Sport Superstition: Mediation of Psychological Tension on Non-Professional Sportsmen's Superstitious Rituals

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This study examined the effects of personality and situational differences on superstition behaviours in sports at three non-professional competition levels. The participants were 219 athletes (169 males, 50 females). We measured superstition by the number and kind of superstitious rituals (SRs), degree of superstitious feeling, and ritual commitment (RC). We used a within-group design that involved manipulating competition importance and uncertainty using scenarios to examine changes in pre-game psychological tension and RC. We found that sport superstition is positively correlated with athletic identity and pre-game psychological tension. Level of competition affects RC. RC is greater when the uncertainty and importance of the game are greater. Moreover, within-variable mediation analysis revealed that state of psychological tension mediated the effect of both uncertainty and importance on RC. Collectively, the results of the present investigation offer empirical support for Neil's (1980) hypothesis that sport superstition acts as a "psychological placebo".

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Superstitious rituals (SRs) are defined as "unusual, repetitive, rigid behavior that is perceived to have a positive effect by the actor, whereas in reality there is no causal link between the behavior and the outcome of an event" (Womack, 1992, p.192). The difference between some SRs and usual pre-game routines (e.g., hours of sleep, nutrition, warm-up) is not always clear. An excessive rigid timing and fixed order seems to draw the line between SR and useful preparation (Schippers & Van Lange, 2006). For example, an athlete who eats the same food at the same place (e.g., same restaurant and table) and at a fixed time (e.g., 5:55 p.m.) before the game could be classified as superstitious.

Various researchers have described SRs (superstitious beliefs and behaviors) practiced by athletes in various sports (e.g., Becker, 1975; Buhrmann & Zaugg, 1981; Neil, 1975; Bleak & Frederick, 1998), at different levels of competition (e.g., Todd & Brown, 2003), and according to different types of SR (e.g., clothing, specific actions, thought; Coffin, 1971; Gmelch, 1972; Becker, 1975). According to these reports, a large majority of athletes exhibit SRs. For instance, Schippers and Van Lange (2006) observed that 80.3% of recruited professional athletes mentioned one or more SR they performed before a game, with an average of 2.6 rituals per person. Interestingly, Bleak and Frederick (1998) found that whereas athletes are attached to their SRs and exhibit superstitious behaviors, they generally do not consider their superstitions as effective. Several behavioral and cognitive explanations may account for this discrepancy.

One explanation is to consider SR as the result of the perception of a causal relation between two elements associated in a fortuitous way, that is to say, behaviors or thoughts and a reinforcement (e.g., top sport performance) (Skinner, 1948). In other words, the superstitious response is defined as "an authority through which an answer is maintained from an accidental correlation with reinforcement" (Skinner, 1948, p.168).

Alternatively, the occurrence of SR can be explained in terms of illusion of control (Langer, 1975; Rudski, 2001, 2004). This concept is defined as the tendency for individuals to believe they can control, or at least influence, outcomes that they demonstrably have no influence over. The illusion of control is thought to be more pronounced in situations characterized by uncertainty, that is, when skills are not sufficient because chance also plays a role (Langer, 1975). For instance, in a lottery task manipulation, Rudski (2004) highlighted a positive correlation between perceived control (which corresponds to illusion of control) and SR (Rudski, 2001, 2004). Rudski operationalized SR by the participant's lottery number attachment. In line with this idea, it is highly likely that SR will be prevalent in competitive sports, which are always mixtures of chance and skills.

Another explanation may derive from Lerner's Just World Hypothesis (Lerner, 1965). According to this theory, people need to believe in the equity and stability of their environment (Lerner, 1965). For example, by maintaining this faith, the individual believes that if they

work hard, they will get what they deserve. From this perspective, an athlete can tend to adopt a SR because it would give him the impression that he was doing everything he could to achieve the best possible performance. It would be the ultimate action, in addition to all those they had already carried out (e.g., training, food sacrifices).

These complementary cognitive-behavioral explanations of SR practice refer to the same need: the perception of control. This need may be relevant to dealing with the psychological tension generated by the uncertainty and importance of competitive situations and mediated by levels of competition and of personal involvement (athletic identity). The aim of our study was to measure the relative contribution of these variables to SR.

Psychological Tension. It is assumed that individuals experience more tension if they perceive less control (Vyse, 1997). Therefore, athletes might engage in SRs in order to achieve optimal performance (Womack, 1979). For Neil (1980), rituals seem to serve a rational and useful purpose. Indeed, in one study, basketball players using purposeful free-throw preparation routines (e.g., three dribbles, motor imagery) obtained a similar, even lower, performance than basketball players who exhibited SRs (e.g., touching the hair) before the throw, but a higher performance than the control group (direct shot) (Foster and Weigand, 2006). From this perspective, SRs would seem to serve as a coping strategy in the face of increased tension due to the uncertainty that is contingent on sporting events. Their effect would be similar to psychological placebo (Neil, 1980). In support of this hypothesis, Schippers and Van Lange (2006) found that psychological tension exerts an effect on the need to enact SRs. In particular, psychological tension mediated the effect of both uncertainty and importance of the competitive situation on the need to enact SRs.

