

THE RELATIONSHIPS BETWEEN PRE-COMPETITION ANXIETY, SELF-EFFICACY, AND FEAR OF INJURY IN ELITE TEAMGYM ATHLETES

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Abstract:

The aim of the present study was to investigate the relationship between state anxiety, self-efficacy and fear of injury in national and European TeamGym competitions. A cross-sectional study design was employed using measures of anxiety, self-efficacy and fear of injury. Fourteen (seven men and seven women) Italian TeamGym athletes (age 26±3 years) filled in the *Self-efficacy for Physical Abilities Scale* and the *Gymnastics Fear Inventory* during their pre-competitive period and the *State Anxiety Inventory* immediately before every competition. The competition level showed a positive effect on state anxiety, with the highest values emerging during the European Championship. Fear of injury and self-efficacy explained 43% and 68% of the variance in an athlete's anxiety, respectively. The present findings indicate that self-efficacy dampens the anxiety level of TeamGym athletes and mediates the effects of fear of injury on anxiety prior to their competition, with athletes who experience less fear of being injured and are more confident in their technical abilities and therefore show a lesser degree of pre-competitive anxiety.

Key words: *anxiety, self-efficacy, fear of injury, performance*

Introduction

Anxiety is the psychological factor most commonly linked to the highest levels of worry (Hanton, Thomas, & Maynard, 2004; Martinent & Ferrand, 2007) and sporting injuries, and can be considered one critical psychological characteristic for gymnastics (Waples, 2005; Cheung & Lo, 1996; Cartoni, Minganti, & Zelli, 2005). Elite gymnasts were found to have the highest anxiety level when compared to elite athletes from different sports (Kolt, & Kirby, 1994). According to Spielberger (1983), anxiety is a response to a perceived threat in four domains: physical harm (injury), loss of self-esteem (failure), social evaluation (expectations of others), and uncertainty. Similar to artistic gymnastics, in TeamGym two of these four features eliciting anxiety are common: the fear of injury and that of failure (Giotis, & Nilsson, 2006; Harringe, Renstrom, & Werner, 2007). With respect to artistic gymnastics, however, the exercises performed at the TeamGym apparatuses (e.g. tumbling track and trampette) are more spectacular but they could possibly lead to a higher number of severe injuries during the take-off and landing phases (Harringe, et al., 2007). In

fact, Bak, Kalms, Olesen, and Jorgensen (1994) reported a significantly higher proportion of overuse injuries in TeamGym gymnasts (mainly tumblers) compared with other categories of gymnasts. This may represent a stronger source of anxiety that is unique to TeamGym athletes. Most of the injuries occur during TeamGym practice (81%), whereas competitions and exhibitions account for 12% and 7% of total injury rates, respectively (Harringe, Lindblad, & Werner, 2004). Furthermore, more than 50% of athletes tend to practice and even compete despite injury symptoms, which could increase the risk of reinjury (Harringe, et al., 2004). In particular, the most dangerous apparatus is the tumbling track (52% of injuries), and the least dangerous (9.5% of injuries) is the floor (Harringe, et al., 2007). Athletes clearly perceive the risk of injury also in the absence of personal experience, due to vicarious experiences with other injured athletes and comments regarding injury from coaches (Short, Reuter, Brandt, Short & Kontos, 2004). This perception of real risk or presence of injuries might increase athletes' fear of injury (Short, et al., 2004), which can be defined as the unpleasant feeling of apprehension or distress caused by the anticipation of physical damage to

