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To cite this article: Petra Jansen, Sabine Hoja & Chiara Meneghetti | (2021) Does repetitive thinking mediate the relationship between self-compassion and competition anxiety in athletes?, Cogent Psychology, 8:1, 1909243, DOI: [10.1080/23311908.2021.1909243](https://doi.org/10.1080/23311908.2021.1909243)

To link to this article: <https://doi.org/10.1080/23311908.2021.1909243>



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Published online: 28 Apr 2021.



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Received: 25 December 2020  
Accepted: 23 March 2021

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Reviewing editor:  
Daryl O'Connor, United Kingdom

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## HEALTH PSYCHOLOGY | RESEARCH ARTICLE

# Does repetitive thinking mediate the relationship between self-compassion and competition anxiety in athletes?

Petra Jansen<sup>1\*</sup>, Sabine Hoja<sup>1</sup> and Chiara Meneghetti<sup>2</sup>

**Abstract:** Due to the promising effect of self-compassion interventions in sports, it was the main goal of this study to investigate, if two aspects of repetitive thinking, worry and rumination, mediate the possible relation of self-compassion on competition anxiety of women and men in different types of sport (team- vs. individual sport). Two hundred and ninety-three athletes participated, 127 were soccer players, 103 handball players, and 63 athletes practiced an individual sport. They completed four questionnaires of sport competition anxiety, rumination, worry, and self-compassion. The results showed that for both rumination and worry, women had higher values than men and individual athletes had higher values than athletes from team sport. Women had higher values in the negative scale of self-compassion compared to men, and individual athletes and handball players had lower values than soccer players. The result of a mediation analysis demonstrated that the relation between the negative scale of self-compassion and the somatic anxiety and concern aspect of competition anxiety was mediated by worry.

**Subjects:** sport psychology; applied psychology; clinical psychology; health psychology

**KEYWORDS:** self-compassion; rumination; worry; competition; individual and team sports



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### ABOUT THE AUTHOR

Prof. Dr. Petra Jansen studied biological and social anthropology, psychology and mathematics at the Johannes-Gutenberg University of Mainz. She obtained her PhD and her habilitation in Experimental Psychology at the Universities of Duisburg-Essen and Düsseldorf on the investigation on spatial knowledge acquisition in children and adults using virtual environments. Since 2008 she is the head of the department of sport science in Regensburg. She teaches lectures in the course of studies “Applied Movement Science” and “Motion and Mindfulness”. Her research focuses on the relation of motor and cognitive and emotional processes, gender difference, embodiment, mindfulness and sport psychology in general.

### PUBLIC INTEREST STATEMENT

During their sporting career, many athletes have to struggle with psychological problems, as for example, fear of an upcoming competition, worries about possible injuries or the concern that one can't perform as well as in training situations. In order to be able to help athletes by providing them helpful tools for fighting their struggles, the underlying mechanisms and relationships of and between these psychological constructs need to be investigated and understood. The aim of the present research is to reveal the relationship between the two aspects worry and rumination and their role in (possibly) influencing competition anxiety and self-compassion. Female and male athletes from different kind of sports were investigated in order to see if there are certain connections or correlations between the type of sport and the different aspects of anxiety and fear.

## 1. Introduction

Competitive athletes use psychological strategies to cope with anxiety and other adverse emotions, which arise during the sport season. Therefore, psychological skill trainings are often used (Moore, 2009) and mindfulness-related approaches become more popular in sport. One reason for this might be, that they seem to influence several psychological sport-related skills (Birrer et al., 2012). One specific approach in this research area, which integrates mindfulness, is self-compassion, the idea that one has to be compassionate to oneself as to a friend. However, an extensive investigation of the level of self-compassion in athletes of different types of sports is missing as well as the relation to other psychological variables like repetitive thinking. In this study the relation of self-compassion to competition anxiety and the possible role of psychological negative aspects, like rumination and worry, which can be considered as a cognitive form of anxiety, in athletes of different types of sport, will be investigated. Because even individual sport settings involve groups, as athletes often train in a team, we follow the interdependence typology and compared athletes from an integrated sport team who work together during competition with a clear group goal (e.g. soccer or handball players) with athletes from an independent group who compete on an individual and different competitive level as swimmer, track and field (Evans et al., 2012). The interdependence is high in the integrated sport team and low in the independent sport team. The difference in interdependence might lead to different perception of interdependence in each athlete, which can influence the perception of pressure and repetitive thinking relating on the attribution of each athlete.

## 2. Repetitive thinking and self-compassion

There are two types of repetitive thinking, namely rumination and worry. Rumination describes a repetitive form of thinking, in which one ponders of oneself and the possible causes for some failures (Nolen-Hoeksema et al., 2008). It can deepen a sad and depressed mood (e.g. Watkins, 2008). The consequences of rumination might be that rumination exacerbates psychopathology, an emotional magnifier, and impairs concentration and sensitivity to context. The strongest evidence for a positive association might exist between rumination and anxiety (Thomsen, 2006). However, repeated focus on problems can sometimes be adaptive (Watkins & Roberts, 2020). A meta-analysis carved out small gender differences exist in rumination with higher scores for women compared to men, this holds also true for the subtypes of rumination, brooding, which involves more negative emotional thoughts and reflection with more negative thinking (Whisman & Johnson, 2013).

Whereas rumination is mostly focused on past events, anxious worrying describes the repeatedly thinking about risks, which lie in the future and uncertainties. Worry predicts anxiety (Watkins, 2008). As well as in rumination, women express more worries than men (Robichaud et al., 2003). For this, both concepts share common processes, but they also differ in their past and future orientation. Some researchers have often described worry as the cognitive component of anxiety (Martens et al., 1990). The studies about the question if rumination and worry relate to the same amount to depression and anxiety come to different results. There are some studies, which suggest that both concepts have a unique association and others, which report undifferentiated relations (Raes, 2010). Whereas repetitive thinking can worsen psychological symptoms like anxiety and depression, self-compassion can reduce them.