Uncertainty and Importance of the Outcome. As sport competition situations are characterized by uncertainty and importance, optimal involvement and skills alone cannot guarantee success. This substantial but permanent lack of control is expected to induce psychological tension (nervousness, thoughts and physiological responses) in athletes, which may in turn lead them to adopt superstitious behaviors (Van Raalte, Brewer, Nemeroff & Linder, 1991). Schippers and Van Lang (2006) showed that sportsmen are more prone to adopt SRs when facing a superior opponent than when facing an inferior opponent. More recently, Wright and Erdal (2008) showed that highly-skilled golf players tended to be more superstitious on a difficult golf-putting task than low-skilled players. Conversely, low-skilled players tended to show more superstitious behaviors during an easy golf-putting task than highly-skilled players. One explanation could be that SRs are linked to the participant's perceived uncertainty of the task: "The feeling of uncertainty that the high skill participants may have had in the difficult condition were likely similar to the feelings of uncertainty the low skill participants felt in the easy condition" (Wright & Erdal, 2008, p.195).

The importance attributed by the athlete to the competition outcome also moderates tension, which is directly related to SRs. For instance, Schippers & Van Lange (2006) showed empirically that professional athletes are more prone to exhibit SRs when playing a final than they are when in training sessions.

Level of Competition. Another situational variable would exert an impact on the occurrence of SRs: the level of competition. The higher the competitive level, the more superstitious the athletes may be. Schippers and Van Lange (2006) explained that they chose professional athletes for their studies because they compete in an extremely stressful environment (see also Womack, 1979). However, Todd and Brown (2003) observed neither a higher number nor a different range of signs of superstition in NCAA Division 1 track and field athletes than in Division 2. One explanation for this discrepancy could be that in the latter study, the two groups of participants did not differ sufficiently in terms of competitive level; both groups included high level competitors, so may not have differed in terms of the degree to which an individual identifies with the role of athlete (athletic identity; Brewer, Van Raalte & Linder, 1993, p.237).

Athletic identity. According to Neil, Anderson, and Sheppard (1981), level of personal investment in sport (finance, training) would be the key variable determining SR occurrence. They observed that high competition level hockey players developed more SRs compared to the low competition level players. They also observed that high-level hockey players had a higher level of personal investment in sport than low-level hockey players.

Several studies have indicated that a strong athletic identity can exert a positive effect on athletic performance, because athletic skills are enhanced more as a result of greater personal investment (Danish, 1983; Werthner & Orlick, 1986). Strong identification with the athletic role can also have a positive effect on the development of a sense of self, and can build confidence in individuals as they improve their athletic skills (Brewer and al., 1993). However, a strong athletic identity can have negative effects. When their personal investment in sport is strong, athletes increase their susceptibility to emotional disturbance following an event such as injury or unexpected termination of the athletic career (Brewer and al., 1993; Brown & Hartley, 1998; Martin, Adams & Smith, 1995; Murphy, Petitpas & Brewer, 1996; Wiechman & Williams, 1997). A positive relation has been observed between athletic identity and SRs: the more ego-involved athletes are, the more likely they are to feel tension, and subsequently develop sport-related superstitions (Neil, Anderson, & Sheppard, 1981; Todd & Brown, 2003).

Practice of SRs has also been related to the locus of control factor (Bleak & Frederick, 1998; Van Raalte, Brewer, Nemeroff, & Linder, 1991; Schippers & Van Lange, 2006; Todd & Brown, 2003). Some studies have found that externals are more prone to exhibit sport superstitious behaviors (Schippers & Van Lang, 2006; Todd & Brown, 2003). According to this line of

reasoning, externals, who describe more control from external factors, may experience a stronger need to engage in SRs in order "to influence luck". In contrast, Van Raalte and al. (1991) has shown that, in a golf putting task, internal locus of control predicts superstition. According to this second line of reasoning, internals, who experience a greater sense of control, would try to make the situation more controllable by carrying out superstitious rituals. However, one study (Bleak & Frederick, 1998) found no link between locus of control and superstition.

The aim of the present study was to examine how sport superstition is affected by situational (uncertainty, importance, level of competition, psychological tension) and individual (athletic identity) variables in non-professional athletes. This question was addressed from different perspectives. First, the number and types of SRs were recorded. Second, we aimed to ascertain whether SRs were related to athletic identity and level of competition. We hypothesized that athletic identity would be positively correlated with sport superstition and that level of competition would exert an effect on SRs. Third, similarly to Schippers & Van Lange (2006), we used a within-group design that involved manipulating the uncertainty and importance of sport competition through the use of scenarios to examine potential changes in athlete's pre-competitive subjective state of tension and in their need to engage in sport superstitious behaviours (ritual commitment, RC). We hypothesized that RC would be higher when the uncertainty and importance of the outcome are high and that psychological tension would be positively related to level of superstition and would mediate the predicted effects of uncertainty and importance on RC.

This study differs from that of Schippers and Van Lange (2006). These authors showed that psychological tension mediates the effects of the uncertainty and importance of sport competition on RC in professional athletes. Our research aimed to extend this finding to non-professional athletes at three levels of competition (young elite, national and regional).

Method

Participants

Participants in the study were 219 healthy Belgian non professional athletes (169 men, 50 women). The mean age of the participants was 21 years ($SD = 6.43$).

The participants belonged to three different levels of competition as organized in Belgium, from lowest to highest: regional division ($n = 77$; men = 63, women = 14), national division ($n = 65$; men = 49, women = 16) and young elite ($n = 76$, men = 57, women = 20). In order to be included in the young elite category, athletes have to be less than 18 years old and belong to an elite training center affiliated to the Belgian Olympic Committee.

Seven sports were represented: basketball ($n = 83$), soccer ($n = 58$), volley ball ($n = 15$), tennis ($n = 16$), table tennis ($n = 20$), judo ($n = 19$) and fencing ($n = 8$).

Measures

Demographic and Athlete History Information. Participants provided their gender, educational level, birth date, sports club, sports team, average number of hours of sports practice each week and current level of competition.

