Book Chapter

Validating the Working Alliance Inventory as a Tool for Measuring the Effectiveness of Coach-Athlete Relationships in Sport

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Abstract

The current study investigates whether the Working Alliance Inventory [1] and its factors *bond*, *goal* and *task*, is a suitable measurement for documenting the coach-athlete relationship in the sport setting among a sample of 670 Norwegian junior athletes. The results in the current study showed moderate positive associations between WAI and perceived performance and perception of self, and strong negative associations between WAI and athlete burnout. The proposed model in the current study had good fit with the data and explained 13% of the variance in perceived performance, 12% of the variance in perception of self, and 25% of the variance in athlete burnout. The results are discussed in regard of applied implications and possible future research.

Keywords

Working Alliance; Sport; Coach-Athlete Relationship

Introduction

The coach-athlete relationship in sport is a crucial determinant of an athlete's motivation, satisfaction and subsequent sport performance [2,3]. Thus, the helping relationships between coaches and their athletes are expected to nurture positive psychological responses as well as improved performances. Consequently, the coach-athlete relationship has received much attention in sport research and the Coach-Athlete Relationship Questionnaire (CART-Q) is used to measure the quality of the relationship [3-7]. The CART-Q is based on the framework of the 3C's conceptual model, which is an abbreviation of the four dimensions closeness, commitment, complementarity and co-orientation [7]. Closeness is defined the emotional bond in the relationship, whereas commitment is defined as the intention to maintain and develop the relationship over time. Complementarity is defined as the cooperative functionality and effectiveness in the relationship. In recent years, co-orientation has been added to the model (3C's+1) and is defined as the mutual perception of both parts in the relationship [7]. Thus, the CART-Q defines the relationship through the 3C's +1 and focuses mainly on the relational aspects and not explicitly on performance outcomes.

Importantly, the main responsibility for coaches in junior elite sport is both to aid their athletes to nurture positive psychological responses and to improve their athletes' performances [8]. It can be argued that performance improvements are the ultimate goal of every junior athlete who is motivated to reach high levels in elite sports and take their sports seriously [9-11]. To this date, however, there are no validated questionnaires of the coach-athlete relationship that measure perceived performance outcomes. Therefore, the aim of the current study was to validate a coach-athlete relationship measurement where athletes' goals and perceived performance development are included.

Junior Elite Sport and Performances

How well athletes perform on sport-specific tasks in training and competitions is dependent on the competitiveness of athletes [12]. Thus, performances are a central concern for athletes in junior elite sports. Athletes' accomplishments are continually being evaluated both by themselves and their coaching staff [13]. Optimization of the athletes' performance development is therefore an essential focus of the coaching process [7]. The amount of economical investments in elite sports is an important factor in explaining the success in elite sports [14-17]. The argument for such enhanced investments is to ensure optimal development and to positively influence the factors that can enhance athletic performance. Therefore, one essential factor that must be considered when relationships in junior elite sports are evaluated is the effect that coaching staff have on athletes' performance outcomes. However, performance outcomes are not directly addressed in the established 3C's+1 model and the CART-Q. Since the coach-athlete relationship is important both for researchers and practitioners in sport, it is essential to use measurements that address the effectiveness of the coach-athlete relationships based on performance outcomes.

The Working Alliance Inventory

The Working Alliance Inventory [1] is a well-documented scale that measures the effectiveness of helping relationships between a therapist and the client in psychological consultations [18,19]. In the WAI, the effectiveness of the relationship is based on three dimensions: goal, task and bond [20]. Goal is defined as the mutual agreement between the therapist and the client about the desired outcomes from therapy [18,21]. Task is defined as the mutual agreement and positive experience about the tasks that are employed to help the client accomplish the goal set in therapy [20,22]. Both goal and task relate to clients' learning and development in therapeutic consultations and thus refer directly to perceived performance outcomes. Bond is defined as the mutual trust and genuine interest clients experience when they work with their therapists in consultations, and represents the relational dimension in the relationship [21].

