



## The effect of self- and interpersonal emotion regulation on athletes' anxiety and goal achievement in competition

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### ABSTRACT

**Objectives:** There exists a wealth of evidence that athletes must regulate their emotions for optimal performance and wellbeing. In addition to athletes' attempts to regulate their own emotions, they may also attempt to regulate each other's emotions (interpersonal emotion regulation). Though self- and interpersonal emotion regulation likely co-occur, previous research has not explored how these strategies concurrently impact athletes' emotions and performance outcomes. In the current study, we examined whether athletes' emotional self-regulation and the receipt of interpersonal emotion regulation from their teammates were related to their anxiety and goal achievement during competition.

**Design:** Quantitative, cross-sectional retrospective survey design.

**Method:** Data were gathered following sport competitions from 509 participants from 50 interdependent sport teams from Canada and the UK ( $M_{age} = 19.0$ ,  $SD = 3.1$ ).

**Results:** Analysis of the data using structural equation modeling revealed that after accounting for pre-competition anxiety, received interpersonal emotion regulation was not associated with anxiety during competition, though affect-worsening self-regulation was positively associated with anxiety during competition. Received interpersonal emotion regulation was also not associated with goal achievement, yet affect-improving and affect-worsening self-regulation were associated with goal achievement. Nevertheless, when the influence of emotional self-regulation on anxiety and goal achievement was set to zero, affect-improving and affect-worsening interpersonal emotion regulation were associated with anxiety during competition and affect-improving interpersonal emotion regulation was associated with goal achievement.

**Conclusions:** These data can be interpreted as evidence that emotion regulation actions between teammates are important for anxiety and performance outcomes, albeit this effect is attenuated in the presence of athletes' own emotional self-regulation. These results extend the extant research on self- and interpersonal emotion regulation in sport, and in line with these observations, we highlight a number of future research opportunities for researchers examining emotion regulation in performance contexts.

It is well-established that emotions, and anxiety in particular, are important for performance outcomes (Uphill & Jones, 2011) – for example, there is considerable evidence that anxiety is associated with negative performance outcomes in sport (Mellalieu et al., 2009). Intense feelings of anxiety require effective regulation strategies (Wolf et al., 2014) and athletes' emotional self-regulation is associated with improved performance in sport (Jones, 2003; Uphill et al., 2009; Uphill

& Jones, 2011). Broadening the scope of emotion regulation efforts beyond an intra-individual perspective, interpersonal emotion regulation refers to the process of regulating the emotions of another person (Niven et al., 2011); researchers have also described this process as extrinsic interpersonal regulation (Gross & Thompson, 2007; Zaki & Williams, 2013). Niven (2017) conceptualized interpersonal emotion regulation as a distinct process that has four key characteristics: (a) It is a

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regulatory process aimed at changing or maintaining a state in relation to some goals or outcomes; (b) it targets affective states; (c) it is a conscious, deliberate process, and (d) it has a social target (e.g., efforts are directed at regulating another person's emotions). Individuals may engage in strategies to try to improve or worsen the emotions of others. For example, affect-improving strategies could include listening to someone's problems, trying to change the way the person thinks about a situation, or distracting the person from their problems; conversely, affect-worsening strategies could include telling someone about their shortcomings to make them feel worse or complaining about the person's behaviour or response to the situation (Niven et al., 2011). Although the associations between anxiety, emotional self-regulation, and performance are well-established in the sport psychology literature, there is no research to date that has examined the associations between emotional self-regulation and interpersonal emotion regulation with anxiety and performance outcomes.

Interpersonal emotion regulation is considered distinct but related to other interpersonal emotional processes such as social support, emotional contagion, and emotion socialization (Dixon-Gordon et al., 2015), and has been found to be associated with various outcomes such as affect and wellbeing (Berríos et al., 2015; Niven, Totterdell, et al., 2012), friendship and trust (Niven, Holman, & Totterdell, 2012), and popularity (Niven et al., 2015). Individuals may try to regulate others' emotions for various reasons, including for instrumental or performance outcomes (e.g., better performance or goal-achievement), for altruistic or compassionate purposes (others' enhanced wellbeing), or for hedonic purposes (increased positive emotions or reduced negative emotions; Netzer et al., 2015; Porat et al., 2016). People may also attempt to regulate others' emotions to manage impressions, to promote a sense of self, or as a form of emotional labour to comply with organizational rules and social conformity within groups to maintain relationships (Niven, 2016).

In sport, athletes seem to engage in various strategies to regulate their own emotions and the emotions of their teammates, often with the aim to enhance performance and relationship outcomes (e.g., Campo et al., 2017; Friesen et al., 2015; Palmateer & Tamminen, 2018; Tamminen & Crocker, 2013). Despite an increase in research exploring the types of strategies that athletes use to regulate the emotions of their teammates and their motives for engaging in such actions, it is unknown whether these interpersonal emotion regulation efforts are associated with emotions and performance. Research among adolescent athletes indicates that efforts to regulate others' emotions is associated with their own enjoyment and commitment in sport (Tamminen et al., 2016); yet, the authors did not examine associations between interpersonal emotion regulation and athletes' actual emotions during competition or with competitive outcomes such as individual goal achievement in competition.