Self-compassion means the compassion for the own person while suffering (Neff, 2003). The whole concept of self-compassion can be differentiated in the aspects of self-kindness instead of self-judgment, mindfulness instead of over-identification and common humanity instead of isolation (Neff, 2003). The results of a meta-analysis on the effects of interventions on self-compassion and psychological outcomes, including randomized controlled trials, showed large significant improvements of eating behavior and rumination (Ferrari et al., 2019). For the aspects of self-compassion itself, stress, depression and mindfulness, self-criticism, and anxiety the effects were moderate. Even at a follow-up time, self-compassion groups make small improvements in

depression and their self-compassion values maintained stable. It might be, that self-compassion helps to avoid manifesting depression. Regarding possible gender differences, men showed slightly higher values in self-compassion than women (Yarnell et al., 2015).

### **3. Repetitive thinking and self-compassion in sport**

Regarding the concepts of repetitive thinking, there are only rarely investigated in the sport context: Regarding rumination in sports, a quasi-experimental study carved out that male German soccer players and female field hockey players were lower in rumination than non-athletes (Roy et al., 2016). Low levels of rumination were associated with a longer career at a higher level in soccer players. The authors conclude that athletes in team sports might benefit from being low in rumination (Roy et al., 2016). Furthermore, the correlation between different measures of rumination and failure-related action orientation (i.e. state orientation) was verified in a study with 157 competitive athletes from different individual and team sports (Kröhler & Berti, 2019). According to the action control theory (Beckmann & Kossak, 2018), an action-orientated athlete acts more intuitively on problems in adverse situations whereas state-orientated athletes are more focused on their emotions and thoughts (Kröhler & Berti, 2019). Rumination might be the consequence of this state orientation. Worry in sports is conceptualized as a multidimensional construct: it has been carved out that worry about situational uncertainties was the strongest predictor for somatic as well as cognitive state anxiety (Dunn & Syrotuik, 2003). In a study with World Cup ski jumpers, it was shown that 27%-36% of the variance in ski flying results could be accounted by levels of worry (Sklett, Loras, & Sigmundsson, 2018). Beside the small number of studies in this context, it is not possible to differentiate the existence of repetitive thinking in various types of sports until now.

As well as mindfulness (e.g. Josefsson et al., 2019; Kaufman et al., 2018), the concept of self-compassion is getting more and more popular in sports science. Mosewich (2020) pointed out that self-compassion can help athletes to achieve their performance potential and to maintain a high level of well-being. For young female athletes, self-compassion is more important for the sport performance than self-criticism (Killham et al., 2018) and it is related to well-being (Ferguson et al., 2014). Also, common humanity, mindfulness, and self-kindness were keys to cope with sport-related adversity and achieve a mentally tough mindset. This result was carved out with two semi-structured interviews with seven participants (Wilson et al., 2019). Self-compassion might be helpful to handle emotional difficulties they might experience in sport. This was investigated in a study with 51 women (Mosewich et al., 2013). In their study, the authors investigate the influence of a 7-day period self-compassion intervention compared to an attention control group on self-compassion, state self-criticism, state rumination and concern of mistakes. Moderate-to-strong effects for the intervention could be demonstrated.

### **4. The relation of self-compassion and repetitive thinking on trait anxiety**

Raes (2010) has investigated the two aspects of repetitive thinking, rumination and worry, as mediators of the relationship between self-compassion and depression and trait anxiety in healthy students. The relation between self-compassion and trait anxiety was mediated through the aspect of brooding from the rumination scale and worrying. Thereby, the mediating effect of worry on trait anxiety was higher than the one of brooding. However, the result that also rumination has an impact on anxiety (and not only on depressive symptoms) is in line with an earlier study (Roelofs et al., 2008).

This pattern of relation can work also for athletes, but no studies examine the relation between the more general aspects of self-compassion and repetitive thinking in relation to the trait competition anxiety in this population. There is only one study in which the relation of self-compassion and repetitive thinking has been investigated in semi-professional football players on fear of the future in the coronavirus pandemic (Jansen, 2021). The results showed that fear of

the future was only indirectly predicted by self-compassion due to the mediating effects of repetitive thinking. Whereas fear of the future is a state variable of anxiety, trait competition anxiety is an outlasting emotion. However, it is of high interest because athletes often experience a high pressure in their sport, which might even differ between athletes according to the interdependence in the group. In sports, competition is relevant, and the pressure is high, which often leads to the phenomenon of choking under pressure (Gröpel & Mesagno, 2019). While under pressure, athletes are sometimes not able to retrieve the best performance, they might experience some kind of state anxiety. Acclimatization as well as quit eye training might alleviate choking (Mesagno & Beckmann, 2017). Beside these psychological trainings, it is important to discover the factors mediating influences for the worsened performance. These can be on the one side higher repetitive thinking and on the other side higher rate of self-compassion.

### 5. The main goal of this study

It is the main goal of this study to investigate the relation between the sport-specific construct of competition anxiety and the general concept of self-compassion as well as the mediating role of worry and rumination for athletes from different sport typologies.<sup>1-1</sup> Due to the fact that competition anxiety affects performance through psychological and cognitive mechanism (Mellalieu et al., 2006) it is important to investigate mechanisms which can reduce competition anxiety. We also consider gender as a factor because self-compassion (Yarnell et al., 2015) and rumination (Robichaud et al., 2003) are gender biased. Given the possible influence of gender in the psychological variable and the relation of self-compassion to gender relevant variable like gender role orientation (Yarnell et al., 2019), we have chosen two types of integrated team-sport, soccer which is male stereotyped (Alvariñas-Villaverde et al., 2017) and handball, which is judged as gender neutral (Pietsch & Jansen, 2021).