the body or a part of the body (Short, et al., 2004). Being a source of common worry, fear of injury can produce a detrimental influence on an athlete's performance and could be a possible reason to abandon the competition (Magyar & Chase, 1996; Cartoni, et al., 2005; Giotis & Nilsson, 2006). Fear of injury can even lead to mental blockings and refusals to execute specific technical movements (Cartoni, et al., 2005; Marini, Sgambati, Barni, Piazza, & Monaci, 2008). In particular, blockings most frequently occur in the tumbling routine and in the rotating backwards vaults (Giotis, 2007), hence tumbling track and trampette turned out to be the apparatuses that athletes felt as the most fearful (Giotis & Nilsson, 2006). Understandably, the perception of injury risks can lead to an athlete's perception of threat when competing or learning a new skill (Magyar & Chase, 1996; Cartoni, et al., 2005). Threat is certainly perceived in several sports such as gymnastics or TeamGym in which athletes are required to perform movements on the ground and on apparatus that are a continual challenge to the force of gravity; gymnasts are well aware of the difference between successful and inaccurate execution that can lead them to faults and possible injuries (Martinent & Ferrand, 2007; Martin, Polster, Jackson, Greenleaf, & Jones, 2008). When there is fear and a potential threat, there is anxiety (Cerin, 2003). In fact, anxiety is the psychological factor most commonly linked to sport injuries, and this could explain the higher anxiety levels of elite gymnasts compared to elite athletes engaged in other sports (Waples, 2005).

Anxiety is a complex psychological phenomenon and probably one of the most difficult emotions to define: Cheng, Hardy and Markland (2009) generically referred to performance anxiety as "an unpleasant psychology state in reaction to a perceived threat". Whereas some theorists view anxiety as a unitary emotion triggered by stimuli perceived to be threatening (Spielberger, 1983), more differentiated models sustained that the phenomenology of anxiety must be considered in its relationships with other emotions, such as fear, stress, anger, tension, self-efficacy and even excitement (Hanton, et al., 2004). The main theorists of emotions and anxiety in sports have in fact postulated, from an ideographic perspective, that both positive and negative emotions may produce functional and/or dysfunctional effects on sports performance and outcomes (Hanin, 2010). Nevertheless, theorists concur that an emotional state can be categorized as "anxiety" only if it involves an element of perceived threat. When an athlete perceives the circumstance as threatening (i.e. competition), he/she can experience a momentarily state anxiety that is conceptualized as a transitory condition of unpleasant, consciously perceived feelings of tension, apprehension, and nervousness

that varies in intensity and fluctuates in time (Spielberger, 1983). Otherwise, the individual's general tendency to be upset in stressful situations or the average level of anxiety over time has been defined as trait anxiety.

Anxiety has traditionally been considered detrimental to performance (Woodman & Hardy, 2003; Martinent & Ferrand, 2007), yet a growing body of literature suggests that competitive state anxiety has both facilitative and debilitating functions (Hanin, 1989, 2010; Murray & Janelle, 2003; Marchant & Morris, 2004; Cottyn, De Clercq, Pannier, Crombez, & Lenoir, 2006; Mellalieu, Hanton, & Fletcher, 2009; Woodman & Hardy, 2003). Furthermore, performance can be affected by several factors, such as skill level (Bejek & Hagtvet, 1996; Hanton, et al., 2004; Waples, 2005), competitiveness (Mellalieu, Hanton, & O'Brien, 2004), sporting performance (Woodman & Hardy, 2003), gender (Cartoni, et al., 2005; Woodman & Hardy, 2003), and type of sport (Mellalieu, et al., 2004).

Athletes can experience anxiety and fear of injury when they lack confidence in their ability to perform successfully in a threatening or taxing situation; individuals, therefore, experience anxiety when they believe themselves to be incapable of managing potentially detrimental events (Bandura, 1997; Chase, Magyar, & Drake, 2005). According to social cognitive theory (Bandura, 1997), self-efficacy refers to the individual's level of confidence in performing a given activity or behaviour, and state anxiety is typically a function of the confidence with which individuals approach activities and tasks; increases in self-efficacy act as a mechanism for anxiety reduction and lower biological stress reactions. High self-confidence, self-efficacy, and positive thinking can, in some ways, control or dismiss the apprehensive emotions that account for anxiety (Hardy, 1996; Bandura, 1997; Martinent & Ferrand, 2007). Conversely, a weaker sense of efficacy arouses anxiety as well as decreases achievement. In particular, low levels of self-efficacy are generally associated with poor performances and high levels to better performances (Bandura, 1997). Furthermore, high self-efficacy associated to low anxiety contributes to better performances in competition (Witting, Duncan, & Schurr, 1987), whereas low self-efficacy associated to high anxiety is related to depression and low self-esteem (Scholz, Gutierrez-Dona, & Schwarzer, 2002).