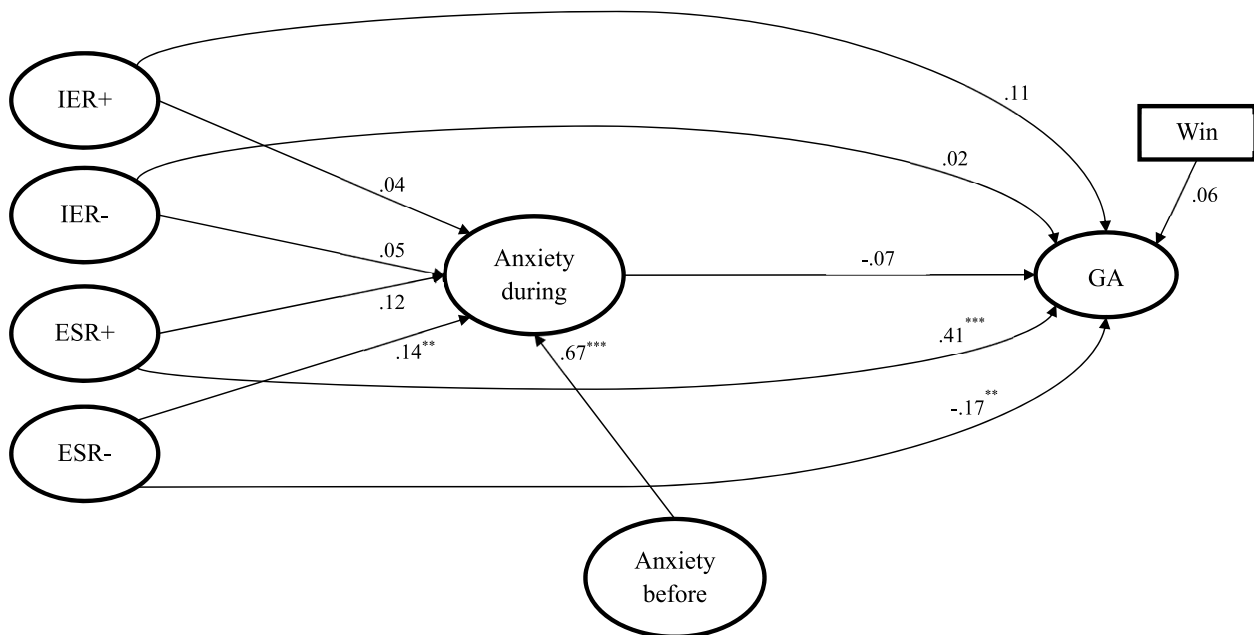
Thus, one limitation in the literature to date concerns the associations between interpersonal emotion regulation, anxiety, and performance in sport. Anxiety is defined as "a specific negative emotional response to competitive stressors" (Mellalieu et al., 2006, p. 4) and it is well-established as an important emotion for athletes' competitive sport experiences (Ford et al., 2017). Anxiety has been associated with attentional disruptions, decreases in performance, and risk of injuries (for reviews, see Woodman & Hardy, 2001; 2003), and athletes' ability to regulate their anxiety effectively in competition is critical for successful sport performance (Ford et al., 2017; Jones, 2012). To date, however, there is limited research that has examined how athletes' interpersonal emotion regulation is associated with anxiety in competition, and in turn, how these are associated with performance outcomes. As such, the present research aimed to address this gap in the literature by examining how athletes' interpersonal emotion regulation relates to their anxiety and goal achievement in competition. In the present study, we assessed performance by asking athletes about their perceptions of their personal goal achievement in competition (Amiot et al., 2004), while controlling for the outcome of the team's

performance (e.g., win/loss). We adopted this approach to assessing performance due to the nature of team sports, such that the team may have lost in competition, yet the athlete may have felt they performed well. Given that we were interested in the processes of interpersonal emotion regulation on athletes' performance, it would not have been appropriate to use team performance as a single indicator of performance for all the athletes on the same team.

Second, much of the existing literature on interpersonal emotion regulation in sport has focused exclusively on actions between teammates to regulate one another's emotions (e.g., Tamminen et al., 2016; 2019), without accounting for athletes' emotional self-regulation. Yet, qualitative research evidence suggests that athletes engage in both self- and interpersonal emotion regulation (Campo et al., 2017; Friesen et al., 2013; Tamminen & Crocker, 2013), although there may be difficulties in engaging in both of these processes. Athletes' efforts to regulate their teammates' emotions are thought to be influenced by appraisals of whether teammates have the ability to regulate their own emotions (Friesen et al., 2013); however, athletes have also reported being unable to regulate their teammates' emotions due to the need to focus on regulating their own emotions (Tamminen & Crocker, 2013). Therefore, on the basis of the previous qualitative research, and given that there is limited research concurrently accounting for athletes' emotional self-regulation and interpersonal emotion regulation, the present study was designed to address this gap in the literature.

The current study also aims to extend previous literature on interpersonal emotion regulation by advancing research on athletes' perceptions of interpersonal emotion regulation during competition. In previous studies, researchers have often asked athletes to reflect on their perceptions of interpersonal emotion regulation in general (Friesen et al., 2015; Palmateer & Tamminen, 2018; Tamminen & Crocker, 2013; Tamminen et al., 2016) or during practices in the lead-up to competition (e.g., Tamminen et al., 2019). Examining athletes' experiences during competition is an important focus, given that previous research suggests athletes report greater anxiety in competition compared to practices (Duncan et al., 2017). To date, only one study has examined the types of interpersonal emotion regulation strategies used in competition by using video-assisted recall in interviews with a sample of 22 male rugby players (Campo et al., 2017, study 1). The results of the study by Campo et al. (2017) demonstrated that athletes used a range of interpersonal emotion regulation strategies, and that athletes used strategies to regulate their own emotions as well as their teammates' emotions during competition. The findings from this study also illustrated how specific emotions such as guilt or anxiety were influenced by teammates' regulatory actions. Hence, in order to build on the existing research in this area, the present study aimed to examine both self- and interpersonal emotion regulation in competition.