Athletic Identity. The Athletic Identity Measurement Scale (AIMS; Brewer, Van Raalte, & Linder, 1993) was used to assess athletic identity. The AIMS is a 10-item measure using a 7-point Likert-type scale ranging from (1) strongly disagree to (7) strongly agree. Score range was from 10 to 70, with higher scores indicating a stronger identification with the athletic role. Internal consistency was reported to be high, with an alpha coefficient of .93, and the test-retest reliability coefficient was found to be .89 over a 14-day period (Brewer et al., 1993). As evidence of construct validity, Brewer et al. (1993) found AIMS scores to be highly correlated with scores on the importance of sports competence subscale of the Perceived Importance Profile (PIP), $r(225) = .83, p < .001$. For this study, the AIMS was translated into French. Back translation method was used. For the present sample, the internal consistency reliability was .85 using Cronbach's alpha.

Superstitious Behavior. Superstition was measured in several ways in keeping with Schippers and Van Lange (2006). The open question: "What ritual(s) do you perform before and/or during a game?" was asked to determine the type and the number of SRs carried out by the athletes. Sometimes, the difference between some SRs and pre-game useful routines is not always clear. A response was considered as a SR when it was characterized by an excessive rigid timing and fixed order. For example, in the context of competition, warming-up at the same time was not classified as superstitious. On the other hand, one of our participants, a soccer goalkeeper, had to kiss a soccer ball two hours before a game, stretch alone exactly 1 hour before a game and had to kiss the game ball just before entering the field. This response was classified as a SR. Response categorisation was controlled by inter-researcher agreement.

Two Likert-type questions were also included, in order to evaluate to what extent each participant perceived himself as superstitious. These questions were: "How superstitious do you find yourself in comparison to other sportsmen?" and "How superstitious do other sportsmen find you?" We used a six point scale ranging from 1 (not at all superstitious) to 6 (very superstitious).

Experimental Manipulation

After completing items assessing demographic information, athletic identity and sport superstition, participants were asked to imagine several competition situations. We designed four vignettes in which each participant was asked to imagine a certain type of match. Vignettes were similar to those used by Schippers and Van Lange (2006). The following variables were thus manipulated:

Uncertainty. Uncertainty was operationalized as *relative standing*. Schippers and Van Lange (2006) assumed that the relative standing of the opponent causes uncertainty, such that uncertainty is high when the opponent is of a superior standing, but relatively low when the opponent is of an inferior standing. As a result, psychological tension should be greater when the opponent is at least as good as the athlete's own team. Thus, participants were asked to imagine that they would face either an opponent against whom they generally win (Inferior opponent), or an opponent against whom they generally lose (Superior opponent).

Importance. Importance was operationalized in terms of the nature of the competition the athlete has to play. Participants were asked to imagine that they were about to play a training match (Low Importance), or a final (High Importance). The following vignette example outlines the high importance and superior opponent condition: "Imagine that you're playing in a final. You will be playing another opponent against whom you have generally lost in the past (e.g., lost seven times, won only once)".

For each situation, the same seven Likert-type questions were asked. The first three were *manipulation checks*. In order to check if the given situations were recognizable, the first question asked whether participants could imagine the vignette for themselves (1 = absolutely not, 6 = absolutely). The second manipulation check asked participants to what extent they expected to win or lose the fictitious match (1 = lose for sure, 6 = win for sure). The last manipulation check asked how important it was for the participants to win the match (1 = not at all important, 6 = very important).

Tension. The third variable measured in these situations was the psychological tension felt by an athlete before a match. This was assessed by the question: "How tense are you before the match (1 = not at all, 6 = very)?"

Ritual Commitment (RC). This last variable can be defined as "the extent to which an athlete wishes or needs to engage in ritual" (Schippers & Van Lange, 2006, p.2539). RC was assessed by the two questions: "How annoying would it be for you if, for whatever reason, you were not able to carry out the rituals that you mentioned before (1 = not at all, 6 = very) and "How important is it for you to be able to carry out these rituals (1 = not at all, 6 = very). Responses to these two questions were significantly correlated (r varying from .82 to .92 for the four situations, all $p < .001$). Thus, the responses to these two questions were averaged in subsequent analyses.

Procedure

This research was conducted by the Department of Sport Psychology of the Catholic University of Louvain-la-Neuve, Belgium. For team sports, participants were recruited by contacting the trainers. For individual sports, participants were recruited by contacting the trainers or the athletes themselves. The distribution of the questionnaires took place before or after a training session at the beginning of the regular season (September). Participants were informed that they would be questioned about their superstitions and that their responses would remain anonymous. They then individually filled out the questionnaire. This took place in the athlete's canteen. Researchers were physically present and took back questionnaires immediately after completion. For two teams ($n = 20$), questionnaires were sent by post. In this case, participants filled out the questionnaires at home and the trainer was responsible for sending them back by post. All athletes ($N = 219$) agreed to fill out the questionnaire, yielding a 100% response rate.

Results

Demographics

No difference was found on gender distribution according to competition level $\chi^2(2, N = 217) = 1.58$, *ns*). Elites ($M = 15.33$, $SD = 1.20$) were younger than regional ($M = 23.61$, $SD = 7.17$, $p < .001$) and national athletes ($M = 23.84$, $SD = 4.91$, $F(2, 217) = 66.31$, $p < .001$). Elites ($M = 11.87$, $SD = 3.49$) practiced more hours of sport each week than regional ($M = 6.17$, $SD = 2.99$) and national sportsmen ($M = 6.77$, $SD = 3.21$, $F(2, 217) = 69.62$, $p < .001$). There was no difference in age between male and female athletes (men: $M = 21.16$, $SD = 6.41$; women: $M = 19.41$, $SD = 6.40$, $F(1, 218) = 2.81$, *ns*) nor in the number of hours of sport practiced each week (men: $M = 8.19$, $SD = 4.02$; women: $M = 8.78$, $SD = 4.58$, $F(1, 218) = .76$, *ns*).

