for 18 months.

2.3. Instruments

An online questionnaire was developed to collect descriptive information about the coaches' work situation (their sport, their athletes' performance level, their role as coach, the time they spend on coaching) and their experiences related to their work as coaches. The measurements that were used are based on previously developed scales proven to hold both satisfactory validity and reliability. The questionnaire included scales to measure the working alliance between the coach and their athletes, coaches' perceived coach performance, social resources in their sports, and coaches' perception of self. All questions were presented in Norwegian, and the questionnaire was conducted online and took approximately 15–20 min to complete. The measurements are described below in more detail.

2.3.1. The Coach–Athlete Working Alliance (CAWA)

The coaches' perception of the coach–athlete working alliance was measured by the coach–athlete working alliance inventory (CAWA) (Moen et al., 2019a). The scale is a Norwegian adjusted and validated version based on the working alliance inventory (Horvath & Greenberg, 1989; Tichenor & Hill, 1989). Results from earlier research show that the CAWA is predictive of athletes' performances and well-being (Moen et al., 2017; Moen et al., 2019b). The scale consists of three subscales measuring the degree of agreement concerning goals related to the coach–athlete working alliance, on the tasks chosen to achieve these goals, and the personal bond between the coach and their athletes. Each subscale has four items associated to goal (e.g., "The coach and athlete are working on mutually agreed upon goals"), task (e.g., "There is agreement about the steps taken to help improve the athlete's situation"), and bond (e.g., "There is mutual trust between the coach and athlete"). The coaches were asked to respond on a 7-point scale ranging from (1) never to (7) always, indicating to what degree the statement applied to them and their coach–athlete relationships. However, the scale is recommended to be used as a one-dimensional scale in sport, and a one-dimensional scale was therefore chosen in the current study (Moen et al., 2019b). The three subscales were calculated by summing the scores of the items corresponding to each subscale and dividing by the number of items. The scores from each subscale were then combined to calculate the total score for the one-dimensional scale (Tables 1 and 2).

Table 1. Pearson correlation coefficients between the investigated variables and descriptive statistics based on cross-sectional data collected from 98 coaches at the pre-test.

	Variables	1	2	3	4
1	CAWA	-			
2	PCP	***0.36*** *	-		
3	CPS	***0.21*** **	***0.40*** *	-	
4	SRS	***0.38*** *	***0.36*** *	***0.30*** *	-
Mean		12.07	4.8	5.25	5.58
SD		1.16	0.75	1.01	0.94
Maximum		14.67	6.50	7.00	7.00
Minimum		9.42	1.50	1.50	2.80
Cronbach's alpha		0.75	0.88	0.83	0.78

Notes. * $p < 0.01$, ** $p < 0.05$. Abbreviations: CAWA = coach–athlete working alliance, PCP = perceived coach performance, CPS = coaches' perception of self, SRS = social resources in sport, SD = standard deviation.

Table 2. Pearson correlation coefficients between the investigated variables and descriptive statistics based on cross-sectional data collected from 75 coaches at the post-test.

	Variables	1	2	3	4
1	CAWA	-			
2	PCP	***0.36*** *	-		
3	CPS	***0.21*** **	***0.40*** *	-	
4	SRS	***0.38*** *	***0.36*** *	***0.30*** *	-
Mean		12.02	4.8	5.11	5.37
SD		1.42	0.78	0.96	1.09
Maximum		14.75	6.50	7.00	7.00
Minimum		8.67	2.50	2.00	2.60
Cronbach's alpha		0.86	0.83	0.78	0.80

Notes. * $p < 0.01$, ** $p < 0.05$. Abbreviations: CAWA = coach–athlete working alliance, PCP = perceived coach performance, CPS = coaches' perception of self, SRS = social resources in sport, SD = standard deviation.