In sum, to address the growing interest in social processes associated with emotion regulation in sport, the current study aimed to examine athletes' receipt of interpersonal emotion regulation during competition as well as anxiety and performance (perceived goal achievement). Establishing evidence for these associations could provide direction for future interventions and applied practice: for example, if interpersonal emotion regulation is shown to be important for athletes' emotions and performance outcomes, then practitioners and coaches might focus on strategies to increase athletes' interpersonal emotion regulation during competition. Based on the existing literature demonstrating the associations between anxiety, emotional self-regulation, and performance, as well as the qualitative and quantitative literature on interpersonal emotion regulation in sport, we proposed the following hypotheses: 1) emotional self-regulation and the receipt of interpersonal emotion regulation during competition would be directly associated with anxiety during competition, which would be subsequently associated with goal achievement; and 2) emotional self-regulation and the receipt of interpersonal emotion regulation would be directly related with goal achievement (see Fig. 1 for the hypothesized and tested model).



**Fig. 1.** Hypothesized and tested model.  $\chi^2(345) = 612.17, p < .001$ , CFI = 0.948, RMSEA = 0.039, 90% CIs [0.034, 0.044], SRMR = 0.044. Standardized coefficients are shown. IER = Interpersonal Emotion Regulation received from teammates during competition, ESR = Emotional Self-Regulation during competition. Plus (+) and minus (-) signs denote affect-improving and affect-worsening, respectively. GA = Mastery Goal Achievement, Win = team win (-1 = loss, 0 = tie, 1 = win). All possible correlations were estimated (among emotion regulation dimensions, among anxiety before competition, emotion regulation, win, and goal achievement, between anxiety during competition and win) but are not shown for brevity. IER+, IER-, ESR+, and ESR- latent factors are specified by an ESEM approach (i.e., cross-loadings set to approximate zeroes). \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

## 1. Method

### 1.1. Design and procedure

This study used a cross-sectional survey design to assess athletes' recalled emotions and emotion regulation during a competition. The surveys were administered immediately following a regular competition; data collection occurred between January 2019 and February 2020. Following approval from the first author's institutional research ethics board, recruitment commenced in Canada and the United Kingdom, targeting competitive interdependent team sport athletes. Coaches were contacted first to obtain access to athletes. Upon agreement with the coach, a member of the research team met with the athletes in person after a competitive match to collect the data via surveys. Athletes who provided informed consent were asked to complete a questionnaire package, reflecting on the competitive match their team just played. Parental consent was obtained for athletes aged 16 years or younger.

### 1.2. Participants

The sample was recruited from various interdependent sport teams including volleyball, soccer, ice hockey, basketball, netball, and lacrosse. The sample included 509 participants, 280 of whom were from women's teams ( $k = 28$ ) and 229 of whom were from men's teams ( $k = 22$ ). On average, 10.0 athletes were recruited from each team ( $SD = 4.1$ ).<sup>1</sup> The participants were 19.0 years old on average ( $SD = 3.1$ ) and their self-identified ethnicities included Black (e.g., African, Haitian, Jamaican, Somali;  $n = 57$ ), Asian (e.g., Korean, Chinese, Filipino, Indian, Vietnamese;  $n = 41$ ), Aboriginal/First Nation ( $n = 3$ ), West Asian/Middle Eastern ( $n = 8$ ), White/Caucasian ( $n = 382$ ), and Other ( $n = 18$ ). The majority of the participants ( $n = 318$ ) had 8+ years of experience in

the sport they were participating in at the time of the study ( $n = 20$  with <1 year;  $n = 53$  with 2–3 years,  $n = 41$  with 4–5 years, and  $n = 72$  with 6–7 years of experience), and most participants ( $n = 214$ ) indicated they had spent one year with their current team ( $n = 119$  with 2 years;  $n = 77$  with 3 years;  $n = 41$  with 4 years;  $n = 25$  with 5 years;  $n = 33$  with 6+ years spent with their current team).

### 1.3. Measures

The questionnaire package included questions asking about athletes' demographic information (e.g., age, gender classification of their team, ethnicity), the result of their latest competition (win/loss/tie), emotional self-regulation and interpersonal emotion regulation received from teammates, emotions felt before and during the competition, and goal achievement.

#### 1.3.1. Emotion regulation

The Emotion Regulation of Others and Self scale (Niven et al., 2011) was used to assess athletes' perception of emotion regulation during the match they had just played. The participants were asked to rate the degree to which they engaged in emotional self-regulation that was affect-improving (four items; e.g., "I laughed to try to improve how I felt") and affect-worsening (four items; e.g., "I thought about my shortcomings to make myself feel worse"), as well as the degree to which they received interpersonal emotion regulation from their teammates that was affect-improving (four items; e.g., "gave me helpful advice to try to improve how I felt") and affect-worsening (three items; e.g., "told me about my shortcomings to try to make me feel worse"). The items were answered on a 5-point scale from 1 ("not at all") to 5 ("a great deal"). Previous studies demonstrated acceptable levels of internal consistency for scores using these subscales: affect-improving self-regulation ( $\alpha = 0.81$ ) and affect-worsening self-regulation ( $\alpha = 0.77$ ) (Tamminen et al., 2016), and affect-improving interpersonal emotion regulation ( $\alpha = 0.92$ ) and affect-worsening interpersonal emotion regulation ( $\alpha = 0.72$ ) (Tamminen et al., 2019).

<sup>1</sup> Among 509 participants, team identification information was missing for 9 participants.

### 1.3.2. Emotions felt before and during competition

The anxiety subscale of the Sport Emotion Scale (Jones et al., 2005) was used to assess how athletes remembered feeling prior to competition and how they remembered feeling during competition. This measure of anxiety included five items (i.e., anxious, tense, nervous, apprehensive, uneasy) that participants were asked to rate on a 5-point scale from 1 (“not at all”) to 5 (“extremely”). Jones et al. (2005) reported an acceptable internal reliability estimate for the anxiety subscale of the Sport Emotion Questionnaire ( $\alpha = .87$ ).