<sup>1</sup>For convenience, we refer to the athletes from an integrated sport team as team sport athletes and to athletes of independent sport as individual athletes according to the classic differentiation.

- (1) Preliminary, and because relevant data are missing, it will be investigated, if there is a difference in self-compassion, repetitive thinking, and competition anxiety in female and male athletes from team and individual sports. We expect higher values in women than men for rumination (Whisman & Johnson, 2013) and higher values for men compared to women for self-compassion (Yarnell et al., 2015) and it will be examined gender difference in competitive anxiety. To the best of our knowledge, there are no studies investigating repetitive thinking, self-compassion and repetitive thinking in team- and individual sports. There are two plausible outcomes: First, psychological scores are higher in individual athletes—compared to team athletes—because they have less social support and have to compete on their own. Second, psychological scores are lower in individual athletes because the pressure might be higher in an interdependent team sport.
- (2) As a main aim we examine self-compassion, repetitive thinking and competition anxiety with a mediation model. According to Raes (2010) we assume a relationship between sport competition anxiety and self-compassion and that rumination and worries mediate that relationship. Furthermore, we investigate if the relation and mediation hold true for women and men of different types of sports, comparing individual sports athletes with two different types of team sport athletes.

## 6. Methods

### 6.1. Participants

Two hundred ninety-three athletes participated, 162 men (mean age = 25.68, SD = 7.624) and 131 women (mean age = 24.34, SD = 6.50). 127 were soccer players (86 men, 41 women), 103 handball players (43 men, 60 women) and 63 athletes practice an individual sport (33 men, 30 women). From the individual sports athletes 10 were swimmers, 18 track and field athletes and 35 karate athletes. Inclusion criteria were older than 16 years and practicing the respective sport of eight or more years.

**Table 1. Demographic data of the participating athletes**

Type of sport	Soccer (n = 127)	Handball (n = 103)	Individual sport (n = 63)	p	Significant differences
Sex (% women)	32.28	58.25	47.62	p < .001**	
Mean age (SD)	24.19 (5.20)	28.05 (8.28)	22.02 (7.32)	p < .001*	Soccer, individual sport < handball
Sport experience (years) (SD)	17.37 (5.89)	18.63 (8.50)	14.13 (5.25)	p < .001*	Individual sport < soccer, handball
Sport practice (h per week) (SD)	2.52 (.93)	2.41 (1.05)	4.73 (2.10)	p < .001*	Soccer, handball < individual sport
League (% international, national)	20.47	29.12	39.68	p = .019**	
Number of competitions (per year)	27.29 (9.75)	24.71 (11.45)	10.29 (5.09)	p < .001*	Individual sport < soccer, handball

n = number, p = p value, SD = standard deviation. \*F-values; \*\*Chi-Quadrat-value

Participants were recruited from different sports clubs and teams (blinded) on state level by personal recruitment. According to Raes (2010), the correlation between self-compassion and depressive mood was  $r = -.55$  and anxiety  $r = -.75$ . With a high effect size of  $r = .55$ , an alpha-level of  $p < .013$  (Bonferroni corrections), a power of  $1-\beta = .95$ , a power analysis (G-Power, Faul et al., 2007) for the correlation resulted in a total  $N = 47$  in each sport group to detect significant effects regarding the correlation between self-compassion and fear for the future, depressive mood, rumination and worry.

The relevant demographic data are given in Table 1.

The study was conducted according to the ethical guidelines of the Helsinki declaration. The project was approved from the Ethics Committee for Research (blinded).

## 6.2. Material

### 6.2.1. Demographic questionnaire

In the demographic questionnaire gender, age, the type of sports, how long they practice this sport in years, the frequency of training per week, the number of competitions in 1 year, and the level of performance (league differentiated in group 1: international, national and state vs. group 2: below state level) were registered.

#### 6.2.1.1. Self-compassion scale. (SCS, Neff, 2003; German version: Hupfeld & Ruffieux, 2011)

The SCS (SCS, Neff, 2003; German version: Hupfeld & Ruffieux, 2011) comprises on the one side the positive elements of self-kindness (“I’m kind to myself, when I am experience suffering”), common humanity (“I try to see my failings as part of the human condition”) and mindfulness (“When I am feeling down I try to approach my feelings with curiosity and openness”) and on the other side the negative aspects of self-judgment (“I can be a bit cold-hearted towards myself when I’m experiencing suffering”), isolation (“When I’m feeling down I tend to feel like most other people are probably happier than I am”), and over-identification (“When something upsets me I get carried away with my feelings”). Responses had to be given on a scale from 1 (almost never) to 5 (almost always). The negative items were reverted for the analysis. For all scales the means were calculated. Since for the German scale the total score was not justified, the positive and negative scales were separately used according to the recommendation of Coroiu et al. (2018) in the correlational analysis. For this, the mean of the three

positive scales and the mean of the three negative scales were calculated. Cronbach's Alpha in this study for the positive scale was .79, and for the negative scale .83.

6.2.1.2. *Rumination-reflection questionnaire*. (RRQ, Trapnell & Campbell, 1999. German version: König, 2012)

The RRQ (RRQ, Trapnell & Campbell, 1999. German version: König, 2012) was developed to examine how often the participants ruminate and reflect about their past. One item is: "Sometimes it is hard for me to shut off thoughts about myself". Cronbach's Alpha for the reflection scale was .90 and for the rumination scale was .90. In this study the German translated rumination scale (König, 2012) from the rumination-reflection questionnaire was used because this scale allows the investigation of the rumination aspect and is not mixed-up with a reflection scale. Cronbach's Alpha in this study was .83.