2.3.2. Perceived Coach Performance (PCP)

The perceived coach performance (PCP) scale measures coaches' perceived satisfaction with their own progress related to their task performances as coaches (Moen et al., 2021b). The scale is an adjusted version of the Athlete Satisfaction Questionnaire (Riemer & Toon, 2001), and items in the scale that originally referred to athletes are adjusted to refer to coaches in the PCP scale. Coach performance includes coaches' perception of absolute performance, improvements in performance and goal achievement. An example item is "I am satisfied with the degree to which I have reached my performance goals during the season". The coaches were asked to consider four items and how satisfied they were with their own progress as coaches in their sports during the last year on a 7-point scale ranging from 1 (not at all satisfied) to 7 (extremely satisfied). The variable was calculated by summing the relevant items and dividing the total by the number of items (Tables 1 and 2).

2.3.3. Coaches' Perception of Self (CPS) and Social Resources in Sport (SRS)

Coaches' perception of self (CPS) and social resources in their sport (SRS) were measured by using Hjemdal and Friborg's resilience scale for adults (Friborg et al., 2005; Friborg et al., 2003). Coaches' perception of self was measured by six items scored on a 7-point scale, e.g., "When something unforeseen happens": (1) I always find a solution, (7) I often feel bewildered; and social resources in their sport by six items, e.g., "I receive support from": (1) my leaders, (7) no leaders. The coaches were instructed to consider their thoughts and feelings related to themselves and the meaningful people around them in the last month in

their sports. The variables were calculated by summing the relevant items and dividing the total by the number of items (Tables 1 and 2).

2.4. The Intervention Protocol

The national coach education program in the current study was carried out by the NOSC. The mentors were selected by the NOSC based on their previous experience from higher-level sports, their formal university background, and/or experience with mentoring in elite sports. The mentors also had to complete a mentoring education program carried out by the Norwegian University of Science and Technology to become mentors (7.5 university points) (Moen et al., 2021a). The mentors were matched with the coaches based on the goal that the coaches decided upon, and the relevance of the mentors' competence and experience to the matching coaches' goals.

All coaches in the program completed six group gatherings that were designed to focus on specific themes related to the coach role, where each gathering lasted for about 6 h. Based on an open dialogue with the coaches, where open questioning skills were mainly used, focusing on their strengths and philosophies in coaching, the coaches decided their personal goals for development in the non-formal coach education program. The first group gathering was used to reflect and decide upon goals, and this was further elaborated in individual sessions with their mentors. The further focus in the group gatherings was to explore and discuss themes and cases based on the coaches' own personal goals for development and their experiences, reflections and different perspectives related to their goals. During the group gatherings, the coaches presented their experiences and perspectives for the other coaches and mentors in the program, both in plenum settings and in smaller groups, and received questions, shared experiences and perspectives from the other coaches and mentors.

Further, the coaches completed at least 15 individual sessions with their personal mentor. The sessions lasted for between 1 and 3 h, depending on whether there were an observation included before the dialogue process between the mentor and the coach or not. The focus in the sessions with the mentors was to explore and discuss themes and cases based on the coaches' personal experiences and perspectives related to their own personal goals for development. The process was based on dialogue between the mentor and the matching coach, and the process was based on mutuality to systematically share perspectives and experience between the parties.

2.5. Statistical Analyses

Composite scores for each of the included questionnaires and their respective subscales were calculated according to their relevant scoring manuals. Then, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. The Shapiro–Wilk test indicated that the data had a normal distribution, the correlation analysis indicated that there are low linear relationships among the studied variables (Tables 1 and 2), the analysis for multicollinearity indicated that VIF (variance inflation factor) is generally acceptable (VIF < 5) and the multicollinearity is low (Tolerance > 0.5), and a visual inspection of the residual plots of the independent and dependent variables indicated that the assumption of homoscedasticity was met.

Demographics and descriptive statistics such as statistical means, ±standard deviations (S.D.), and maximum and minimum values were analyzed with IBM SPSS (version 28.0) for the pre-test and the post-test scores. To test the hypothesis that the coach program improves the coach–athlete working alliance, the perceived coach performance, coaches' perception of self, and social resources in their sport, a data analysis procedure with these variables was conducted. Firstly, descriptive statistics including statistical means and stan-