### 1.3.3. Goal achievement

The Attainment of Sport Achievement Goals Scale (Amiot et al., 2004) was used to assess athletes’ sense of goal achievement following their match. Though this scale assesses goal achievement in three dimensions (mastery, self-referenced, and normative; four items each), for the current study, the achievement of mastery goals was used as the outcome variable as an indicator of athletes’ assessment that they attained their performance goals for the competition (see Data Analysis section). Using a 7-point scale from 1 (“not at all”) to 7 (“very strongly”), the participants were asked to rate their perceived mastery goal achievement (e.g., “I provided a quality effort”). Previous studies have demonstrated acceptable levels of internal consistency for scores using the mastery goal achievement subscale ( $\alpha = 0.88$ , Gaudreau & Braaten, 2016).

## 1.4. Data Analysis

To test the hypothesized model (Fig. 1), we used Mplus (version 8.4) to conduct structural equation modeling with maximum likelihood estimation, which provides robust standard errors against non-normality (Muthén and Muthén, 2017). Given no specific level two hypotheses were proposed, the TYPE = COMPLEX function was used to account for the nested structure of the data by adjusting the standard errors, without using a two-level analysis (Muthén and Muthén, 2017).<sup>2</sup> Model fit was considered acceptable based on the following cut-off values: comparative fit index (CFI)  $\geq 0.95$ , root mean square error of approximation (RMSEA)  $\leq 0.06$ , and standardized root mean square residual (SRMR)  $\leq 0.08$  (Hu & Bentler, 1999). Chi-square tests are also reported but given their sensitivity to large sample sizes (Brannick, 1995), we disregarded them when drawing inferences about our models.

Anxiety before and during competition, emotion regulation dimensions, and goal achievement were specified as latent factors, and preliminary confirmatory factor analyses (CFA) were conducted on the measurement models of latent factors to examine their factorial validity. The anxiety before competition latent factor revealed an acceptable fit: CFI = 1.00, RMSEA =  $<0.001$ , 90% CIs [0.000, 0.038], SRMR = 0.009, and the anxiety during competition latent factor also revealed an acceptable fit: CFI = 0.990, RMSEA = 0.056, 90% CIs [0.018, 0.094], SRMR = 0.018. The global goal achievement factor across the 12 items revealed a poor fit, CFI = 0.786, RMSEA = 0.155, 90% CIs [0.145, 0.165], SRMR = 0.075. Thus, a latent factor of mastery goal achievement based on four indicators was used in the analysis (CFI = 0.999,

<sup>2</sup> To descriptively examine the degree of nesting in the data, intraclass correlations (ICCs) and design effects  $(1 + (\text{Mean cluster size} - 1) * \text{ICC})$  were calculated for each of the 29 observed variables (15 items for emotion regulation, 10 anxiety items, and four goal achievement items). Design effects above 2 indicate that nesting should be accounted for (Muthén & Satorra, 1995). The ICCs ranged from 0.034 to 0.171, and 11 variables showed design effects above 2, which suggested the need to account for the nesting.

RMSEA = 0.026, 90% CIs [0.000, 0.096], SRMR = 0.009).<sup>3</sup> Further, the CFA of the four-factor structure of emotion regulation demonstrated a reasonable fit: CFI = 0.934, RMSEA = 0.059, 90% CIs [0.050, 0.068], SRMR = 0.051. Yet, given the CFI was slightly below the cut-off, an exploratory structural equation modeling (ESEM) with oblique target rotation was used for adjustment (Asparouhov & Muthén, 2009). An ESEM approach specifies cross-loadings to approximate zeroes, as opposed to the CFA approach that fixes them exactly at zeroes. Some overlap was expected between emotion regulation dimensions (e.g., Niven et al., 2011), therefore this approach was deemed more appropriate. Indeed, the ESEM approach returned a better fit for emotion regulation, CFI = 0.958, RMSEA = 0.061, 90% CIs [0.050, 0.072], SRMR = 0.026, and, thus, was retained for specifying the emotion regulation dimensions during hypothesis testing. Finally, team win (coded as  $-1$  for loss ( $k = 21$ ),  $0$  for tie ( $k = 2$ ),  $+1$  for win ( $k = 27$ )) was specified as a control variable to account for its influence on goal achievement.

## 2. Results

Inspection of the dataset for missing data revealed that missing responses ranged from 0 to 5 (1.0%) per item, which were handled using the maximum likelihood estimation as the missing-data function (Muthén and Muthén, 2017). Descriptive statistics, internal reliability estimates (McDonald, 1999), and bivariate correlations among study variables are provided in Table 1. Athletes’ affect-improving emotional self regulation was positively correlated with receipt of affect-improving interpersonal emotion regulation from teammates, and athletes’ affect-worsening self-regulation was also associated with the receipt of affect-worsening interpersonal emotion regulation from teammates.

The main results of the structural equation model are summarized in Fig. 1 (measurement model results are reported in Supplemental Table 1). Overall, the model fit was acceptable,  $\chi^2(345) = 612.17$ ,  $p < .001$ , CFI = 0.948, RMSEA = 0.039, 90% CIs [0.034, 0.044], SRMR = 0.044. After accounting for the influence of pre-competition anxiety on anxiety during competition, affect-worsening self-regulation had a statistically significant positive association with anxiety during competition. This result suggests that athletes’ actions to worsen their own emotions were linked to their anxiety during competition. The results also showed a direct positive association between affect-improving self-regulation and goal achievement and a direct negative association between affect-worsening self-regulation and goal achievement. This finding suggests that athletes’ goal achievement was linked to greater engagement in actions to improve one’s emotions, and lower engagement in actions to worsen one’s emotions in competition. All other path coefficients were statistically non-significant (see Fig. 1).