Preliminary analyses

Averages of same items between vignettes. For subsequent analyses, averages of the same item for each vignette were needed. Therefore, internal consistency indices were calculated. From Table 1, it can be seen that each indices indicated acceptable reliability.

Correlation between superstition measures. In our study, superstition was measured in three different ways. An open-ended question was formulated in order to collect the number and type of rituals carried out before or during a match. Two Likert-type questions measured the degree of superstitious feeling (Item 1: "How superstitious do you find yourself in comparison to other sportsmen?" and Item 2: "How superstitious do other sportsmen find you?"). The third measure—ritual commitment (RC)—was quantified as the mean scores of the last

Table 1. *α coefficients for the same items across the 4 vignettes*

Vignettes Items	α for the 4 vignettes
Item 1: "Can you imagine the situation?"	.84
Item 2: "To what extent do you expect to win or lose the match?"	.69
Item 3: "How important is it for you to win this match?"	.69
Item 4: "How tense are you before the match?"	.80
Items 5: "How annoying would it be for you if, for whatever reason, you were not able to carry out the rituals that you mentioned before?"	.93
Item 6: "How important is it for you to be able to carry out these rituals?"	.93

two items of each of the four vignettes. Table 2 shows the correlations between the three measures of superstition.

Measures of superstition were correlated (Table 2.). The α coefficient reflecting internal consistency of their values was .72. This result allowed us to obtain a standardized total superstition score from the average of the standardized scores of the three measures of superstition.

Manipulation check

A repeated-measures analysis of variance was conducted to examine the manipulation check items. The dependent variables were, respectively, ability to imagine the situation outlined in the vignette (judgements of realism), expectations regarding winning or losing (uncertainty), and importance attached to winning. The independent factors were importance (training vs. final) and relative standing (inferior opponent vs. superior opponent).

Judgments of realism. Participants were capable of imagining the four situations (overall mean $M = 4.82$, $SD = 1.39$). The data also revealed a main effect for relative standing, $F(1, 218)$

Table 2. *Correlations between superstition measures (N = 219)*

		Superstitious Feeling			RC			
		Item 1	Item 2	*M* four vignettes	TW	TL	FW	FL
Number of Rituals		.49	.25	.47	.39	.39	.48	.44
Superstitious Feeling	Item 1	\	\	.42	.31	.41	.42	.41
	Item 2	\	\	.29	.21	.28	.31	.29

Note. All correlation coefficients are at $p < .01$; *M* = Mean; T = Training; F = Final; W = Won; L = Lost.

$= 23.82, p < .01, \eta^2 = .10$. Participants were better able to depict the situation playing against an inferior opponent ($M = 5.00$, $SD = 1.27$) than the situation against a superior opponent ($M = 4.66$, $SD = 1.51$). No other significant effect was found.

Expectation of winning versus losing. For the question: "To what extent do you expect to win or lose the match?" a main effect for relative standing was found, $F(1, 218) = 216.41, p < .01, \eta^2 = .50$. Participants were less confident of winning when facing a superior opponent ($M = 3.66$, $SD = 1.07$), than when facing an inferior opponent ($M = 4.73$, $SD = 1.01$). These findings are perfectly consistent with the intended manipulation of relative standing. An interaction effect was found for importance and relative standing, $F(1, 218) = 34.69, p < .01, \eta^2 = .14$). Participants expected more to win against a superior opponent in the final situation ($M = 3.80$, $SD = .09$), than in a training situation ($M = 3.53$, $SD = 1.05$). Also participants were less confident of winning against an inferior opponent in a final ($M = 4.58$, $SD = 0.99$), than in a training match ($M = 4.87$, $SD = 1.03$).

Importance of winning. For the question about the importance for the participant to win the game, a main effect for importance, $F(1, 218) = 131.07, p < .01, \eta^2 = .38$, and relative standing, $F(1, 218) = 17.49, p < .01, \eta^2 = .08$, was found. Participants found it more important to win a final ($M = 5.61$, $SD = 0.79$) than to win a training match ($M = 4.68$, $SD = 1.49$). The findings are perfectly consistent with the intended manipulation of importance of outcome. The participants also found it more essential to win against a superior opponent ($M = 5.26$, $SD = 1.07$), than against an inferior opponent ($M = 5.03$, $SD = 1.21$). An interaction effect between uncer-

tainty and importance, $F(1, 218) = 14.91, p < .01, \eta^2 = .06$, was revealed. Through this interaction, it appears that the uncertainty effect was cancelled out in the situation of playing a final match.

Number and kind of superstitious rituals

Of the 219 participants, 165 (75.8%) reported one or more SRs, with an average of 1.59 ($SD = 1.84$) and a maximum of 12 rituals. We used Schippers and Van Lange's (2006) definition of SR to differentiate a SR from a pre-game routine. For the whole sample ($N = 219$), the mean of the extent to which participants perceived themselves as superstitious was 2.41 ($SD = 1.26$) for item 1 and 1.90 ($SD = 1.13$) for item 2. For those participants reporting at least one SR ($n = 165$), the mean for degree of superstitious feeling was 2.66 ($SD = 1.26$) for item 1 and 1.98 ($SD = 1.16$) for item 2.