dard deviations measuring the investigated variables were carried out for the experimental group and control group at each testing time-point. Additionally, paired samples *t*-tests were applied to test for improvements between pre-test and post-test, in each of the two groups. To investigate whether the coaches in the experimental group had significantly improved their CAWA, PCP, CPS, and SRS compared to coaches in the control group, a series of four separate linear regression analyses was conducted. The age of the coach, the amount of time coaches spent on their work as coaches, the different pre-test scores, and the group variable were entered as independent variables in the analyses, and the post-test scores were included as dependent variables. Thus, in the first model CAWA-post was entered as the depended variable, and Age, Amount of time coaching, CAWA-pre and the Group variable were entered as independent variables. In the second model PCP-post was entered as the dependent variable, and Age, Amount of time coaching, PCP-pre and the Group variable were entered as independent variables. In the third model CPS-post was entered as the depended variable, and Age, Amount of time coaching, CPS-pre and the Group variable were entered as independent variables. Finally, in the fourth model SRS-post was entered as the dependent variable, and Age, Amount of time coaching, SRS-pre and the Group variable were entered as independent variables.

3. Results

Ninety-eight coaches participated in the investigation at the pre-test, where 69 were from the experimental group and 29 were from the control group. The sample consisted of 61 males (62%) and 37 females (38%) whose ages ranged from 26 to 71 years (M = 38.3, SD = 38.3). The participants practiced a variety of sports (N > 20) including both team and individual sports, and the most represented sports were handball (15.3%), cross-country skiing (10.2%), soccer (7.1%), and track and field (7.1%).

Seventy-five coaches completed the data collection after 18 months, which gives a response rate of 73.5%. Fifty-four of the coaches that completed the data collection were from the experimental group (78%) and 21 were from the control group (72%). The missing data were omitted from the data analysis. Head coaches comprised 74% of the experimental group, whereas 26% were assistant coaches. A total of 26% worked with senior elite athletes at international top level, 68.5% worked with junior elite athletes, and 5.5% worked with athletes from lower levels. In the control group, 5% of the coaches worked with senior elite athletes, 72% worked with junior elite athletes, and 23% worked with athletes from lower levels. Head coaches comprised 48%, while 52% were assistant coaches. In the experimental group, 70% of the coaches were employed full-time as coaches, whereas 26% were employed part-time, and 4% worked voluntarily as coaches. In the control group, 43% of the coaches were employed full-time, 33% were part-time, and 24% were voluntary. The mean amount of hours spent on coaching per week in the experimental group was 36 h (±15 h), where 5 h was the minimum and 75 h was the maximum. The mean amount of hours spent on coaching per week in the control group was 20 h (± 13 h), where 5 h was the minimum and 50 was the maximum.

3.1. Descriptive Statistics

Descriptive statistics of coaches' scores on the coach–athlete working alliance variable, perceived coach performance, coaches' perception of self, and social resources in their sport from the pre-test and post-test are in Tables 1 and 2, respectively. Power analysis in SPSS was conducted which suggested that at least 29 participants were needed to reach high statistical power for the analysis.

The correlations between the variables range from 0.21 (CAWA and CPS) to 0.40 (CPS and PCP), which are considered to be weak correlations (0.21) and moderate to strong correlations (0.40).

3.2. Paired Samples t-Tests

Means, standard deviations and paired samples *t*-tests for the outcome variables at pre-test and post-test are given in Table 3 for the experimental group and Table 4 for the control group. The paired samples *t*-tests compared values between the pre-test and post-test.

Table 3. Paired sample *t*-test with mean, standard deviation and *p*-values for the experimental group at pre-test and post-test (n = 54).

Variable	Pre-Test		Post-Test		
	Mean	**SD**	**Mean**	**SD**	***p***
CAWA	12.02	1.14	12.06	1.46	0.808
PCP	4.84	0.68	4.90	0.67	0.577
CPS	4.97	1.01	4.94	0.94	0.813
SRS	5.63	0.83	5.50	0.95	0.278

Notes. * $p < 0.01$, ** $p < 0.05$. Abbreviations: CAWA = coach–athlete working alliance, PCP = perceived coach performance, CPS = coaches' perception of self, SRS = social resources in sport, SD = standard deviation.

Table 4. Paired sample *t*-test with mean, standard deviation and *p*-values for the control group at pre-test and post-test (n = 21).