### 2.1. Post hoc analyses

Given the dearth of research on received interpersonal emotion regulation in performance contexts, several post hoc analyses were conducted to further explore the relationships between the measured variables. First, given emotional self-regulation was associated with anxiety (affect-worsening) and goal achievement (both affect-improving and affect-worsening) but the receipt of interpersonal emotion regulation was not, we sought to explore whether the influence of interpersonal emotion regulation on anxiety and goal achievement might have been attenuated because emotional self-regulation accounted for substantial variance in anxiety and goal achievement. Thus, we constrained

<sup>3</sup> Another sensible approach was to use a 3-factor structure of goal achievement (mastery, self-referenced, normative). However, only one (mastery) was used in the analysis in light of parsimony (i.e., using all three as outcomes would have resulted in a substantial increase in the number of parameters to be tested).

**Table 1**  
Descriptive statistics and bivariate correlations.

Variables	Mean	SD	$\omega$	1	2	3	4	5	6
1. Anxiety-before	2.38	.90	.84	–					
2. Anxiety-during	2.30	.94	.88	.63***	–				
3. Affect-improving IER	2.86	.99	.81	.20***	.24***	–			
4. Affect-worsening IER	1.27	.62	.84	.06	.16***	.02	–		
5. Affect-improving ESR	2.85	.90	.76	.13**	.21***	.52***	.05	–	
6. Affect-worsening ESR	1.52	.72	.84	.24***	.33***	.06	.48***	.003	–
7. Goal achievement - mastery	4.69	1.19	.85	.02	.02	.28***	-.04	.36***	-.15**

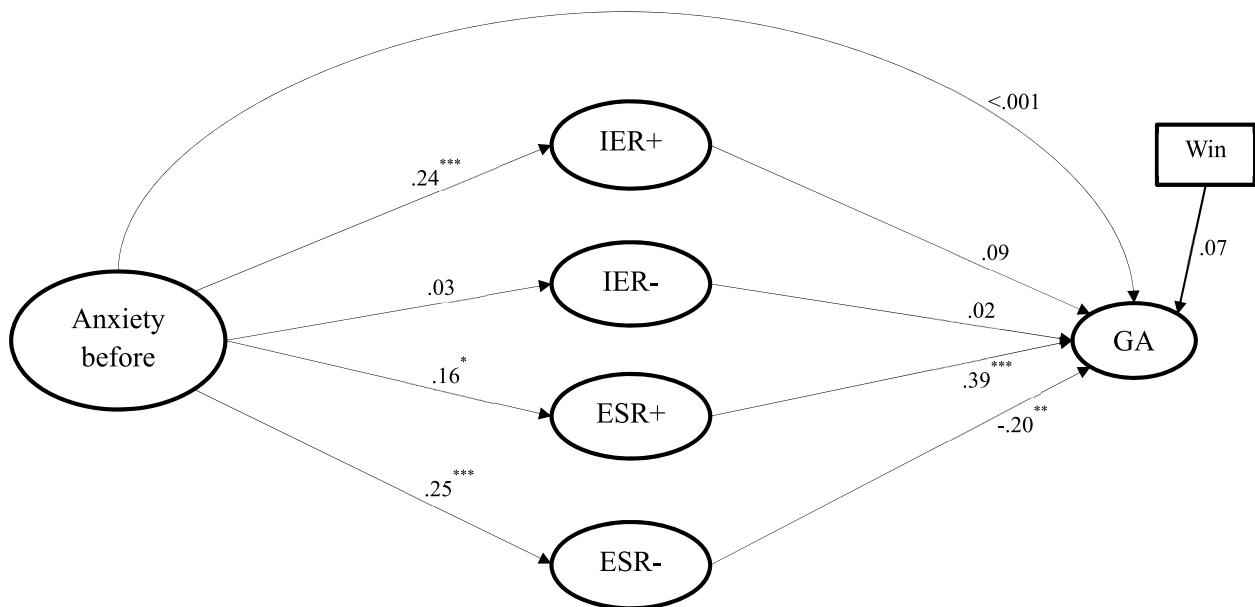
Note. For purposes of reporting descriptive statistics and bivariate correlations, subscale means were computed and were used as opposed to latent means. SD = Standard deviation, IER = Interpersonal Emotion Regulation received from teammates, ESR = Emotional Self-Regulation,  $\omega$  = McDonald's Omega. Goal achievement was measured on a 1–7 scale and all other variables were measured on a 1–5 scale. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

the path coefficients and correlations stemming from affect-improving and affect-worsening emotional self-regulation to zero. The results showed that anxiety during competition was positively predicted by affect-improving interpersonal emotion regulation,  $\beta = 0.11, p = .010$ , and affect-worsening interpersonal emotion regulation,  $\beta = 0.13, p = .017$ . The results further showed a significant positive association between affect-improving interpersonal emotion regulation and goal achievement,  $\beta = 0.33, p < .001$ . The association between affect-worsening interpersonal emotion regulation and goal achievement, however, was not significant,  $\beta = -0.06, p = .286$ .