The therapeutic setting is not the same as the coach-athlete relationship setting. However, in the helping relationship between coaches and athletes, it is essential that coaches establish a close and trustful relationship with their athletes [2]. Coaches need to understand how their athletes think, feel and act to be able to help them grow [2]. Experiences are essential in athletes' learning and it is the bond between coaches and athletes that gives coaches the opportunity to understand their athletes [22]. In the process of developing the athlete's potential, it is essential to define the desired outcomes and effective tasks that help them toward goal attainment [22]. Thus, elite sport is competitive and to become competitive the athletes need to develop their necessary sport-specific capacities [9]. The WAI refers to the general principles that are important to achieve learning and development, and not specifically to methods and tools that are used in the therapeutic setting. Thus, the WAI shares essential principles that are important to develop athletes in their sports. Notably, the validity of the three factors has been empirically investigated in the clinical therapist-client relationship. Tracey and Kokotovic [23], using data from both therapists and clients (124 dyads), found that a bi-level structure of the scale suited the data best, above the original 3-factor model. In other words, a hierarchy of items, sub dimensions, and a common total dimension was the best representation of the data, although model fit indices were rather modest. Accordingly, Andrusyna and colleagues [24] tested the factor structure of the WAI in a sample of patients undergoing cognitive-behavioral therapy (N=94). After conducting exploratory factor analyses of their data, they suggested an alternative structure of the items, consisting of two factors labeled as "Agreement/Confidence" of 8 items, and "Relationship" of 3 items. Thus, research has not fully established the factor structure of the WAI.

The WAI has also been used in other settings than therapy. Recently, it has been used in the sport setting to document the effectiveness of the coach-athlete relationship [9]. The results of this study showed WAI to be highly associated with how satisfied athletes are with their coaches, and that the bond dimension uniquely explains 50% of this association [9].

Furthermore, Moen and Myhre [22] have shown that the WAI explains 66% of the variance in athlete burnout, while in the study by Moen et al. [10], WAI explained 27% of the variance in perceived performance. Interestingly, Myhre and Moen [25] have shown that the working alliance between coaches and athletes can also explain the burnout syndrome among coaches. In this study, WAI explained 57% of the variance in cynicism, 32% of the variance in reduced sense of accomplishment and 26% of the variance in exhaustion. Thus, the WAI is believed to be a useful scale for the assessment of the coach-athlete relationship, and its association with highly relevant variables of athlete functioning, such as athletes' perceived performance and self-perception, and non-functioning variables such as athlete burnout.

Effective coach-athlete relationships in junior elite sport are key in providing positive performance development as perceived by athletes, and in preventing occurrences of non-functional states [7,11,26-28]. The coach-athlete relationship has been shown to explain athletes' successes, well-being, but also performance impairments and non-functioning athletes in numerous studies [29-32]. Therefore, a well-functioning coach-athlete relationship should be associated with perceived performance development, whereas a non-functioning coach-athlete relationship may be associated with non-functional states such as athlete burnout [33]. The coach-athlete relationship is considered to be key in developing athletic well-being, exemplified by a positive perception of self. However, to the author's knowledge, no studies have investigated the factorial structure of the WAI in a sample of young athletes, or explicitly validated the WAI against the abovementioned constructs in a sport setting.

The Current Study

The aim of the current study was to investigate the validity of the Norwegian version of the WAI in the sport setting. Based on the theory and previous findings discussed in the current study, the coach-athlete working alliance in junior elite sports was hypothesized to be positively associated with perceived

performance and perception of self, and negatively associated with athlete burnout.
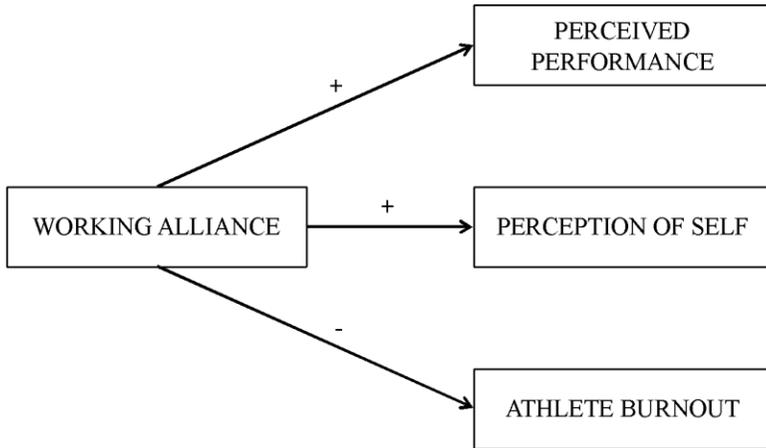
Figure 1: The theoretical model in the study with the expected relations between the variables.