Table 3 shows the number and types of rituals practiced by the participants in each sport discipline. Unusual SRs included: drawing a Turkish eye on the right shoe and placing a secret photograph on the left shoe (basketball); never combing hair (tennis); always putting the same toy in the sports bag (tennis); never entering the court first (tennis); always touching mother's hand (basketball); putting on shoes just at the beginning of the match (soccer); avoiding scoring the first two points of the game when the participant plays against an equal opponent (basketball); touching an object that belongs to the participant's father (basketball); taking a cold bath before each match (tennis); wearing the same clothes throughout a tournament (tennis); before a game, seeing number 22 brings luck, seeing number 23 brings bad luck (soccer).

Athletic identity and superstition

In order to determine the relationship between athletic identity and superstition, correlation analyses were conducted between the score for athletic identity and the three measurements of superstition ($n = 218$). Athletic identity showed significant positive correlations with the standardized scores for degree of superstition, $r = .19, p < .001$; the number of rituals, $r = .19$, $p < .05$; Item 1 of the measure of superstitious feeling, $r = .17, p < .05$; ritual commitment (mean for the four situations), $r = .18, p < .05$; but not for Item 2 of the measure of superstitious feeling, $r = .04$, *ns*. The athletic identity variable was thus positively correlated with each of the measurements of superstition, except for Item 2 of the measure of superstitious feeling.

Athletic identity scores also showed significant correlations with the following variables: hours of sport/week, $r = .54$, $p < .01$; Item 3 (average for the four situations):"How important is it for you to win this match?", $r = .27$, $p < .01$; Item 4 (average for the four situations): "How tense are you before the match?", $r = .27$, $p < .01$.

Table 3. *Number and kind of superstitious rituals*

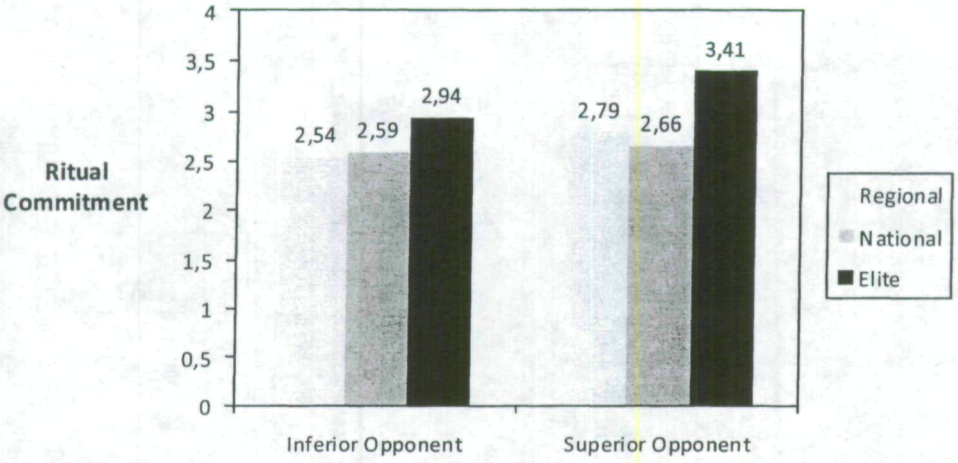
Kind of Ritual	Number of times mentioned by participants							
	Soccer *N=53*	Basketball *N=83*	Volleyball *N=15*	Tennis *N=16*	T. Tennis *N=20*	Judo *N=19*	Fencing *N=8*	*T*
Food	12	7	3	1	2	2	.	27
Relaxation (e.g., to go for a walk)	6	11	1	1	1	4	1	26
To enter the field in a particular way, to have a precise seat in the cloakroom	10	12	1	6	3	2	.	34
"Lucky-charm" clothes	10	39	3	10	2	1	.	65
To go to sleep at a fixed hour	1	1	.	.	.	1	.	3
To dress in a fixed order	6	4	.	.	2	1	.	13
Warm-up (e.g., unusual habit)	5	23	4	7	4	2	2	47
Activity the day before the competition	1	.	.	.	.	.	.	1
To take care of equipment (e.g., to polish shoes	3	10	1	2	2	1	.	19
Execute things in a precise order	1	.	.	1	2	.	.	4
Personal care (e.g., never wash the hair)	2	4	1	1	1	.	.	9
To go to the toilet (e.g., a fixed number of times, in a fixed order)	2	2	.	1	.	.	.	5
Interpersonal rituals (e.g., to wish good luck to all of the team members)	5	11	.	.	.	.	3	19
To get up at a specific hour	.	.	1	.	.	.	.	1
To stay at home the day before the game	1	.	.	.	.	.	.	1
Prayers	1	4	.	.	.	.	.	5
Rituals during competition	3	34	.	18	10	2	1	57
Total	69	162	15	48	29	17	7	348
Ritual/Person	1.3	1.95	1	3	1.45	0.89	0.87	1.59

Level of competition

Effect of competition level on superstition. In order to test the hypothesis that level of competition will have an effect on superstition, we carried out a uni-variate analysis of variance with measures of superstition, except RC, as the dependent variables; and level of competition as the independent variable. There was no difference between competition level and the standardized score for superstition, $F(2, 215) = 0.82$, *ns*, number of rituals, $F(2,217) = 0.88$, *ns*, or degree of superstitious feeling, Item 1: $F(2, 217) = 0.03$, *ns*; Item 2: $F(2, 216) = 0.34$, *ns*.