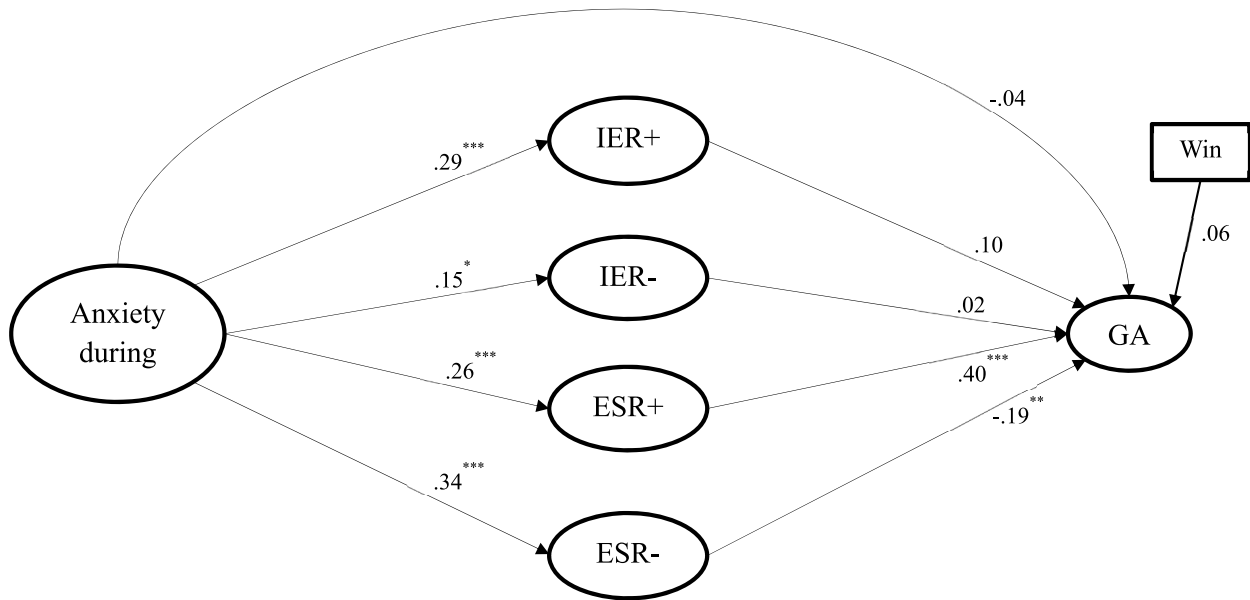
The next set of post hoc analyses involved making two adjustments to the a priori model. First, given the direct associations between emotional self-regulation and goal achievement were more substantial than the association between anxiety during competition and goal achievement, emotion regulation dimensions were specified as outcomes of anxiety and as immediate predictors of goal achievement (see Figs. 2 and 3). This was deemed appropriate given the possibility that emotion regulation is an antecedent and an outcome of felt emotions (Uphill et al., 2012; Uphill & Jones, 2011). Second, because pre-competition anxiety appeared to explain substantial variance in anxiety during competition, in these post hoc analyses we tested anxiety before and during competition separately (Figs. 2 and 3). The model focusing on anxiety before competition indicated a good fit,  $\chi^2(222) = 373.12, p < .001, CFI =$

0.960, RMSEA = 0.037, 90% CIs [0.030, 0.043], SRMR = 0.040 (Fig. 2). The results demonstrated that pre-competition anxiety was positively associated with the receipt of affect-improving interpersonal emotion regulation during competition but not with affect-worsening interpersonal emotion regulation. Moreover, pre-competition anxiety was positively related with both affect-improving and affect-worsening self-regulation. As in the a priori model, goal achievement was positively predicted by affect-improving self-regulation and negatively predicted by affect-worsening self-regulation, but not by interpersonal emotion regulation and anxiety (see Fig. 2).

The model focusing on anxiety during competition indicated a good fit,  $\chi^2(222) = 406.41, p < .001, CFI = 0.956, RMSEA = 0.041, 90\% CIs [0.034, 0.047], SRMR = 0.039$  (Fig. 3). Here, we expected that the associations between anxiety and the endogenous variables would be stronger than in the model where pre-competition anxiety was the predictor (Fig. 2) because the athletes reported emotion regulation used during competition. In line with expectations, anxiety during competition showed stronger positive associations with all four emotion regulation dimensions. As in other models reported here, goal achievement was positively predicted by affect-improving self-regulation and negatively predicted by affect-worsening self-regulation, but not by interpersonal emotion regulation and anxiety (see Fig. 3).



**Fig. 2.** Posthoc model with emotion regulation as an outcome of anxiety before competition and as immediate predictors of goal achievement.  $\chi^2(222) = 373.12, p < .001, CFI = 0.960, RMSEA = 0.037, 90\% CIs [0.030, 0.043], SRMR = 0.040$ . Standardized coefficients are shown. IER = Interpersonal Emotion Regulation received from teammates during competition, ESR = Emotional Self-Regulation during competition. Plus (+) and minus (-) signs denote affect-improving and affect-worsening, respectively. GA = Mastery Goal Achievement, Win = team win (-1 = loss, 0 = tie, 1 = win). All possible correlations were estimated (among emotion regulation dimensions, between win and emotion regulation, between win and anxiety) but are not shown for brevity. IER+, IER-, ESR+, and ESR- latent factors are specified by an ESEM approach (i.e., cross-loadings set to approximate zeroes). \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



**Fig. 3.** Posthoc model with emotion regulation as an outcome of anxiety during competition and as immediate predictors of goal achievement.  $\chi^2(222) = 406.41, p < .001$ , CFI = 0.956, RMSEA = 0.041, 90% CIs [0.034, 0.047], SRMR = 0.039. Standardized coefficients are shown. IER = Interpersonal Emotion Regulation received from teammates during competition. ESR = Emotional Self-Regulation during competition. Plus (+) and minus (-) signs denote affect-improving and affect-worsening, respectively. GA = Mastery Goal Achievement, Win = team win (-1 = loss, 0 = tie, 1 = win). All possible correlations were estimated (among emotion regulation dimensions, between win and emotion regulation, between win and anxiety) but are not shown for brevity. IER+, IER-, ESR+, and ESR- latent factors are specified by an ESEM approach (i.e., cross-loadings set to approximate zeroes). \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### 3. Discussion

The purpose of this study was to examine the effect of emotional self-regulation and interpersonal emotion regulation on athletes' anxiety and goal achievement in relation to a competition. The findings from this study make a novel contribution to the literature by providing information about the occurrence of both self- and interpersonal emotion regulation during competition, and help to clarify the role of interpersonal emotion regulation in predicting athletes' anxiety and goal achievement.