Method

The Norwegian Olympic sport Centre, responsible for developing elite sports in Norway, has on the behalf of the authors recruited all schools in Norway that are specialized for elite sports to participate in a nationwide cross-sectional online survey. All schools accepted to participate and provided athletes' email information to the authors. One thousand nine hundred and seventeen junior athletes from all 27 different Norwegian high schools for elite sports were then invited by the authors to voluntarily participate in this study.

Athletes in Norway who attend high schools specialized for elite sports are normally highly motivated to develop and perform in their sports. The high schools for elite sports in Norway involve training on the school schedule every day of the week, and athletes normally practice their sports after school several days during weekdays and in the weekends. In the invitation, athletes were asked to participate in an online questionnaire that measured psychological variables such as perceived working

alliance with their coaches, perceived performance, perception of self and athlete burnout. In addition, they responded to questions covering demographic variables, such as gender, age, ambitions (ambition to become future elite athlete or no ambition to become future elite athlete), type of school (public or private) and their type of sports.

Procedure and Materials

The Norwegian Social Science Data Services, which is the research ethic board for social sciences in Norway, approved this study. The psychological measurements used in the current study are based on previously developed scales proven to hold both satisfactory validity and reliability.

The Working Alliance Inventory (WAI)

An adjusted version for sport of the WAI [1] was used to assess the coach-athlete relationship characteristics [18,23]. The WAI consists of a 12-item questionnaire that yields three central dimensions: (a) agreement on the goals pursued in the relationship (the goal dimension); (b) agreement and positive experience on tasks to be accomplished to achieve these goals (the task dimension); and (c) the development of a personal bond between the coach and the athlete (the bonding dimension). In order to adapt the WAI from the therapeutic to the athletic setting, it was necessary to change the wording of the questions accordingly. The items of the WAI after the wording was adjusted for the sport setting, when client and therapist is replaced with athlete and coach, respectively, as seen in Table 1.

Table 1: The WAI dimensions goal, task and bond adjusted for the sport context.

Item	Goal
4	There are doubts or a lack of understanding about what the coach and athlete are trying to accomplish.
6	The coach and the athlete are working on mutually agreed upon goals.
10	The coach and the athlete have different ideas about what the athlete's real problems are.
11	The athlete and the coach have established a good understanding of the changes that would be good for the athlete.
	Task
1	There is agreement about the steps taken to help improve the athlete's situation.
2	There is agreement about the usefulness of the current activity to help the athlete to improve.
8	There is agreement on what is important for the athlete to work on.
12	The athlete believes that the way they are working with his/her problem is correct.
	Bond
3	There is a mutual liking between the coach and the athlete.
5	The athlete feels confident in the coach's ability to help him/her.
7	The athlete feels that the coach appreciates him/her as a person.
9	There is mutual trust between the coach and the athlete.

Athletes were asked to consider these 12 items regarding their thoughts and feelings towards their responsible coach on a 7-point Likert scale ranging from 1 (never) to 7 (always). The items covering these dimensions are specified in Table 1. Validation studies of the WAI have shown good construct validity and high reliability [23,34]. Cronbach's alphas were .92, .90, and .73 for the goal, task and bonding dimensions, respectively.

Perception of Self (PS)

The PS scale is one of six dimensions of the Resilience Scale for Adults [35,36]. The PS has 6 items that cover the self-dimension of mental resilience. An example of an item that covers the PS dimension is: "*When something unexpected happens I often feel perplexed*". The measurement is well-tested with very acceptable reliability and validity scores [37]. Each item is measured on a scale from one to seven, where higher scores

reflect higher levels of protective factors of resilience. The Cronbach's alpha was .79.