6.2.1.3. *Penn-State worry questionnaire*. (PSWQ, Meyer et al., 1990; German version: Glöckner-Rist & Rist, 2014)

The PSWQ (PSWQ, Meyer et al., 1990; German version: Glöckner-Rist & Rist, 2014) consists of 16 items measuring worry (Meyer et al., 1990). Some example items are: "I worry all the time" or "I never worry about anything". A value between 1,2,3,4, and 5 is assigned to a response depending upon whether the item is worded positively or negatively. The German version has been developed from Glöckner-Rist and Rist (2014). The test comprises 16 items, 11 of them stand for a worry tendency and 5 items, which contradicts a worry tendency. Those five items have to be converted. Responses had to be given on a scale from 1 (almost never) to 5 (almost always). The maximum of 80 points could be achieved and reflects a high worry. Cronbach's Alpha in this study was .91

6.2.1.4. *Competition anxiety inventory—trait*. (WAI-T; Brand et al., 2009)

The WAI-T (WAI-T; Brand et al., 2009) consists of 12 items measuring sport-specific anxiety. Items are grouped into three subcategories of a) somatic anxiety, b) concern and c) concentration disturbances. One of the questions for somatic anxiety might be for example: "Prior to competitions, my heart is beating due to agitation", for the concern: "Prior to competitions, I have doubts, if I can reach my goal" and for concentration disturbances: "Prior to competitions, I am susceptible for distraction". Responses had to be given on a scale from 1 (almost never) to 4 (almost always). Cronbach's Alpha in this study for the WAI-T somatic anxiety was .81, for the WAI-T concern, .85, and for WAI-T concentration disturbances, .61. Due to the low reliability (which was also the lowest in Brand et al., 2009), the WAI-T subcategory concentration disturbances was consequently excluded from the analysis.

## 7. Procedure

Participants were recruited from different sport clubs in South Germany with the help of students who were associated with the respective club. The recruitment strategy was the same for each sport club. Each club received a small gratification which depended on the number of participating athletes, three euros per athlete. The data were retrieved before the mid-term of the season and the beginning of the coronavirus pandemic in December 2019. The athletes were tested in their sports club in small groups up to ten persons per group in presence of an experimenter. Each test session lasted around 30 minutes. After reading the explanation of the study, athletes signed the consent form and completed the tests, presented in paper form, in the following order: self-compassion scale, competition anxiety -, rumination- and the Penn-State worry questionnaire.

## 8. Statistical analysis

Due to missing values for the RRQ and PSWQ 1% respectively 1.7% were replaced by the respective mean of the group. To address the first goal of our study, two univariate analysis of variance for the dependent variables in the rumination reflection questionnaire and Penn-State worry questionnaire (overall score) with the factors type of sports (soccer, handball and individual sport) and gender were conducted. The Levene-test was applied to test homogeneity of the variances, which was given. Also, one MANOVA (Pillai's trace) with the two sub-scales of the self-compassion scale and the factors type of sports (soccer, handball and individual sport) and gender were executed. Further, a MANOVA (Pillai's trace) with the two aspects of the competition-anxiety inventory and the factors type of sports (soccer, handball and individual sport) and gender were executed. For all analyses of variance, sport experience, sport practice, number of competitions and level were considered as a co-variate in a second analysis for each measure. A  $p < .05$  was considered as significant. Subsequent t-tests were Bonferroni-corrected.

To investigate the main goal of our study correlations within each sport type between the WAI-T (two subscales), RRQ, PSWQ and the negative and positive scale of the SCS score were analyzed. Due to multiple testing, Bonferroni corrections were applied,  $p < .01$  was considered as significant. After this, mediation analyses for the positive and the negative scale of self-compassion and the correlated questionnaire of the WAI-T were conducted using the Process Analysis of Hayes (2018). In a second step and due to the results of the MANOVA, several co-variables were included (sex, type of sport, years of practice, training, number of competitions and level) to examine their impacts on the whole pattern of the relations. The analysis uses ordinary least squares regression, yielding unstandardized path coefficients for total, direct, and indirect effects. Bootstrapping with 5000 samples together with heteroscedasticity consistent standard errors (Davidson & MacKinnon, 1993) were employed. Effects were regarded as significant when zero was not included in the confidence interval. For the analysis of all data SPSS 25 was used.

## 9. Results

### 9.1. Effects of gender and kind of sport in self-compassion, repetitive thinking, and competition anxiety

#### 9.1.1. Self-compassion (positive and negative subscales)

First of all, there is a correlation between the two subscales of self-compassion ( $p < .001$ ). The multivariate analysis with the two sub-scales using Pillai's trace showed a significant effect of gender,  $F(2, 286) = 5.54, p = .004, \eta_p^2 = .037$ , no significant effect for group,  $F(4, 574) = 1.88, p = .113, \eta_p^2 = .01$  nor an interaction between both factors,  $F(4, 574) = 2.15, p = .074, \eta_p^2 = .02$ . A significant effect of gender could be demonstrated only for the negative scale,  $F(1, 287) = 9.10, p = .003, \eta_p^2 = .03$  but not for the positive scale,  $F(1, 287) = .069, p = .793, \eta_p^2 < .001$ . Women ( $M = 2.87, SD = 0.62$ ) showed higher values in the negative scale of self-compassion compared with men ( $M = 2.59, SD = 0.61$ ). For the negative scale there was also a significant effect of group,  $F(2, 287) = 3.27, p = .039, \eta_p^2 = .022$ . Individual athletes ( $M = 2.88, SD = 0.69$ ),  $t(188) = 3.024, p = .003$  and handballers ( $M = 2.76, SD = 0.63$ ),  $t(228) = 2.13, p = .034$  had higher values than soccer players ( $M = 2.59, SD = 0.56$ ), whereas this was not significant after Bonferroni-correction ( $p < .016$ ). However, if sport experience, sport practice, number of competitions and level were included as a co-variate in a second analysis, the significant effect of gender remained significant ( $p < .05$ ). Furthermore there was an interaction between group and gender for the positive scale of self-compassion,  $F(2, 280) = 3.14, p = .045, \eta_p^2 = .02$ .