Considering the high psychological demands of TeamGym performance, it is possible to hypothesize that competitive situations are highly stressful, influencing the athlete's anxiety, fear of injury, and self-efficacy, especially when the outcome is important and uncertain (Eubank & Collins, 2000; Murray & Janelle, 2003). Thus the aim of the present study was to evaluate the relationship among anxiety, fear of injury and self-efficacy

constructs with respect to different competition levels.

We assumed that state anxiety is an unpleasant and transitory state that differs in threat across many different situations (Spielberger, 1983). Thus, it was hypothesized that state anxiety could change in relation to the level of the competition (national versus international). To the authors' knowledge there is a paucity of research that examined the relationship between state anxiety and other psychological factors (i.e. self-efficacy and fear of injury) in different competition settings. Therefore, in line with Bandura's theory (1997) and with previous studies on artistic gymnastics (Cartoni, et al., 2005), it was predicted that a high sense of self-efficacy might protect TeamGym athletes from pre-competitive anxiety and from experiencing fear of physical injury.

Methods

TeamGym competition

Originating from Scandinavia, in 1996 the Union Europeenne de Gymnastique organized the first European TeamGym Championship in Finland. Since then, international competitions take place every two years, whereas national competitions are organized on a yearly basis. National TeamGym Championships include two qualifying and final competitions to determine the national team for the European Championship. This sport differs from artistic gymnastics because it includes 6-12 members in female, male, and mixed teams and exhibits gymnastic skills in three different events: floor, tumbling and trampette. All the team members perform simultaneously a three-minute floor exercise, mainly consisting of choreographic elements such as jumps/leaps, balances, and body waves. It requires skill mastery and synchronization as well as expressive presentation. The tumbling routine provides three acrobatic rounds and each series consists of at least three different acrobatic elements, performed on a long tumbling lane. Only six members from the team can be chosen for each round and they do not have to be the same every time (Union Europeenne de Gymnastique, 2007); they have to perform acrobatic elements consecutively and close to each other; the routine has to be done with music and it should last about 2:45 minutes. Also, the trampette program provides three rounds of different somersaults to be performed in 2:45 minutes; at least one run is done using a vaulting apparatus. The team receives a total score for each event.

Participants

Prior to participating in this study, 14 Italian elite TeamGym athletes (age 26±3 years) of the senior Italian mixed team (seven males and seven

females) provided a written informed consent. All athletes had at least five years of previous training experience (consisting of 2.5-hour sessions, three times per week), and they participated in the qualifying (i.e. First and Second) and Final phase of the Italian TeamGym Championship (IF), and in the qualifying phase of the European Championship (EC) in the same team with the same program. Considering that the TeamGym Code of Points (Union Europeenne de Gymnastique, 2007) establishes a maximum difficulty score of 2.5 points for floor exercise, and 4.00 points for tumbling and trampette performances, the athlete's competition program included elements ranging from 3.20 to 4.00 points for tumbling, from 2.80 to 3.70 points for trampette; and 2.10 points for the floor routine.

Instrumentation

The Demographic Questionnaire

Each participant was asked to complete a demographic questionnaire including data on gender, age, and years of experience in TeamGym competition. Furthermore, the questionnaire ascertained the athlete's perceptions of the most difficult and appreciated apparatus, as well as the occurrence of previous injuries during tumbling, trampette, and floor exercises.