Perceived Satisfaction with Progress in Sport

Individual performance from the Athlete Satisfaction Questionnaire was used to measure athletes' perceived satisfaction with their own progress in sport [38]. This subscale seeks to measure athletes' perceived satisfaction with their own task performance. Task performance includes the perception of absolute performance, improvements in performance and goal achievement (e.g. "*I am satisfied with the degree to which I have reached my performance goals during the season*"). Athletes were asked to consider 4 items and how satisfied they were with their own progress in sport during the last year, on a 7-point scale ranging from 1 (not at all satisfied) to 7 (extremely satisfied). Cronbach's alpha was .92 for the measurement.

Athlete Burnout Questionnaire (ABQ)

The ABQ consists of three five-item subscales assessing the three key dimensions of burnout: (1) devaluation of sports participation, (2) a reduced sense of accomplishment, and (3) emotional and physical exhaustion [13,39]. Examples of items that cover these dimensions are respectively: "*I have negative feelings toward sports*", "*It seems that no matter what I do, I don't perform as well as I should*", and "*I feel so tired from my training that I have trouble finding energy to do other things*". Athletes rated the extent to which each item addressed their participation motives in sport on a five-point Likert scale ranging from 1 ("*Almost Never*") to 5 ("*Almost Always*"). A global burnout score was computed by calculating a mean from the three subscales [40]. Cronbach's alphas were .85, .86, and .76 for emotional and physical exhaustion, devaluation of sports participation, and reduced sense of accomplishment, respectively, and .90 for the global score.

Data Analysis Procedures

Firstly, the reliability and validity of the Norwegian version of the scale was analyzed. In order to investigate the structure of the WAI in an athlete setting with no a priori assumptions, we conducted exploratory analysis on all the items in the scale using SPSS (version 25.0). Then, in order to test the suggested structure of items in the scale confirmatory factor analysis was conducted in AMOS 25. Subsequently, and based on the hypothesized relationship of the relevant variables, data was analyzed by running descriptive statistics, and thereafter by examining the correlations between these variables, using Pearson correlation coefficient in SPSS. Finally, we used path analysis to test the convergent and discriminant validity of the WAI against perception of self, subjective performance, and athlete burnout.

Results

From the 1917 participants, 670 (49.3% males and 51.7% females) completed the data collection, which gives a response rate of 35.5%. The sample had a mean age of 18 years (ranging from 17 to 20 years), and practiced a variety of sports with football (18%), handball (18%), cross country skiing (11%), biathlon (9%), ice-hockey (5%), alpine skiing (5%), cycling (5%) and track and field (4%) being those most frequently reported. 78% of the junior athletes in the current study had ambitions to become future elite athletes in their sports, whereas 22% did not.

## Exploratory and Confirmatory Factor Analysis

Because the adapted WAI had not yet been validated in an athlete setting, structure of items in the scale [18] was first investigated by means of exploratory factor analysis in SPSS. A maximum likelihood extraction was performed with direct oblimin rotation, and a 3-factor limitation. Direct oblimin rotation is the standard method when one seeks a non-orthogonal solution [41] – that is, one in which the factors are allowed to be

correlated. In the current study, based on previous studies, factors were presumed to be overlapping.

The first factor had an eigenvalue of 7.53 and explained 62.78 percent of the variance in the data, the second factor had an eigenvalue of 1.09 and explained 9.07 percent of the variance, whereas the third factor had an eigenvalue of 0.70 and explained 5.8 percent of the variance. All items factor loadings were above the .40 threshold [41].

The SPSS factor plot displayed a coherent pattern of items, although the two items with negative wording that were reversed before the analysis did somewhat depart from the coherent structure. Based on the exploratory analyses the researchers concluded that the structure of the WAI was best represented by one sum score of all items, and not three subdimensions.