Previous qualitative research suggests that athletes perceive interpersonal emotion regulation to be important for performance (Campo et al., 2017; Palmateer & Tamminen, 2018; Tamminen & Crocker, 2013). Furthermore, there exists evidence that interpersonal emotion regulation received from teammates during practices in the days leading up to a competition is associated with team performance (Tamminen et al., 2019). In the present study, affect worsening emotional self-regulation within competition did predict anxiety, and goal achievement was also predicted by affect-improving and affect-worsening emotional self-regulation. However, our initial analyses did not find a significant relationship between interpersonal emotion regulation during competition and athletes' anxiety or goal achievement, in the presence of athletes' emotional self-regulation. Yet, our post-hoc analyses indicated that when the effects of athletes' emotional self-regulation were constrained, affect-improving and affect-worsening interpersonal emotion regulation positively predicted anxiety during competition, while goal achievement was predicted by affect-improving interpersonal emotion regulation. These post-hoc analyses suggest that interpersonal emotion regulation may be less important for changing athletes' anxiety and modifying goal-driven behaviors when athletes already self-regulate their emotions. Although unexpected, this result provides important information regarding the role of emotional self-regulation and interpersonal emotion regulation occurring in conjunction during competition.

One possible explanation for the results could be that interpersonal emotion regulation is only important in cases where athletes lack the necessary emotional self-regulation to manage their anxiety during

competition. Support for this idea was also proposed by Friesen et al. (2013), who suggested that athletes' decisions to regulate teammates' emotions were influenced by their appraisals of the teammates' emotional self-regulation abilities. Similarly, Braun and Tamminen (2019) found that athletes reported more emotional self-regulation during practices when their coaches were not present, whereas athletes reported less emotional self-regulation when coaches were present and were engaging in interpersonal emotion regulation efforts. Taken together, it seems that emotional self-regulation may be perceived as more influential for predicting athletes' emotions and goal achievement during competition than interpersonal emotion regulation. It is also worth noting that, consistent with previous research (Tamminen et al., 2016), athletes' emotional self-regulation and perceptions of interpersonal emotion regulation from teammates were correlated in the current study (e.g., athletes who reported greater affect-improving emotional self-regulation also reported greater affect-improving interpersonal emotion regulation from teammates). Yet, interpersonal emotion regulation may still be helpful for athletes in situations where they are unable to regulate their emotions, under situations of pressure or high emotional intensity, or if they expect or prefer others to provide support in regulating their emotions (Braun & Tamminen, 2019; Palmateer & Tamminen, 2018). Nevertheless, this claim is speculative and remains to be examined in future research.

Another possible explanation for the results in our study concerns the timing and occurrence of self- and interpersonal emotion regulation. It is plausible that emotional self-regulation occurs more frequently in competitions, whereas interpersonal emotion regulation may occur more frequently outside of competitions, such as in practices or when athletes are socializing and spending time together in breaks around competitions. Previous research has indicated that prior to competition, team sport athletes perceive their teammates' interpersonal emotion regulation to influence their psychological state including their anxiety levels (Wolf et al., 2017). Further evidence suggests that athletes may have less opportunity to engage in interpersonal emotion regulation during competitions (cf. Palmateer & Tamminen, 2018), thereby requiring more emotional self-regulation to manage anxiety during competitions, whereas athletes' interpersonal emotion regulation may

occur more easily and be more valuable outside of competition. Thus, the relative contribution of interpersonal emotion regulation to athletes' anxiety and goal achievement may be obscured when taking into account athletes' self-regulation during competition; yet, the effects of interpersonal emotion regulation in the lead-up to competitions may nevertheless remain important for predicting performance outcomes. Such a proposition would be consistent with evidence indicating that athletes' interpersonal emotion regulation during practices in the days leading up to a competition predicted the likelihood of team success (Tamminen et al., 2019).

Given that most of the previous research on this topic has focused on asking athletes to reflect on interpersonal emotion regulation in general, rather than asking specifically about interpersonal emotion regulation in competition (Friesen et al., 2015; Palmateer & Tamminen, 2018; Tamminen & Crocker, 2013; Tamminen et al., 2016), the current study makes a contribution to the literature by examining athletes' experiences during competition. In extending future work on self-regulation and interpersonal emotion regulation in sport, researchers may seek to establish when and how athletes engage in self- and interpersonal emotion regulation across different periods of time and settings (e.g., competition, practice, training, and time away from the immediate training environment), as well as the relative contributions of each to athletes' emotions and performance outcomes. For example, researchers may seek to examine daily patterns of athletes' emotion regulation before, during, and after competitions.

Our analyses also indicated that athletes' anxiety prior to and during competition predicted affect-improving interpersonal emotion regulation they received from teammates. This finding suggests that athletes with higher anxiety before and during competition may implicitly or explicitly seek support from others (Hammermeister & Burton, 2001; Madden et al., 1990), thereby attracting teammates' interpersonal emotion regulation. It is also possible that teammates may have noticed or picked up on athletes' expressions and nonverbal signals that they were anxious, and tried to improve their emotions. Extending this area of research, it may be valuable to consider how athletes' emotional intelligence (Laborde et al., 2016) is associated with interpersonal emotion regulation among teammates (cf. Wagstaff, Fletcher, & Hanton, 2012), or how nonverbal behaviours may communicate the need for interpersonal regulation of one's emotions.

Finally, although researchers (e.g., Jones, 2012) have noted that emotional self-regulation is associated with improved performance, the current results significantly extend previous research by demonstrating that affect-worsening actions also have important consequences for performance. Specifically, athletes' affect-worsening self-regulatory actions were positively associated with anxiety and negatively related with mastery goal achievement. Thus, when promoting emotion regulation strategies among athletes, it may be important to devise ways for athletes to become aware of the range of strategies that may be used (individually and interpersonally) to regulate one's own and others' emotions, and to gain experience in selecting and effectively deploying these in complex situations.