#### 9.1.2. Rumination-reflection questionnaire (total score)

The univariate analysis of variance showed a significant effect of group,  $F(2, 287) = 4.83, p = .009, \eta_p^2 = .03$  and gender,  $F(1, 287) = 11.55, p = .001, \eta_p^2 = .039$  but not an interaction between both factors,  $F(2, 287) = .74, p = .480, \eta_p^2 = .01$ . Women ( $M = 41.73, SD = 7.36$ ) had higher values in the rumination



score than men ( $M = 38.40$ ,  $SD = 7.64$ ), and individual sport athletes ( $M = 42.51$ ,  $SD = 7.74$ ) had higher values than soccer players ( $M = 39.08$ ,  $SD = 7.47$ ) and handball players ( $M = 39.28$ ,  $SD = 7.66$ ), GT2 Hochberg test, all  $p < .05$ . However, if sport experience, sport practice, number of competitions and level were included as a co-variate in a second analysis, the significant effect of group disappeared ( $p = .070$ ), the co-variate sport experience get significant ( $p = .015$ ).

### 9.1.3. Penn-state worry questionnaire (total score)

The univariate analysis of variance showed a significant effect of group,  $F(2, 286) = 3.10$ ,  $p = .047$ ,  $\eta_p^2 = .02$  and gender,  $F(1, 286) = 21.63$ ,  $p < .001$ ,  $\eta_p^2 = .07$  effect but not an interaction between both factors,  $F(2, 286) = 1.30$ ,  $p = .280$ ,  $\eta_p^2 = .01$ . Women ( $M = 48.79$ ,  $SD = 11.77$ ) had higher values in the worry score than men ( $M = 42.39$ ,  $SD = 10.83$ ), and individual sport athletes ( $M = 48.13$ ,  $SD = 12.59$ ) had higher values than soccer players ( $M = 44.37$ ,  $SD = 10.89$ ) and handball players ( $M = 44.60$ ,  $SD = 11.92$ ), GT2 Hochberg test did not carve out significant post-hoc comparisons (all  $p_s > .08$ ). If sport experience, sport practice, number of competitions and level were included as a co-variate in a second analysis, the significant effect of group disappeared ( $p = .164$ ). However, none of the co-variables got significant.

### 9.1.4. Competition anxiety inventory—trait (subscales)

First of all, there is a correlation between both aspects of the WAI-T (WAI-T somatic anxiety-concern,  $r = .55$ , all  $p < .01$ ). The multivariate analysis with the two sub-scales of the WAI-T using Pillai's trace showed a significant effect of gender,  $F(2, 286) = 6.86$ ,  $p = .001$ ,  $\eta_p^2 = .05$ , a significant effect for group,  $F(4, 574) = 3.74$ ,  $p = .005$ ,  $\eta_p^2 = .03$  but no significant interaction between both factors,  $F(4, 574) = 2.21$ ,  $p = .07$ ,  $\eta_p^2 = .02$ .

A significant effect for gender could be carved out for WAI-T somatic anxiety,  $F(1, 287) = 8.98$ ,  $p = .003$ ,  $\eta_p^2 = .03$  and WAI-T concern,  $F(1, 287) = 11.61$ ,  $p = .001$ ,  $\eta_p^2 = .04$ . In both subgroups, women ( $M = 9.56$ ,  $SD = 2.99$  and  $M = 10.50$ ,  $SD = 2.92$ ) have higher values than men ( $M = 8.13$ ,  $SD = 2.77$  and  $M = 8.99$ ,  $SD = 3.06$ ). Further, a main effect of group for WAI-T somatic anxiety,  $F(2, 287) = 6.42$ ,  $p = .002$ ,  $\eta_p^2 = .04$ , but not for WAI-T concern,  $F(2, 287) = 2.84$ ,  $p = .060$ ,  $\eta_p^2 = .02$  could be detected. For the WAI-T somatic anxiety, the soccer players ( $M = 7.94$ ,  $SD = 2.578$ ) show lower values than handball players ( $M = 9.20$ ,  $SD = 2.908$ ) and individual sport athletes ( $M = 9.75$ ,  $SD = 3.32$ ). Furthermore, there was a significant interaction between gender and group, for the WAI-T concern,  $F(2, 287) = 3.81$ ,  $p = .023$ ,  $\eta_p^2 = .03$ , see [Figure 1](#). There was no difference in the WAI-T concern for the female athletes ( $p_s \geq .801$ ) but for the male athletes, the value was higher for the individual athletes compared to the soccer players and handball players (Bonferroni correct,  $p_s \leq .011$ ). However, if sport experience, sport practice, number of competitions and level were included as co-variables in a second analysis, the results did not change.