The Gymnastics Fear Inventory

Gymnastics Fear Inventory (Cartoni, et al., 2005) was used to assess the athletes' fear of getting injured during exercise. This instrument consists of five questions on a four-point Likert scale, ranging from *never* (1) to *very much* (4). The items are: (1) "Does it occur that you think about injuries prior to a movement?", (2) "Do you think of being a fearful athlete?", (3) "Are you afraid of getting injured?", (4) "Are you afraid of a new skill?", (5) "Are you afraid of a skill you are familiar with?". The total score is obtained by adding the scores across the five items giving a possible range from 5 to 20. A .80 Cronbach's alpha coefficient was obtained, indicating a good internal consistency of the questionnaire.

The Self-efficacy for Physical Abilities Questionnaire

The Self-efficacy for Physical Abilities Questionnaire (SEM-S) (Bortoli & Robazza, 1996, cited in Barberini, Dotto, Bortoli, & Robazza, 1996) was used to measure the athletes' view of their own physical abilities. It comprises ten items: four positive (e.g. "I have good control of my movements in all situations"), three negative (e.g. "I have little confidence in my motor abilities") and three for "a demanding situation" (e.g. "I can quickly resolve the problems that I may encounter during competitions") on a five-point Likert scale ranging from *not at all* (1) to *quite a lot* (5). The total score is obtained by adding the scores across the items,

giving a range from 10 to 50. A .77 Cronbach alpha coefficient was obtained, indicating a satisfactory internal consistency of this measurement tool.

The State-Trait Anxiety Inventory

The Italian version of the *State-Trait Anxiety Inventory* (STAI-Y), form Y1 (Spielberger, 1983; Lazzari & Pancheri, 1980) was used to evaluate the athletes' state anxiety prior to competitions. It comprises 20 items, ten anxiety-absent (e.g. "I feel calm", "I feel secure"), and ten anxiety-present negative items (e.g. "I feel tense", "I feel nervous") which require one to describe the intensity of a feeling at a particular moment using the following 4-point scale: *not at all* (1); *somewhat* (2); *moderately so* (3); *very much so* (4). The total score can range from 20 to 80 points. A .94 Cronbach's alpha coefficient was obtained, indicating a very good internal consistency of this questionnaire.

Procedure

The institutional review board for use of human subjects approved this study.

To investigate the possible relationship between anxiety, fear of injury and self-efficacy related to different levels of competition, the inclusion criteria were: 1) older than 16 years (Union Europeenne de Gymnastique, 2007); 2) belonging to the same team; 3) obtained the first position in the 2007 Italian TeamGym Championship (Union Europeenne de Gymnastique, 2007); 4) participated in the 2008 national and European competitions, presenting the same exercise program.

Participants individually completed the questionnaires. An investigator was present to provide assistance if required. After ensuring the confidentiality of the responses, the subjects were assured that there were no right or wrong answers. Considering that self-efficacy and fear of injury are relatively stable constructs (Bandura, 1997), the *Fear Inventory* and the *Self-Efficacy for Physical Abilities* were administered before a training session of the pre-competitive period. Due to the strong dependence of anxiety on the actual competitive situation (Murray & Janelle, 2003), the STAI-Y1 was administered after the warm-up sessions and immediately prior to the beginning of each of the four competitions under examination.

Data analysis

After selecting a .05 level of confidence, data analyses were conducted using the Statistical Package for the Social Science, version 17.0 (SPSS, Chicago, IL). All data are presented as mean values and standard deviations. Variables were tested for the hypothesis of a normal distribution with the Kolmogorov test. The possible presence of gender differences in state anxiety, self-efficacy, and fear

of injury was tested with a preliminary analysis. Analysis of variance (ANOVA) for repeated measures was conducted to evaluate the differences between competitions both for anxiety levels, and for ten anxiety-absent and for ten anxiety-present negative items, separately. *Post-hoc* comparisons were performed by means of Fisher's LSD, and the Bonferroni correction was applied in the case of multiple comparisons. To provide a meaningful analysis for significant comparison of small groups, the effect size (eta square) was calculated. The intra-individual variability in state anxiety levels between competitions was calculated too; the median of the standard deviations of athletes' anxiety intensity between the four competition levels was considered as the cut off to determine the low and high variability (\leq median value=low variability; $>$ median value=high variability). Independent sample *t*-tests were applied to verify whether the low and high variability groups differed in trait anxiety, self-efficacy and fear of injury.