Variable	Pre-Test		Post-Test		
	Mean	**SD**	**Mean**	**SD**	***p***
CAWA	12.10	1.31	11.93	1.33	0.429
PCP	4.76	1.05	4.56	1.00	0.389
CPS	5.58	1.00	5.53	0.89	0.778
SRS	***5.39***	***1.30***	***5.02***	***1.35***	***0.041*** **

Notes. * $p < 0.01$, ** $p < 0.05$. Abbreviations: CAWA = coach–athlete working alliance, PCP = perceived coach performance, CPS = coaches' perception of self, SRS = social resources in sport, SD = standard deviation.

Table 3 shows that there are no significant changes from the pre- to the post-test. The mean values for all the variables investigated are stable from the pre-test to the post-test in the experimental group.

Table 4 shows a significant negative change from the pre-test to the post-test in SRS in the control group. This significant negative change indicates that the coaches in the control group experienced reduced social support from the pre- to the post-test, while coaches in the experimental group did not experience the same negative development.

3.3. Hierarchical Regression Anlyses

The hierarchical regression analyses in Table 5 revealed that all variables at the pre-test predicted significantly their respective variables at the post-test in all four separate regression analyses. There was also a significant effect of age and group on the PCP-post score, and of the amount of time on coaching and group variable on the SRS-post score. The results of the regression analyses are summarized in Table 5.

Table 5. Summary of linear regression analysis for the independent variables predicting the dependent variables (n = 75).

Dependent Variable	Predictors	*B*	*t*	*p*	R^2
CAWA-post	Age	0.099	0.762	0.449	
	Amount of time spent on coaching	−0.088	−0.900	0.371	
	CAWA-pre	***0.579***	***5.927***	***0.000*** *	
	Group	−0.148	−1.149	0.254	0.34
PCP-post	***Age***	***0.307***	***2.072***	***0.042*** ***	
	Amount of time spent on coaching	0.190	1.789	0.078	
	PCP-pre	***0.304***	***2.743***	***0.008*** **	
	Group	***−0.340***	***−2.352***	***0.022*** ***	0.21
CPS-post	Age	0.109	0.894	0.374	
	Amount of time spent on coaching	0.082	0.898	0.372	
	CPS-pre	***0.602***	***6.352***	***0.000*** *	
	Group	0.067	0.562	0.576	0.42
SRS-post	Age	0.070	0.622	0.536	
	Amount of time spent on coaching	***−0.237***	***−2.716***	***0.008*** **	
	SRS-pre	***0.631***	***7.421***	***0.000*** *	
	Group	***−0.233***	***−2.035***	***0.046*** ***	0.47

Notes. * $p < 0.001$, ** $p < 0.01$, *** $p < 0.05$. Abbreviations: CAWA = coach–athlete working alliance, PCP = perceived coach performance, CPS = coaches' perception of self, SRS = social resources in sport.

4. Discussion

The purpose of the present study was to examine possible effects from an 18-month non-formal coach education program based on mentorship on the coach–athlete working alliance, perceived coach performance, coaches' perception of self, and social resources in sport. The hypotheses in the current study predicted that coach–athlete working alliance (CAWA), perceived coach performance (PCP), coaches' perceptions of self (CPS), and social resources in sports (SRS) would be positively affected by the non-formal coach education program. The hypotheses were partly confirmed: the scores at PCP and SRS were predicted by the group variable in the regression analyses, whereas the experimental group was associated with significantly higher scores than the control group at the post-test when controlling for the pre-test scores. Hypotheses 2 and 4 were therefore confirmed. Thus, the analysis in the current study shows that there were significant effects from the non-formal coaching program on perceived coach performance and social resources in sport.