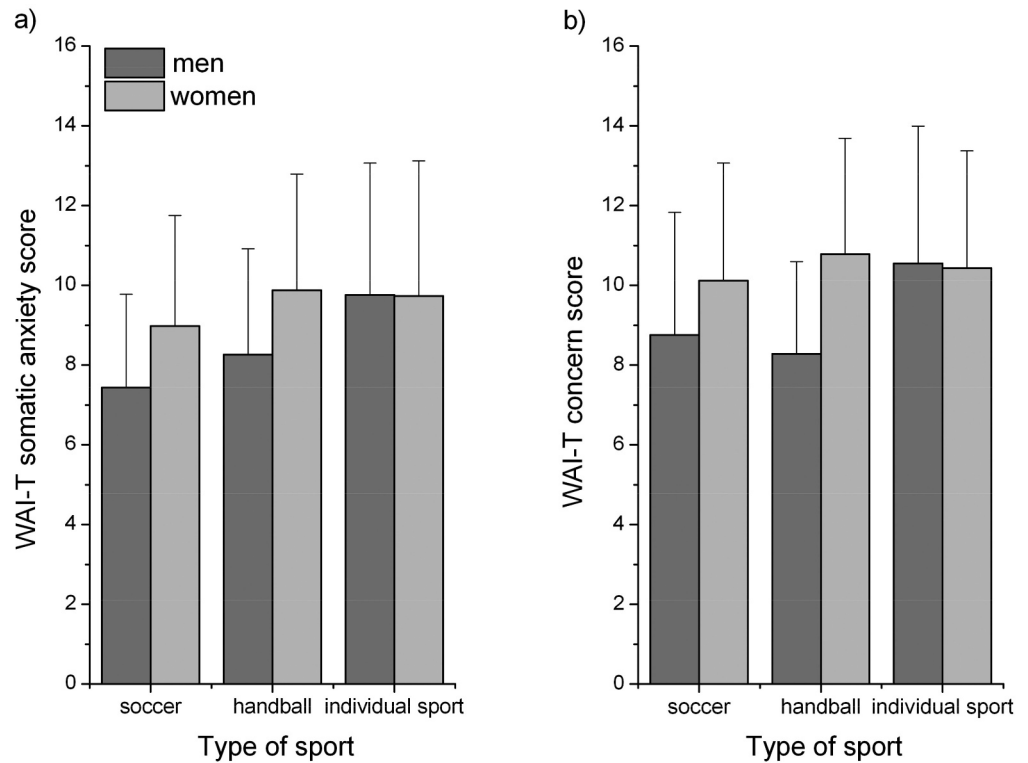
## 10. Relation between self-compassion, repetitive thinking and competition anxiety

### 10.1. Correlation analysis

The correlation analysis demonstrated that the negative scale of self-compassion is correlated to all other psychological measurements, whereas the positive scale is only correlated to the WAI-T somatic anxiety, see [Table 2](#). The correlations remained significant if gender, type of sports, sport experience, practices of sport, number of competitions and level were considered as control variables in a partial correlation (all  $p_s < .001$ ).

A parallel mediation was performed to analyze whether self-compassion (positive scale) predicts WAI-T somatic anxiety and whether the direct path would be mediated by the perceived rumination and worry. An effect of self-compassion (positive scale) on WAI-T concern was not observed. For this, further analyses were not conducted because of the missing prediction of self-compassion

**Figure 1. Mean score (SD) of the WAI-T somatic anxiety (Figure 1a) and WAI-T concern (Figure 1b) dependent on gender and sport group.**



**Table 2. Correlation between self-compassion, worry, rumination and competition anxiety**

	SCS Positive	SCS Negative	Rumination	Worry	Anxiety-Concern	Anxiety-Somatic
SCS Positive	1	-.33**	-.24**	-.20**	-.14	-.16*
SCS Negative		1	.57**	.56**	.51**	.38**
Rumination			1	.62**	.43**	.30**
Worry				1	.49**	.36**
Anxiety-Concern					1	.55**
Anxiety-Somatic						1

\*\*p < .001

\*p < .01

(positive scale) on WAI-T somatic anxiety. Since there was no correlation between self-compassion (positive scale) and WAI-T concern, a mediation model was not verified.

## 10.2. Mediation models (for the negative scales of SCS)

### 10.2.1. WAI-T somatic anxiety

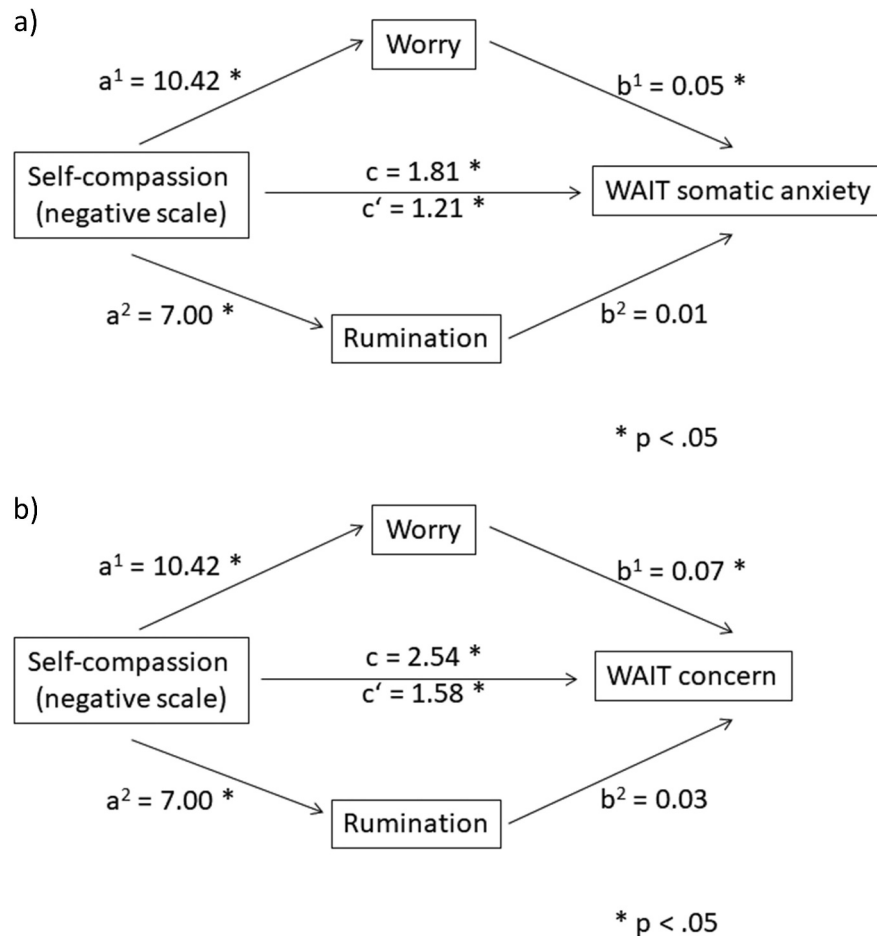
A simple mediation was performed to analyze whether the negative scale of self-compassion predicts WAI-T somatic anxiety and whether the direct path would be mediated by the perceived rumination and worry. A total of self-compassion (negative scale) on WAI-T somatic anxiety was