Confirmatory factor analyses were also conducted to test previous a priori assumptions about the structure of the scale. Based on the original structure of the scale, and the findings of Tracey and Kokotovic [23], we first specified a model with the three factors in AMOS 25. We ran a Maximum Likelihood Estimation of the 3-factor model, with covariates freed between the latent constructs. Judgement of model fits was based on criteria recommended by Hu and Bentler [41,42]. Indicators of model fits were the comparative fit index (CFI) and the Tucker-Lewis index (TLI; both values preferably above or close to .95), and values of the root mean squared error of approximation (RMSEA), preferably less than .08. The suggested three factor structure did provide adequate model fits, apart from the parsimoniousness indicator (RMSEA): $\chi^2(51, N = 670) = 353.0$, $p < .001$, CFI = .954, TLI = .940, RMSEA = .094. See Figure 2.
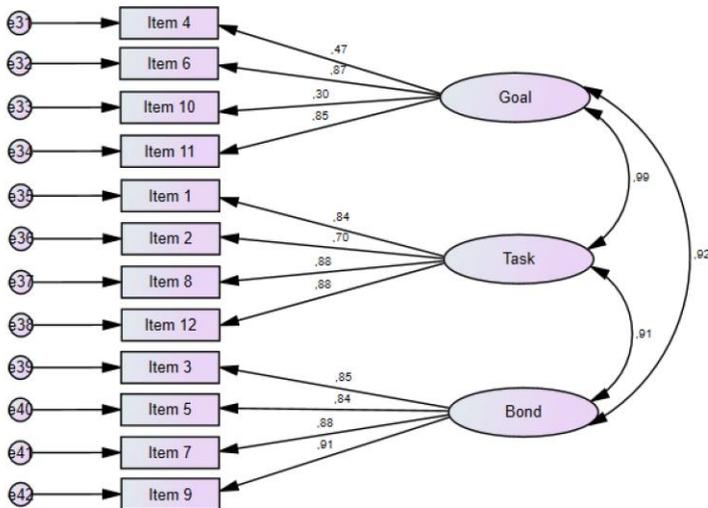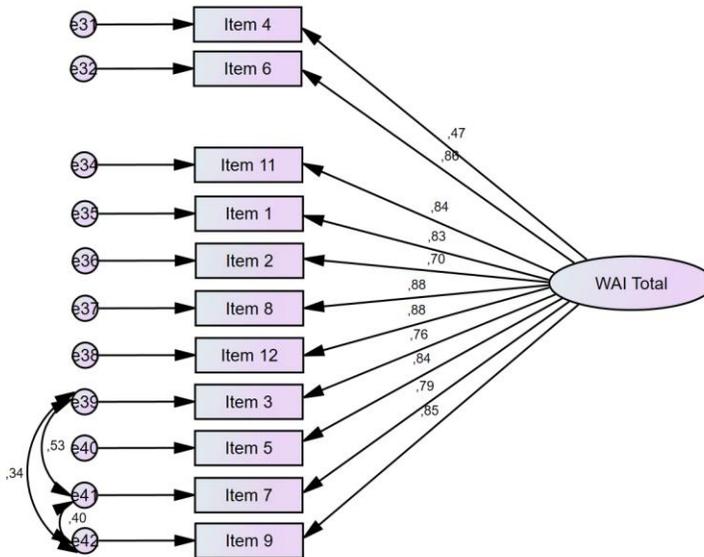
Figure 2: Analysis of the proposed model of a three-factor structure of the WAI.

Notably, the bi-level model of the WAI suggested by Tracey and Kokotovic [18] was also tested in AMOS, but this model failed to converge, indicating too high complexity/lack of parsimoniousness. A two-factor solution was proposed by Andrusyna et al. [24], and based on their findings, we also tested this two-factor structure in AMOS. From their analyses, a factor labeled "Agreement/Confidence" was created from 9 items, whereas a second factor labeled "Relationship" was created from 3 items. In the model had adequate fits, apart from the parsimoniousness indicator: $\chi^2(53, N = 670) = 318.62$, $p < .001$, CFI $= .959$, TLI $= .949$, RMSEA $= .087$.

When running the one factor solution on the full 12 item scale, the factor loading of item number 10 failed to reach the .40 threshold. The error terms of item 9, 11, and 12 had large amounts of shared variance as seen by the modification indices, as well as 11 and 12. When omitting item 10 and inserting covariances between the error terms of the three items, we gained good model fit of the one factor solution $\chi^2(41, N = 670)$

= 185.24, $p < .001$, CFI = .978, TLI = .970, RMSEA = .073. See Figure 3.

Figure 3: Analysis of the proposed model of a one factor structure of the WAI.