4.1. Perceived Coach Performance

The paired sample *t*-tests indicated that there were no significant changes in the PCP variable, neither in the experimental group nor the control group, when comparing the means from the pre- and the post-test. The regression analysis, however, indicated that the PCP variable was predicted by the group variable, and that the experimental group predicted higher scores in PCP compared to the control group. The results from the regression analyses give reason to believe that the coach education program affected the coaches' perceived performances. An earlier study investigating effects from a coach education program found positive, but not significant effects in the experimental group on the coach–athlete relationship and perceived coach performance (Moen et al., 2021a). However, the trend was that the development of these variables in the control group

was negative, but the changes did not reach significance. However, when the group variable was entered in the regression analysis it significantly predicted perceived coach performance at the post-test (Moen et al., 2021a). A possible explanation for these results might be that elite coaches are exposed to many stressors in their work, such as performance, organizational and personal stressors, and that these stressors might contribute to a reduced sense of accomplishment in their work. Many coaches might therefore experience that their perceptions of themselves as coaches are reduced over time. A recent study found that the majority (61%) of 244 Polish coaches in football, swimming and handball reported high levels of reduced sense of personal accomplishment in their work as coaches (Sas-Nowosielski et al., 2018). Thus, when coaches maintain their perception of their own performance over time, such as the coaches in the current study, it might be interpreted as a positive finding. A recent study claims that coach meetings that are organized informally, so that coaches are able to share their experiences of coaching elite athletics, and to discuss relevant cases to achieve professional development, led to awareness and new improved practices (Dohlsten et al., 2021). This is in line with how the non-formal coach education in the current study was organized.

The findings in the current study appear to align with earlier studies suggesting that interpersonal competence and self-efficacy among coaches may increase when they participate in mentor-based coach education programs (Evans et al., 2015). PCP measures coaches' perceived satisfaction with progress related to their task performances as coaches. However, PCP does not explicitly relate to which task performance is considered, as that is an individual decision made by each of the coaches in the current study. It is reasonable to believe that the coaches' assessments of their task performance include tasks that are related to their self-efficacy beliefs, since self-efficacy refers to coaches' beliefs in their ability to successfully perform specific tasks (Feltz et al., 2008). Similarly, Silva et al. (2020), Leeder and Sawiuk (2020), and Sawiuk et al. (2016) claim that mentor-based coach development programs increase coaches' ongoing learning, and if coaches' PCP increases, learning has occurred.

The regression analysis also showed that age significantly predicted PCP at the post-test. Higher ages predicted higher scores in SRS. Thus, a potential explanation may be that coaches need to have years of experience as elite coaches, and maybe of life in general, to learn how to relate to and handle the multiple stressors they are exposed to in their role and still maintain their belief in themselves as coaches. Other studies also found that coaches with more years of experience in their sports significantly experienced more coaching success (Trudel et al., 2020; Balogh & Trzaskoma-Bicsérdy, 2020; Callary & Gearity, 2019; Walker et al., 2018; Gilbert et al., 2009). Thus, it might be important for young promising coaches to understand that experience is key to growing into the role and becoming a future elite coach.

4.2. Social Resources in Sport

The paired sample *t*-tests indicated that there were significant negative changes in the SRS variable in the control group from the pre-test to the post-test. In the experimental group, however, there were no significant changes. The regression analysis, however, showed that the group variable significantly predicted SRS at the post-test. Thus, the coaches who participated in the non-formal coach education program seemed to experience greater availability of social resources in their sports at the post-test compared to the coaches in the control group. Interestingly, social support from social resources is found to be important when coaches are exposed to stressors (Norris et al., 2022). Based on the findings in the current study, it is reasonable to ask whether coaches should be advised to develop a social support network that provides social support resources to help them

cope more effectively with the stressors they experience in their role. The social support resources should be aimed at maintaining or developing their performance levels and positively influencing their psychological well-being. A recent study also claims that social support has significant positive effects on job and life satisfaction, is preventive for burnout symptoms and reduces stress levels (Ferreira et al., 2024). The results in the current study give reason to discuss if the non-formal coach education program based on mentorship provided social support for the coaches, and was experienced as a social resource. The program was designed to facilitate dialogue and discussions based on cases that were self-experienced by the elite coaches, and to explore these based on the coaches' personal experiences and perspectives. It was the coaches' own personal self-set goals for learning and development in the coach role that characterized the group gatherings and mentoring process in the non-formal coach program. Norris et al. (2022) also advised that social resources should be aimed to help coaches to alter their perceptions of potential stressors to see them as less of a threat, and help them to perceive them as a challenge, to avoid potential negative influences of stressors. The coach education program also facilitated group gatherings, where coaches shared their experiences and perspectives with the other coaches in the program. Thus, the coaches in the program might have been experienced as a social resource that was able to support and help when coaches were exposed to stressful events. Maintaining an effective social support network is therefore claimed to be crucial for coaches' performance and psychological wellbeing (Ferreira et al., 2024). This is in line with recent studies of mentor-based coach development, whereas such programs strengthen the coaches' communities of sharing practice and encourage reciprocal learning among coaches (Leeder & Sawiuk, 2020; Sawiuk et al., 2016). Thus, following such programs the social resources among coaches might be strengthened.