observed,  $\beta = 1.81, p < .001$ . After entering the two mediators into the model, self-compassion (negative scale) predicted worry significantly,  $\beta = 10.42, p < .001$  as well as rumination,  $\beta = 7.00, p < .001$  and had a direct effect on WAI-T somatic anxiety  $\beta = 1.21, p < .001$ . We found that the relationship between self-compassion and WAI-T somatic anxiety is partially mediated by worry, indirect effect  $ab = .55, 95\%-CI [.14, .99]$ , but not mediated by rumination, indirect effect  $ab = .05, 95\%-CI [-.37, .46]$ , see [Figure 2a](#). If gender, types of sports, sport experience, practices of sport, number of competitions and level were included in the analysis the indirect effect of worry on the relation of self-compassion and WAI-T is still significant. However, gender ( $\beta = .73, p = .033$ ) as well as types of sports ( $\beta = .70, p = .013$ ) predicted WAI-T somatic anxiety, too.

10.2.2. WAI-T concern

A parallel mediation was performed to analyze whether self-compassion predicts WAI-T concern and whether the direct path would be mediated by the perceived rumination and worry. A total effect of self-compassion (negative scale) on WAI-T concern was observed,  $\beta 2.54, p < .001$ . After entering the two mediators into the model, self-compassion (negative scale) predicted worry significantly,  $\beta = 10.42, p < .001$  as well as rumination,  $\beta = 7.00, p < .001$  and had a direct effect on WAI-T concern  $\beta = 1.58, p < .001$ . Worry predicted also WAI-T concern,  $\beta = .07, p < .001$ . We found that the relationship between self-compassion (negative scale) and WAI-T concern is partially mediated by worry, indirect effect  $ab = .73, 95\%-CI [.35, 1.12]$ , but not mediated by rumination, indirect effect  $ab = .23, 95\%-CI [-.14, .59]$ , see [Figure 2b](#). If gender, types of sports, sport experience, practices of sport, number of competitions and level were

Figure 2. Mediation for the relation of self-compassion (negative scale) and WAI-T somatic anxiety ([Figure 2a](#)) and WAI-T concern ([Figure 2b](#)) and the possible mediators: rumination and worry. B values are reported.



included in the analysis the indirect effect of worry on the relation of self-compassion and WAI-T concern is still significant. However, gender ( $\beta = .71, p = .029$ ) as well as level of sport ( $\beta = .98, p = .013$ ) predicted WAI-T concern.

### 11. Discussion

Regarding the first research goal on a possible difference in self-compassion, repetitive thinking and competition anxiety in female and male athletes from different (individual and team) sports, our results demonstrate the following picture: for both rumination and worry, women had higher values than men (as supposed; Whisman & Johnson, 2013; Yarnell et al., 2015). Individual athletes had higher values than athletes from team sports. Furthermore, in the two subscales of self-compassion, men showed lower values in the negative subscale compared to women. Regarding the competition anxiety, women demonstrated higher values than men, for the aspects of somatic anxiety and concern. Furthermore, soccer players have lower values in the WAI-T somatic anxiety than the other two groups. Regarding the subscale concern, men have lower values in the team sports compared to the individual sports group.

Regarding the second and the main goal, our results carved out that the relation between the negative scale of self-compassion and competition somatic anxiety and concern is mediated by worry, whereas the positive self-compassion has negligible effect. Gender, sport group, sport practice, sport experience, number of competition and level do not play a significant role and the relation between other aspects of competition anxiety is not shown.

### 12. Self-compassion and repetitive thinking in athletes

First of all, our results show only a significant gender effect in the negative subscale, women show higher values than men. Unfortunately, there are less studies investigating possible gender difference in the subscales in self-compassion. Regarding possible differences between athletes from team- and individual sport we did not find relevant differences. At the first glance one might argue that athletes across various discipline—both of individual and group sports (and in team sport with gender role orientation (Yarnell et al., 2019)—have in some way a kind of a common sense of self-related processes. For example, they believe that self-criticism is in some ways needed to flourish and to show the best performance in sports (Ferguson et al., 2014). This assumption has to be investigated in more detail.

Regarding repetitive thinking our results show that women have higher values in repetitive thinking confirming the results of the meta-analysis of Whisman and Johnson (2013). They detect small gender differences with lower values of men in rumination. This means, that even in a healthy, physical active sample of athletes those gender differences appear. The effect size of gender difference was also small to medium for rumination, which is in line with the meta-analysis mentioned above. A medium effect-size could be detected for worry, which is almost exactly the same effect size than in the study of Robichaud et al. (2003). To the best of our knowledge, there has been no study until now investigating rumination and worry in team and individual sports. We obtained clear results: In both aspects, individual athletes have higher values than athletes from team sport. However, higher ruminative tendencies predicted fewer errors on a cognitive task (Altamirano, Miyake & Whitmer, 2010), where the goal has to be maintained, as it is evident in most of the individual sports types. In most individual sports the athlete is focused on the own body and the own performance and does not have to react as much as team sports athletes to other changing situations. For this, the results of Altamirano et al. (2010) could be transferred the context of applied sport psychology. Our results manifest a higher rate of worry in individual sports athletes than team athletes. This is in accordance with a study with young athletes, which found that athletes of individual sports are more likely to suffer from anxiety than team sport athletes (Pluhar et al., 2019). In contrast to individual

sport, team sports added a social element as the sense of community might promote feelings of comfort, which might lead to a lower rate of worry. The finding that rumination and worry did not differ between both team sports (soccer and volleyball) maybe due to the comparability of both ball sports regarding the social aspect of cohesion. However, the results of the study changed if sport practice, sport experience, number of competition and level were included in the analysis. The group effect disappears. This gives a hint, that not the type of sport but the circumstances of the engagement in this sport play a more important role for the existence of sport type specific effects for rumination and worry, which is in line with one result of the study of Roy et al. (2016), who demonstrate a relation between reflective rumination and performance ability.