In summary, the items of the WAI are best treated as one single factor among junior athletes as seen by the factor analysis, and may be used as a total sum score and not as three separate sums of subdimensions. We found that item number 10 could be omitted, and covariances could be inserted in the latent analyses, but due to the probability of sample specific characteristics of the scale, the researchers recommend using the total items of the scale as one single score. The weak factor loading of item 10, and partly item 4, is probably due to the reversed scoring of the items. Notably, the relative difference of the model fit indices of the different models tested herein were rather low, but correlations between the subdimensions were very high, indicating that items are measuring a unidimensional phenomenon in the current sample.

Correlations and Descriptive Statistics

Correlations between the study variables as well as the statistical means, standard deviations, minimum and maximum scores from the variables, as seen in Table 2.

Table 2: Correlations, descriptive statistics and Cronbach's alphas of the variables, n=670.

Variable	1	2	3	4	5	6	7
1. WAI-Bond	-						
2. WAI-Goal	.76*	-					
3. WAI-Task	.84*	.79*	-				
4. WAI-Sum	.94*	.91*	.94*	-			
5. Perceived Performance	.32**	.30**	.39**	.36**	-		
6. Perception of Self	.32**	.29**	.37**	.35**	.34**	-	
7. Athlete Burnout sum	-.48**	-.46**	-.49**	-.51**	-.49**	-.47**	-
Mean	5.50	5.28	5.18	63.83	4.71	4.91	36.11
Standard deviation	1.42	1.16	1.30	14.4	1.16	1.16	10.11
Maximum	7	7	7	84	7	7	72
Minimum	1	1	1	12	1	1	15
Cronbach's alpha	.73	.92	.90	.94	.85	.79	.90
*** $p < .05$, ** $p < .01$, * $p < .001$							

There were significant strong positive correlations between the three different dimensions, bond, goal and task, that constitute the WAI, and the three dimensions and the total WAI score. These high correlations among the sub dimensions and with the total score of WAI lend further support to the use of a single factor version of the scale. There are statistically significant, positive relations between perceived performance and WAI-bond, WAI-goal and WAI-task (.32, .29, .39, respectively), and perception of self (.34). In addition, there was statistically significant negative correlation between perceived performance and athlete burnout (-.49). There were statistically significant, positive relations between perception of self and WAI-bond, WAI-goal and WAI-task (.32, .29, .37, respectively), and statistically significant negative correlation between perception

of self and athlete burnout (-.47). All correlations between athlete burnout and WAI-bond, WAI-goal, WAI-task and the total score of WAI, were negative statistically significant (-.48, -.46, -.49, -.51, respectively).

Convergent and Discriminant Validity

Finally, to further test the convergent and discriminant validity of the WAI, we defined a model in AMOS with the latent version of the full WAI as a predictor of perceived performance, perceptions of self, and athlete burnout. This model would—through providing model fit indices—determine these validity issues better than the correlation analyses. Results from these analyses, seen in Figure 4, showed that the model had good fit with the data: $\chi^2(84, N = 670) = 413.95$, $p < .001$, CFI = .954, TLI = .943, RMSEA = .077. WAI explained 13% of the variance in perceived performance, 12 % of the variance in perception of self, and 25 % of the variance in athlete burnout. Results confirmed that WAI could be discriminated from the associated phenomenon's perceived performance, perceptions of self, and athlete burnout, and at the same time having meaningful overlaps with these concepts.
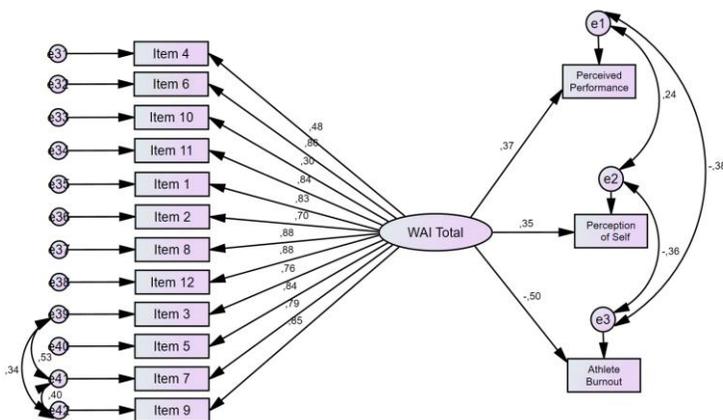
Figure 4: Analysis of the latent version of the full WAI as a predictor of perceived performance, perceptions of self, and athlete burnout.