The amount of time coaches spend on coaching with their athletes also significantly predicted SRS at the post-test. The more time coaches spent on coaching their athletes, the less available are the social resources in their sports. This is an interesting and important finding. The maximum amount of time coaches in the experimental group spent on coaching was 75 h per week, and the mean was 36 h. Thus, the most active coaches might be fully occupied with coaching processes with their athletes, and because of that might not be able to spend time on social activities. The question is, do the most active coaches need to prioritize more time to be involved in social activities? A recent study found that coaches that participated in informal group meetings, where their own experiences and thoughts were in focus, became aware of the importance of belonging to a social community as a social supportive resource (Dohlsten et al., 2021). At the same time, the coaches' athletics clubs and federations in this study did not fully support these social communities and did not trust the potential effect they had on coach development. Thus, coaches might feel pressure to use all their time on coaching processes with their athletes. However, this need to be investigated in future research.

4.3. Coaches' Perceptions of Self and the Coach–Athlete Working Alliance

Hypotheses 1 and 3 predicted that CAWA and CPS would be affected by the coach education program; these hypotheses were not confirmed. Earlier research has detected that CAWA was affected by a coach education program arranged by the NOSC (Moen et al., 2021b). However, the coach education program in the study by Moen et al. (2021b) focused more explicitly on attention skills and the ability for coaches to build strong relationships with their athletes. The program in the current study had a more open and individual approach, and the coaches that participated were challenged to determine goals for their own development based on their own thoughts and reflections, and not necessarily on relationship issues. This might serve as a potential explanation for why the hypothesis was

not confirmed. A possible explanation for why coaches' perception of self was not affected may be that people's perception of self is found to be a quite stable trait among adults and is therefore difficult to influence (Hank & Baltes-Götz, 2019). Coaches' self-perceptions are influenced by a combination of both internal processes and external influences (Fox, 2000). Coaches' self-perceptions are internally influenced by their experiences and personal reflections, and externally by feedback from others based on the roles they have in various environments. Thus, several sources have an impact on the coaches' self-perception and the coach education program was mainly aimed at influencing how the participants could develop as coaches.

Interestingly, mentor-based programs are also found to have positive effects on learning and development in other contexts (Arnsby et al., 2023; Lejonberg et al., 2018).

4.4. Practical Implications

The study suggests that non-formal, mentorship-based programs might have an impact on coaches' perceptions of their performance. Mentorship might enable coaches to reflect on their practices, leading to greater confidence and self-efficacy, which are critical for effective coaching. This aligns with findings from studies which show that when coaches perceive themselves as effective, they are more motivated and better able to foster positive relationships with their athletes (Feltz et al., 2008). The increase in perceived competence likely leads to higher commitment, improved performance, and positive outcomes for athletes. Based on these findings, sports organizations might consider exploring the implementation of structured mentorship programs that incorporate goal setting, self-assessment, and regular feedback. Structured mentorship programs encourage self-reflection and skill refinement. Incorporating elements of experiential learning and reflective practice could be instrumental in enhancing coaches' practical knowledge and perceived effectiveness. Since coach development is an individual process, where coaches might choose to focus on different areas and tasks related to their coach development, PCP seems to be an important variable to include in studies that investigate possible outcomes from coach education programs. PCP has the potential to measure different domain-specific tasks since the individual coach decides which tasks are assessed in the self-reported questionnaire.

In addition, the finding that social resources in sport appeared to improve after the mentorship program suggests that such programs may help coaches establish stronger networks. Social resources like peer support and access to information are vital for reducing isolation and fostering a collaborative culture within sports environments. This is especially significant as coaching can be an isolating profession, and peer mentorship is a proven strategy to build support networks that buffer against burnout and stress (Stoszkowski & Collins, 2016). Developing social support networks through mentorship programs can lead to greater collaboration and knowledge-sharing. Practical applications might include regular peer mentorship meetings, group workshops, and social events where coaches can connect and share experiences.