### **13. Competition anxiety in athletes**

In competition anxiety gender differences emerged, with women showing higher values in somatic anxiety and concern. This result is partly in line with the study of Correia and Rosado (2019) demonstrating higher levels for somatic anxiety but (also for concentration) not for concern respectively worry. Women are more prone to feel anxious than male athletes, a result which has been already discussed earlier (e.g. Martens et al., 1990). Only in one study, elite (international) female athletes possessed less somatic anxiety than their male counterparts (Hagan et al., 2017). However, in the study presented here, only three athletes trained on an international level, which might explain the conflicting results.

Further, the type of sport differs in competition anxiety. The effect, that soccer players show lower values than individual sports athletes in the somatic anxiety score fits to the general lower anxiety of team sports athletes compared to individual sports athletes (Correia & Rosado, 2019). If athletes compete as individuals, the pressure to achieve the desired outcome depends on the own person, which augments the pressure essentially. In the somatic anxiety aspect, the soccer players show lower values than the handball players, which raises the assumption that also team players react differently, which is confirmed by the different results of soccer and handball players in the dimension of concern. Since there was no interaction with gender, we can exclude that the different proportion of men and women in each group contributes to the different result. The differences in competition anxiety levels within various team sports have to be investigated in more detail including psychological measurements, which are related to competition anxiety, as for example, mental toughness and motivation (Schaefer et al., 2016). Furthermore, the results only slightly changed for the concern aspect of the competition anxiety.

### **14. Relation between self-compassion and competition anxiety**

The first relevant result of our study regarding the relation between self-compassion and competition anxiety is that the relation exists mainly for the negative subscale of self-compassion. The relation of self-compassion to somatic anxiety and concern is mediated by worry but not by rumination. Gender and type of sports do not influence this result. The result is in line with the study of Raes (2010) who carved out that for a healthy group of non-athletes, especially worry mediates the relation between self-compassion and anxiety. However, in his study there was no differentiation between various aspects of anxiety, which seemed to be worth to investigate beside the sports context. That negative scale of self-compassion (composed by self-judgment, isolation and over-identification) is especially related to the somatic anxiety and concern aspect of competition anxiety. This fits with the result that high self-compassion was related to a lower depression rate (Bakker et al., 2019). The relation between self-compassion and somatic anxiety is in line with one study demonstrating that self-compassion is lower in patients with somatoform disorder, which is characterized by persistent physical symptoms that suggest the presence of a medical condition but are not fully explained by this condition (Deswaran-van Der Ven et al., 2018). Also, self-compassion promotes not only adaptive psychological but also physiological responses in athletes in relation to a sport failure, self-

compassion predicted athletes' heart rate variability (Ceccarelli et al., 2019) and self-related processes like body-consciousness, body surveillance and body shame (Mosewich et al., 2011). One question which has to be investigated in the near future is, why only the negative scale of self-compassion showed significant relations to the other psychological variables. We could not compare this with the study of Raes (2010) because he did not differ between a positive and negative scale. The negative SCS assesses tendencies towards self-criticism (Coroiu et al., 2018), which might be a relevant psychological trait in athletes. It would be interesting to investigate, if the related psychological variables are positive, the positive scale of SCS is more related to it than the negative scale.

The relation of self-compassion has been often investigated in relation to negative aspects like anxiety, but it seems to be worth investigating this and the mediation factors in relation to positive aspects e.g. mental toughness (Wilson et al., 2019) or well-being and performance outcomes, which are interrelated (Mosewich et al., 2019)

Furthermore, these results raise the points of the role of self-compassion as individual disposition of to approach requests (Neff, 2003), and in particular in sport context: high self-compassion disposition (self-judgment, isolation and over-identification in athletes) contributes to increase the worry which in turn increases anxiety for competition (somatic and concern component). Self-compassion might be a promising approach against the development of the choking under pressure phenomenon in sport (Gröpel & Mesagno, 2019).

## 15. Limitations

Though the study has several strengths, there are some limitations. The first one is the different group size and the different proportion of women and men. However, this is in line with the stereotype nature of the sports (Alvarinas-Villaverde et al., 2017; Pietsch & Jansen, 2020). Also, individual sports athletes practice different types of sports and from the team sport only athletes from two ball-sports were included in the study. The second limitation is the minor reliability of the concentration disturbances aspect of the WAI-T, for this in further studies another competition anxiety inventory should be used. The third limitation is that meditational analysis on cross-sectional data must always proceed with caution. In order to justify the statistical meditational analysis, the model before was grounded in the theoretical literature but does not permit conceptual mediation. In addition, it might be necessary in the future to include multiple time points of data collection with each variable measured at the time point relevant to its position. For this, the claim of longitudinal studies is necessary. Furthermore, rumination and worry were considered as antecedents of anxiety as in many other studies (e.g. Hoyer et al., 2009).

## 16. Conclusion

This study shows that the relation between self-compassion (negative scale) and somatic and concern competition anxiety is mediated by the worry aspect of repetitive thinking and independent from gender, type of sport and league of practice. The strength of the study is that it differentiates between different forms of anxiety and different kinds of sport.

### Funding

The authors received no direct funding for this research.

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### Funder Information

The authors received no direct funding for their research.

### Disclosure of potential conflict of interest

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

### Funding

The authors received no direct funding for this research.

### Research involving human participants

The research involves human participants.

### Informed consent

Informed consent was obtained by the participants before participating to the study. The research was approved by the Ethical review board of the University of Padua (n .3405)

### Citation information

Cite this article as: Does repetitive thinking mediate the relationship between self-compassion and competition anxiety in athletes?, Petra Jansen, Sabine Hoja & Chiara Meneghetti, *Cogent Psychology* (2021), 8: 1909243.

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