Discussion

In the current study, the extent to which the WAI is a suitable tool for measuring the effectiveness of the coach-athlete relationship in a sport setting was investigated. The hypothesized model in the current study estimated the coach-athlete working alliance in junior sports to be positively associated with perceived performance and perception of self, and negatively associated with athlete burnout. The results in the current study confirmed these hypotheses. In the current sample of junior athletes, there were moderate positive associations between WAI and perceived performance and perception of self, and a strong negative association between WAI and athlete burnout. The proposed model in the current study had good fit with the data and explained 13% of the variance in perceived performance, 12% of the variance in perception of self, and 25% of the variance in athlete burnout.

The factor structure of the WAI in the clinical setting has been debated over the recent decades [24]. Research supports both three first-order dimensions, one general second-order dimension and a hierarchical bilevel model [18]. The researchers in the current study showed that apart from the parsimoniousness indicator, both the three and two factor models also provided adequate model fits (Figure 2). However, the results in the current study showed that the WAI is best treated as one single factor, as the confirmatory factor analyses with one factor showed good model fit (Figure 3). The correlation matrix also showed very strong relationships between the three dimensions of WAI, bond, goal and task, which indicates that the WAI can be treated as one factor.

Athletes must be Well-Functioning

The majority (78%) of the sample of Norwegian junior athletes attending high schools specialized for sports in the current study had ambitions to become future international top athletes in their sports. To achieve this they must be well-functioning and experience that their sport-specific capabilities make them competitive over time [43]. To be competitive in elite sports,

athletes need to complete exercises that improve their sport-specific capabilities over a long period of time [44], and the coach is meant to help them to grow their talents [9]. Therefore, it was expected that athletes' perceived performance, improvements in performance and goal achievements in their sports, would be positively associated with the coach-athlete working alliance. The researchers in the current study concluded that WAI explained 13% of the variance in perceived performance, and that WAI was moderately to strongly associated with perceived performance. The WAI-task dimension showed the strongest association with perceived performance (.39), which underlines the importance of defining tasks that are relevant for improvements in performance, and experience that these tasks are effective for the improvement of own performance [12].

Athletes' perception of self denotes the perception of how well they are functioning in general. In recent studies, it has been claimed that the coach-athlete relationship can explain the well-being of athletes [29]. Therefore, perception of self was expected to be positively associated with WAI. The researchers in the current study concluded that WAI explain 12% of the variance in perception of self and that the WAI was moderately positively associated with perception of self. The WAI-task dimension was also moderately/ strongly associated with perception of self (.37).

The Coach-Athlete Working Alliance as Buffer of Athlete Burnout

In the current study, the strongest association was found between WAI and the non-functional state referred to as athlete burnout. The WAI explained 25% of the variance in athlete burnout and the two constructs were strongly negatively associated (-.51). All three dimensions of the WAI are also strongly associated with athlete burnout. The strong negative association between perceived performance and athlete burnout confirms that athletes who experience the athlete burnout syndrome are not competitive, and thus the essential aim of the coach-athlete working alliance is therefore not achieved. In all, the results of

the current study confirmed the hypotheses in the proposed model.

Conclusions and Limitations

The results in the current study showed that the WAI is a valid measurement to measure the effectiveness of the coach-athlete relationship. The WAI was associated with both variables that document functioning athletes, perceived performance and self-perception, and non-functioning athletes such as athlete burnout. Even though several interesting results are presented in this study, several limitations should be kept in mind when interpreting the results. First of all, longitudinal studies are needed to fully investigate both direct and indirect relationships and how these develop over time. Secondly, the data in the current study were based on self-report measures and how these self-report instruments accurately reflect the variables is unknown. The fact that the items representing the WAI that had reversed scores had low factor loadings gives reason to discuss the extent to which the participants really read and understood the items in depth during self-reporting.

Applications in Sport

The results of this study indicate the WAI can be used as a tool to document the effectiveness of coach-athlete relationships. Thus, the measurement can be used in future research in the sport setting to investigate relationship issues, and to evaluate coaches and help them to improve the effectiveness their coaching. Ultimately, such systematic work with coach development will influence their athletes positively.

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