A repeated-measures analysis of variance was conducted to determine the effect of competition level on ritual commitment (RC). The dependent variable was RC; the independent variables were competition level, importance and relative standing. Only participants reporting at least one SR were selected for this analysis ($n = 165$). A main effect for competition level was found, $F(2, 163) = 3.62$, $p < .05$, $\eta^2 = .03$. The LSD analysis of means comparisons showed that elite ($M = 3.18$) scored higher on RC, compared to regional ($M = 2.66$, $p < .05$) and national ($M = 2.62$, $p < .05$) competition levels. An interaction effect between relative standing and competition level was also found, $F(1, 165) = 13.91$, $p < .001$, $\eta^2 = .08$; (see Figure 1.). The analysis showed that elite sportsmen scored higher on RC when playing a superior opponent. However, this effect did not occur for the regional and national competition levels (see Figure 1.).

Figure 1. RC according to relative standing and competition level.

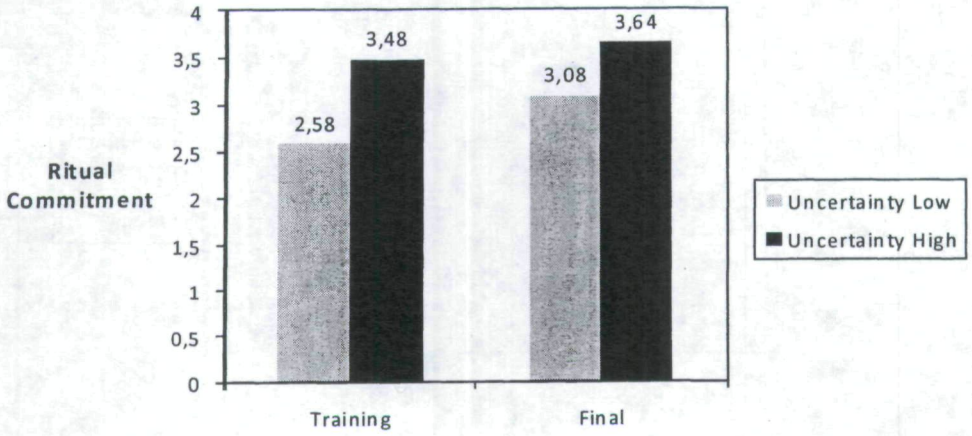


Effect of competition level on athletic identity. A univariate analysis of variance was conducted to determine the effect of competition level on athletic identity. The dependent variable was athletic identity and the independent variable was competition level. A main effect for competition level was found, $F(2, 207) = 17.75, p < .001$. The higher mean score for young elites ($M = 5.35$) showed them to have a stronger athletic identity than national ($M = 4.61, p < .001$) and regional athletes ($M = 4.40, p < .001$).

Effect of importance and relative standing on ritual commitment

A repeated-measures analysis of variance was conducted to determine the effects of importance and relative standing on RC. The dependent variable was RC; the independent factors were importance and relative standing. Only participants reporting at least one SR were selected for this analysis ($n = 165$). The results account for 60 % of overall variance. A main effect was found for importance, $F(1, 165) = 96.03, p < .001, \eta^2 = .37$, and relative standing, $F(1, 165) = 28.29, p < .001, \eta^2 = .15$. There was also an interaction effect between these two factors, $F(1, 165) = 13{,}91, p < .001, \eta^2 = .08$). RC was higher when importance was high ($M = 3.56, SD = 1.55$), rather than low ($M = 2.88, SD = 1.37$). RC was higher when playing a superior opponent ($M = 3.36, SD = 1.46$) than when playing an inferior one ($M = 3.03, SD = 1.47$). The interaction effect between the two independent variables is shown in Figure 2. The figure shows that the effect of relative standing decreased in the "playing a final game" situation (see Figure 2.).

Figure 2. Effect of importance and relative standing on RC.



Psychological tension

Psychological tension and superstition. A correlation analysis ($N = 219$) was conducted to examine the relationship between the tension felt before a match (the mean of the four vignettes) and superstition. Tension showed significant positive correlations with the standardized scores for superstition, $r = .28, p < .001$; the number of rituals, $r = .23, p < .001$; Item 1 of the degree of superstitious feeling, $r = .16, p < .01$; Item 2 of the degree of superstitious feeling, $r = .16, p < .05$; ritual commitment (the mean for the four situations), $r = .30, p < .001$. Tension was thus positively correlated with each of our measures of superstition.

Mediation of psychological tension on the relative standing and importance effect on RC. In order to test the mediation effect of tension, we used the Judd, Kenny, and McClelland (2001) method, as it allowed us to test mediation with a two-level within-subjects design. Only participants reporting at least one SR were selected for this analysis ($n = 165$).

The method proceeds through three stages. A main effect for the independent variable (IV) on the dependent variable (DV) must first be shown. In the second stage, regression analyses are carried out, for each level of the factor, with the mediator (M) as the IV. Then, regression analyses are conducted including difference of the two DV levels as dependent variable and the difference of the two M levels as predictor.

Step 1. The main effect for relative standing (IV) and importance (IV) on RC was demonstrated above.

The other two steps were carried out twice: once for the factor relative standing and again for the factor importance. Before carrying out these regression analyses, we created new variables with the mean for RC (DV) or tension (M) for each of the two levels of the factor relative standing (*Mean* between inferior opponent/training match and inferior opponent/final situation; *M* between superior opponent/training match and superior opponent/final situation) and the factor importance (*M* between inferior and superior opponent/training match; *M* between inferior and superior opponent/final situation).