The Pearson correlation coefficient was calculated to determine the extent and direction of linear relationships between variables. The 95% confidence intervals around the correlation coefficients were calculated.

The mediator model of Baron and Kenny (1986) was used to assess the effect of self-efficacy on the relationship between state anxiety and fear of injury. Three linear regression analyses were conducted to test the conditions which must be met to consider a variable as a mediator (Baron & Kenny, 1986). The first and the second ones tested whether fear of injury predicted aspects of state anxiety and the hypothesized mediator, respectively. The last analysis included the fear of injury and the mediator variable as predictors of state anxiety. If the inclusion of the mediator variable decreases to a non-significant level of associations between the predictor and the outcome variables, the data suggest a full mediation model (Baron & Kenny, 1986). Furthermore, indirect effects from fear of injury through the mediator on the dependent variables were tested by using the Sobel Test (*z*), with *z* value >1.96 indicating a significant effect at the $p<.005$ level (Preacher & Hayes, 2004).

Results

No significant difference was found for gender in the levels of anxiety, self-efficacy and fear of injury. Thus, data were pooled for further analyses. Only 43% of the TeamGym athletes reported no previous injury. Athletes reported only tumbling (57%) and trampette (43%) as the most fearful events, with 63% and 37% of the occurrence of previous injuries, respectively. Most frequently they preferred tumbling (72%) with respect to trampette (14%) and floor (14%).

TeamGym athletes showed high levels of self-efficacy (36.2 ± 5.4 points) and average levels of fear of injury ($M=9.4 \pm 2.6$ points) referred to the score range of the questionnaires, with significantly ($F_{(1,13)}=9.27$; $p<.05$; ES: .37) higher (10.6 ± 2 points) fear values for those who reported previous injuries with respect to those who had experienced no previous injury (8.2 ± 1.6 points). Prior to their competition, the athletes showed average levels of state anxiety (First=mean 44, $s=2.3$ points; Second=mean 40.3, $s=1.9$ points; IC=mean 43.3, $s=1.8$ points; EC=mean 48.5, $s=2.1$ points), with significant differences between competitions ($F_{(3,40)}=14.80$; $p=.001$, ES: .26-.67). *Post-hoc* analysis showed higher anxiety levels before European competitions as compared to national ones (see Figure 1). No difference emerged between the first qualifying and the final Italian competitions. No differences emerged in anxiety-absent and anxiety-present items separately between competitions, either.

As concerns the intra-individual variability in anxiety levels, the median standard deviation used as a cut-off value was equal to 3. Thus, athletes with a standard deviation lower than/equal to vs. greater than 3 were classified as low vs. high

variability individuals, respectively. Results indicated that the athletes in the high-variability group ($n=5$) scored significantly higher ($p<.04$) on trait anxiety ($M=48 \pm 3.7$ points) and lower ($p<.01$) on self-efficacy values ($M=30.6 \pm 1.9$ points) than the athletes in the low variability group ($n=9$; $M=33 \pm 8$ points; $M=39.8 \pm 3$ points). No intra-individual differences emerged in fear of injuries.