### 3.1. Limitations and future research directions

One limitation of the study was that we collected data from athletes at one time point after a competitive match, and athletes were asked to reflect on their pre-competition anxiety and their anxiety experience during competition retrospectively. This approach was constrained by logistical and scheduling challenges when collecting data with a large sample of athletes in the current study (e.g., not all athletes would be present early enough before the competition to complete a pre-competition survey, and coaches expressed concerns about having athletes complete a survey immediately before competing). Nevertheless, our cross-sectional, retrospective approach to data collection is a limitation, as emotions are dynamic and can change rapidly as a result of events unfolding before and during a sport match. Furthermore, there

are myriad events that could impact athletes' anxiety (aside from self- and interpersonal emotion regulation), such as the score of the game during the first part of competition, perceptions of fatigue, teammate or personal mistakes in the game, injury, refereeing, and so on. Whereas there is evidence to suggest that athletes can recall their precompetitive emotions accurately (Tenenbaum & Elran, 2003), recalled pre-competitive and in-competition emotions may have been impacted by the athletes' performance and the outcome of the competition. Further, the cross-sectional design precludes establishing directionality between emotion regulation and anxiety, despite the cyclical relationships between these processes (i.e., anxiety can be an antecedent *and* an outcome of emotion regulation). Thus, future research could adopt alternative research approaches to replicate and extend these findings. For example, using video-assisted recall in interviews with athletes to review video of their competition and report on their recalled emotions and emotion regulation actions across the duration of a competition would be valuable for examining moment-by-moment changes in athletes' emotions and regulatory actions (for examples, see Campo et al., 2017; Martinet et al., 2012). This approach could also be used to identify other potential factors that could influence athletes' anxiety (e.g., score of the game, refereeing, mistakes, etc.).

Another limitation was that the athletes in the current study were only asked to report the emotion regulation provided by their teammates. In sport teams, athletes often share closer relationships with certain teammates than others (i.e., subgroups; Martin et al., 2016), and it is plausible to expect members who occupy leadership roles to be more likely to provide support than non-leader members (Cotterill & Fransen, 2016). Moreover, given that coaches also report engaging in interpersonal emotion regulation with athletes (Braun & Tamminen, 2019), it would be important to consider the actions of coaches and support staff in regulating athletes' emotions before, during, and after competitions. Other sources of interpersonal emotion regulation could also include parents (particularly among youth sport athletes) and opponents. Thus, it would be worthwhile to consider this complexity by exploring how relationship-oriented and role-related factors influence the extent to which athletes provide and receive interpersonal emotion regulation as well as its impact.

Another consideration that may be worthy of note is that the measure of self- and interpersonal emotion regulation used in the current study provides information about general actions that athletes may undertake to improve or worsen their emotions, although this measure does not target actions intended to up-regulate or down-regulate specific emotions. This measure has been used in previous sport psychology research (e.g., Tamminen et al., 2016; 2019), although it is not a sport-specific measure of interpersonal emotion regulation. As such, research may be advanced by developing a measure of interpersonal emotion regulation that is sensitive to the sport context and that considers the different types of regulatory actions that may be used to up-regulate and down-regulate positive and negative emotions in sport. The development of such a measure would be useful to examine the specific actions that athletes, coaches, and others engage in to regulate their own and others' positive and negative emotions in sport, and it would also provide direction for applied interventions and education about specific strategies that are likely to be beneficial for performance. It would also be useful to assess how frequently athletes engage in affect-improving or affect-worsening actions (e.g., 'how often/how much do athletes engage in interpersonal emotion regulation'), as well as the relative impact of these actions on one's emotions (e.g., 'to what extent do particular types of interpersonal emotion regulation impact emotions'). For example, athletes may report a low frequency of affect-improving or affect-worsening actions from teammates, but these actions may still have a large impact on one's emotional state.

Future research should examine whether interpersonal emotion regulation may be important in cases where athletes lack the necessary emotional self-regulation to manage their anxiety in competition, to determine whether athletes who lack regulatory skills or who exhibit

poor emotional self-regulation or low coping self-efficacy (Nicholls et al., 2010) rely on others to a greater extent for interpersonal emotion regulation. Additionally, future research should examine whether interpersonal emotion regulation may occur more frequently or to greater effect in contexts outside of competition (e.g., during practices). To further advance our understanding of athletes' efforts to regulate their own and others' emotions, researchers should consider the timing and situational occurrence of regulatory actions, as well as the co-occurrence of self- and interpersonal emotion regulation. Extending this line of inquiry, future research could examine the relative proportion of self- and interpersonal emotion regulation that athletes report across different sport-related contexts using experience sampling methods or daily diaries (e.g., in practices, in competitions, when spending time with teammates, via text and electronic communication).

#### 4. Conclusion

The results of this study extend existing research by demonstrating that interpersonal emotion regulation received from teammates during competition was not associated with emotions or performance. Yet, subsequent analyses indicated that interpersonal emotion regulation was associated with anxiety and goal achievement when athletes' emotional self-regulation was constrained in the model. Furthermore, these findings extend previous research by demonstrating that athletes engage in both affect-improving and affect-worsening self-regulation strategies and that these strategies are associated with anxiety and goal achievement. This study builds on previous knowledge regarding the relationship between interpersonal emotion regulation and performance by assessing athletes' self- and interpersonal emotion regulation during competition concurrently, and by examining associations with athletes' performance, therefore filling an important gap in the literature.

#### CRedit authorship contribution statement

**Katherine A. Tamminen:** Conceptualization, Methodology, Investigation, Resources, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Jeemin Kim:** Methodology, Formal analysis, Investigation, Writing – review & editing. **Chad Danyluck:** Conceptualization, Methodology, Writing – review & editing. **Carolyn E. McEwen:** Conceptualization, Methodology, Writing – review & editing. **Christopher R.D. Wagstaff:** Conceptualization, Methodology, Writing – review & editing. **Svenja A. Wolf:** Conceptualization, Methodology, Writing – review & editing.

#### Declaration of competing interest

The authors have no conflicts of interest to report.

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#### Appendix A. Supplementary data

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