Step 2. Regression analyses were then conducted for each measure of RC as a function of psychological tension. Results showed that psychological tension predicted RC both when relative standing was low, $\beta = .44$, $SE = .08$, $t(164) = 5.33, p < .001$, and when relative standing was high, $\beta = .26$, $SE = .08$, $t(164) = 3.36, p < .001$. For the importance factor, regression analyses showed that tension predicted RC both for the training match, $\beta = .32$, $SE = .07$, $t(164) = 4.64, p < .001$, and the final game, $\beta = .34$, $SE = .09$, $t(164) = 3.75, p < .001$.

Step 3. Finally, we analysed if the RC level difference was predicted by the tension level difference. For the factor relative standing, results showed that the RC difference score varied according to the tension level difference score, $\beta = .24$, $SE = .05$, $t(164) = 4.89, p < .001$. This result was similar for the factor importance, $\beta = .23$, $SE = .06$, $t(164) = 3.97, p < .001$.

Additional analyses: gender differences and superstition measures

A univariate analysis of variance was conducted to examine if athletic identity differed according to gender. No main effect for gender was found (Female, $M = 4.92$, $SD = 1.10$; Male, $M = 4.73$, $SD = 1.05$, $F(1, 218) = 1.24$, *ns*).

Main effects for gender were found on the standardized score for superstition, ($F(1, 217) = 8.08$, $p < .01$), and number of rituals, ($F(1, 218) = 8.32$, $p < .01$); but not on degree of superstition feeling (Item 1: $F(1, 217) = 3.40$, *ns*; Item 2: $F(1, 217) = 0.97$, *ns*). Analysis of means showed that women scored higher than men on the standardized score for superstition (Female, $M = 0.26$, $SD = .26$; Male, $M = -0.08$, $SD = -.08$), and had a higher number of rituals (Female, $M = 2.52$, $SD = 2.06$; Male $M = 1.68$, $SD = 1.73$).

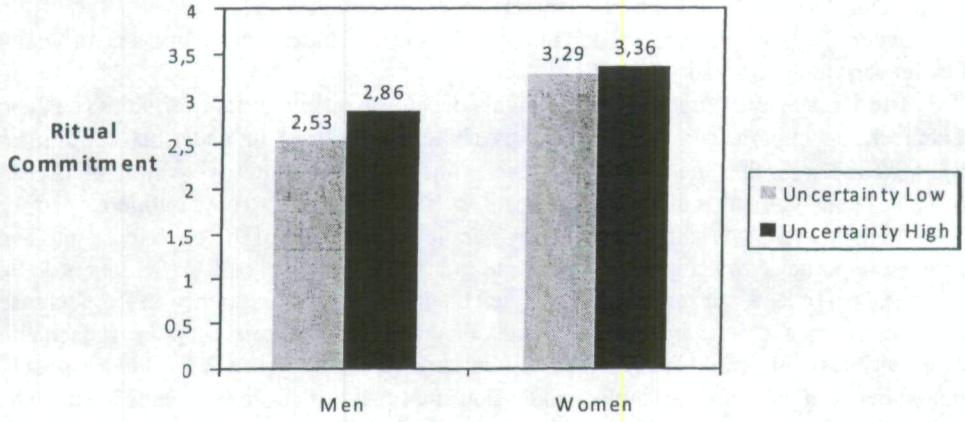
A univariate analysis of variance was then conducted to determine the effect of gender on superstition. The dependent variables were measures of superstition, except RC, with gender as the independent variable. A main effect for gender was found on the standardized score for superstition, $F(1, 217) = 8.08$, $p < .01$; number of rituals, $F(1, 218) = 8.32$, $p < .01$; but not on degree of superstitious feeling, Item 1: $F(1, 217) = 3{,}40$, *ns*; Item 2: $F(1, 217) = 0.97$, *ns*. Analysis of means showed that women scored higher than men on the standardized score for superstition (Female, $M = 0.26$, $SD = .26$; Male, $M = -0.08$, $SD = -.08$) and had a higher number of rituals (Female, $M = 2.52$, $SD = 2.06$; Male, $M = 1.68$, $SD = 1.73$).

A two-way repeated-measures analysis of variance was conducted to determine the effect of gender on ritual commitment (RC). The dependent variable was RC ; the independent variables were gender, importance and relative standing. A main effect for gender was found, $F(1, 217) = 7.79$, $p < .01$, $\eta^2 = .04$. The LSD analysis of means showed that women (M=3.32, SD=1.59) scored higher than men on RC ($M = 2.70$, $SD = 1.50$, $p < .01$). An interaction effect between gender and relative standing was also found ($F(1, 217) = 4.58$, $p < .05$, $\eta^2 = .02$, Figure 3.). Post-hoc analysis revealed that male athletes, but not female, scored higher on RC when playing a superior opponent.

We also investigated whether state of psychological tension acted as a mediator of the relationship between gender and RC, following Baron and Kenny's (1986) method. This method proceeds through four stages of regression analyses. First, the independent variable (IV) must be correlated with the dependent variable (DV). Second, the IV must be correlated with the mediator (M). Third, a correlation between the M and the DV must be shown while controlling the effect of the IV on the DV. Fourth, the procedures can only be achieved if, while controlling for M, the effect of the IV on the DV is zero.

The IV was gender, with ritual commitment (the mean for the four vignettes) as the DV and psychological tension (the mean for the four vignettes) as the M. Only participants reporting at least one SR were selected for this analysis ($n = 165$).

Figure 3. RC according to relative standing and gender.



Results showed that (1) gender predicted psychological tension, $\beta = .51$, SE = .20, $t(164) = 2.58$, $p < .01$; (2) gender predicted ritual commitment, $\beta = .48$, SE = .23, $t(164) = 2.11$, $p < .05$; (3) psychological tension predicted ritual commitment while controlling the effect of gender on ritual commitment, $\beta = .37$, SE = .09, $t(164) = 3.87$, $p < .001$ and (4) gender did not predict ritual commitment while controlling for tension, $\beta = .31$, SE = .22, $t(164) = 1.38$, *ns*.