The study did not find significant effects on CAWA and CPS; these areas could still benefit from further program adjustments or extended training. Building a strong coach–athlete relationship and fostering positive self-perception among coaches are essential to effective coaching, impacting athletes' satisfaction and performance (Davis & Jowett, 2014). Future programs should discuss if developing stronger coach–athlete relationships should be a specific aim related to the program, as well as more individual goals, since individual-decided goals might be measured by PCP. Integrating specific relational and self-reflective activities into the mentorship program may support growth in these areas over time. Mentorship programs can include components focused on relationship-building

skills and self-awareness. Training in active listening, empathy, and communication can strengthen CAWA, while self-assessment tools and reflective practices may foster CPS. These adjustments could eventually help coaches enhance their relational skills and build confidence in their professional identity.

5. Conclusions

Although the results are interesting and the strength of the current study is the experimental design that lasted for 18 months with a control group, it also has several limitations that should be kept in mind. First, the coaches in the experimental group were volunteers recommended by their federations, which may have introduced a motivation or commitment bias. This could have influenced the results and might limit the generalizability of the results to the broader coaching population. The number of participants in the current study could also have been larger, especially the control group, and a larger number of participants would be needed for future research. The unequal group sizes and participant attrition may have limited the statistical power of the current study and introduced a potential bias, and the relatively low number of participants might have influenced the power of the statistical analyses. In addition, all data were based on coaches' and athletes' self-reports. Future research should address the reliance on self-reported measures by incorporating more objective data collection and utilizing a mixed-methods approach. Including third-party observations, focused interviews and performance metrics can help validate self-reported outcomes and reduce potential biases, thereby enhancing the reliability and validity of the findings. The varied professional backgrounds and sports specializations of the mentors might also have influenced the results, and future studies should consider accounting for such differences to ensure more reliable findings. Future studies should also include analyses where both indirect and direct relationships between independent variables are included to explain the effect on the dependent variable, such as structural equation modelling (SEM). There are several methodologies that can offer deeper insights into coach development in non-formal coach education programs and its influence on athletes and sports environments. A mixed-methods approach could provide a more comprehensive understanding of the coaching program's impact by combining quantitative data with qualitative insights, such as observations and interviews with peers and athletes. Quantitative surveys could measure variables such as perceived coach performance (PCP), coach–athlete working alliance (CAWA), and social resources in sport (SRS). However, building stronger coach–athlete relationships (CAWA) should then be specifically targeted in the mentorship program. The current coach education program had an individual approach to coach development, and this might be the reason that no significant results were found on CAWA and CPS. Future studies should implement both an individual approach and a specific aim that is relevant for all coaches, such as CAWA. Complementing these, qualitative interviews or focus groups could explore coaches' subjective experiences, providing a richer context for understanding changes in perceptions of self (CPS) and relationship dynamics. In addition, a randomized controlled trial (RCT) could provide the strongest evidence of the program's impact. By randomly assigning coaches to either participate in the mentorship program or a waiting list control group, researchers could achieve a high level of internal validity. Such an approach would allow researchers to directly compare the intervention's effects on PCP, CPS, CAWA, and SRS across randomized groups. While RCTs are less common in coaching research due to practical constraints, they are increasingly advocated for to strengthen the evidence base.

The current study among Norwegian coaches might not automatically be generalized to coaches from other samples in other countries in the world. Nordic countries have for years developed their coach education and practices towards more mentorship-based

programs, focusing on autonomy and self-experience among coaches, to strengthen their professional growth (Næss & Lange, 2022). Thus, other samples might not be as familiar with such an approach. Also, because the study was conducted within Norway's well-organized NOSC system, the results may not generalize to countries with different or less structured sports organizations.

The existing literature underscores the importance of mentorship in fostering not only professional and personal growth for coaches but also positive outcomes for athletes. Future research should continue to explore the nuances of these relationships, examining the long-term impact of mentorship on coaching effectiveness and athlete development.

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