Discussion

The present investigation examined the effects of individual and situational variables on non professional athletes' sport superstition behaviours in seven different sports and at three competition levels. An index of superstition was calculated from three separate measures rather than from a single questionnaire. Variables were manipulated through sports scenarios in order to examine the relationship between superstition and psychological tension/athletic identity according to different competition levels. The results provided good evidence in support of most of our hypotheses.

First, as in professional or semi-professional athletes (e.g., Todd & Brown, 2003), we found that SRs were practised by non-professional athletes. Interestingly, however, athletes who reported practicing at least one superstitious ritual did not report feeling superstitious,

which may reflect the fact that it is generally considered as pejorative (Johoda, 1969; Samuelsen, 1957). According to this line of reasoning, sportsmen who engage in SRs will not necessarily judge themselves to be superstitious (Johoda, 1969; Samuelsen, 1957).

Second, SRs varied in relation to individual variables. Indeed, we found a positive relation between athletic identity and SRs.

Third, intensity of superstition was highly dependent on situational variables (i.e., level of competition, importance and uncertainty, psychological tension). Indeed, ritual commitment (RC) was higher for the elite competition level probably because elites were more involved in their sport than national and regional competitors (i.e., they had a stronger athletic identity). Like other situational variables, uncertainty (paralleling the level of the opponent), and even more the importance of competition, appeared to increase the level of RC (Schippers & Van Lange, 2006). Indeed, our results indicated that the influence of uncertainty on RC decreased dramatically when athletes imagined playing a final rather than a training game, thus making uncertainty less influential on RC than the importance of the game. We found a positive relation between pre-game psychological tension and superstition. These results led us to test the idea that psychological tension mediates the effect of importance and uncertainty on RC, which was confirmed by our within-subjects mediation analyses (according to the method developed by Judd and al., 2001). These results are compatible with those of Schippers and Van Lange (2006) and also reinforce the idea that SRs exert a « Psychological Placebo » effect on sport performance (Neil, 1980).

Fourth, according to additional analyses, women were more prone to use superstitious behaviours and had a higher need to engage in ritual. These results are in accordance with previous research that found a greater amount of superstitious behaviours among female athletes (Bleak & Frederik, 1998; Buhrmann & Zaugg, 1981; Gregory & Petrie, 1974). Furthermore, analyses revealed that female athletes experience more pre-game tension and that this subjective state of psychological tension mediates the effect of gender on RC. These results are in accordance with other studies, using self-reports (e.g.,?Filaire, Ferran, & Verger, 2009) or objective measures for stress (e.g., blood cortisol response; Obminski, 2008), that reveal higher pre-competitive stress among females. A discussion of the processes involved in gender difference on pre-competitive anxiety is beyond the scope of this article. It is noteworthy, however, that we did not find gender differences to be related to level of competition or athletic identity. According to our results, women exhibit more superstitious behaviours because of a higher subjective feeling of pre-competitive psychological tension.

These results have major implications for sport psychologists and trainers: (a) SRs are signs of high sport involvement; (b) for some athletes, especially women, pre-game preparation is of great importance; (c) consequently, SRs would be as functional as usual pre-game

routines. Sports psychologists and coaches should thus not only pay attention to the occurrence and development of superstition in athletes, but also encourage athletes to put these behaviours to optimal use during the pre-game preparation. For example, in an interview (Stafford, 2009), Miles Maclagan, the trainer of the British tennis player Andy Murray, reported making use of SRs. For example, he always wants Murray to practice on court number three before his first match. Although Murray found his coach a little weird, he admitted that mind games enhance his pre-game concentration and supports using psychology as an "on-court weapon" (Stafford, 2009).

The present research makes unique contributions to the existing literature because (1) we used a standardized global score of superstition rather than a single questionnaire; (2) we emphasized the high frequency of SRs in non-professional athletes; (3) we found that RC was greater in elites than in national and regional players; (4) we carried out additional analyses which revealed a gender difference on both pre-competitive subjective state of tension and superstition measures.

Some limitations of the present study should be noted however. First, for two sport teams ($n = 20$), the trainer himself was in charge of collecting the questionnaires, which could have influenced sportsmen's responses. Indeed, it is likely that some responses were an underestimation of the real situation. Second, a greater number of participants would have been desirable to make comparisons between sports at different levels of competition. Third, although examination of our manipulation checks revealed that participants were normally capable of imagining each of the four pre-competitive scenarios, the vignette methodology does have weaknesses. The distribution of questionnaires could take place immediately before, during or after real sports competition situations. The use of mental imagery techniques or video might also be useful. Fourth, we used the same methodology as Schippers and Van Lange (2006) to examine pre-competitive state of psychological tension. However, this variable should be examined by more reliable self-report measures (e.g., Competitive State Anxiety Inventory-2, CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990). Pre-competitive tension should also be assessed by objective measures (e.g., heart rate, skin conductance, cortisol response). Fifth, although we found a relation between superstition and tension, additional investigations are necessary to demonstrate that SRs represent an effective way to cope with psychological tension.

To summarize, our results provide empirical support for the idea that SRs could be considered as a means to control pre-game tension. Thus, although the enactment of sport SRs may seem somewhat irrational to some observers, we view them as an inherent part of mental and physical preparation for sports competition, that is to say, in situations with outcomes perceived by sportsmen as both uncertain and important.

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