Table 1 shows the correlation coefficients and p values between anxiety, fear of injury and self-efficacy levels. Fear of injuries was negatively correlated with self-efficacy ($p=.032$). Anxiety was positively correlated with fear of physical injuries and negatively with physical self-efficacy. Furthermore, an in-depth analysis of the correlation between anxiety and self-efficacy was conducted after computing separate anxiety indices from the ten anxiety-absent and ten anxiety-negative items. Self-efficacy results positively correlated ($p=.038$) with ten anxiety-absent items only.

Self-efficacy (see Figure 2) met each of the conditions necessary to be tested as a mediator of the effect of fear of injury on the perceived state anxiety (Baron & Kenny, 1986); in TeamGym athletes self-efficacy was denoted as a full mediator ($\text{Beta}=-1.202$, $z=-2.199$, $p<.05$).

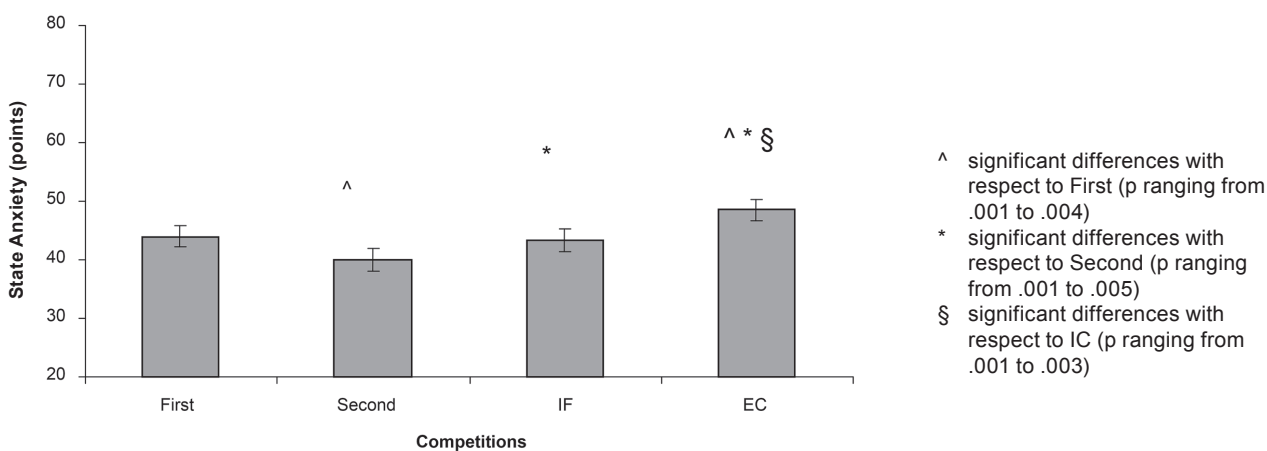
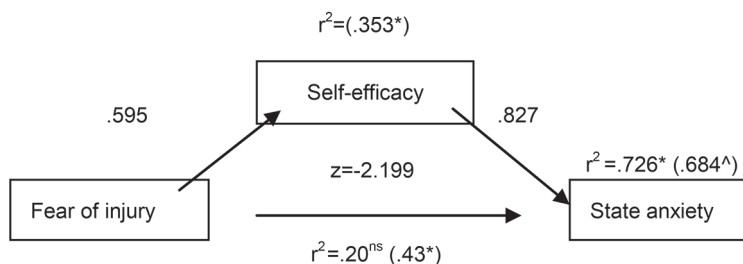


Figure 1. Anxiety levels during the First Italian Qualifying (First), Second Italian Qualifying (Second), Italian Final Championship (IF), and European Qualifying Championship (EC) competitions.

Table 1. Correlations between anxiety levels during the four TeamGym official competitions (i.e. First Italian Qualifying, Second Italian Qualifying, Italian Final, and European Qualifying), Self-efficacy and Fear of Injury

	1 st Italian Qualifying	2 nd Italian Qualifying	Italian Final	European Qualifying	Self-efficacy	Fear of Injury
First Italian Qualifying	1.00	.954($p<.0001$)	.975($p<.0001$)	.739($p=.004$)	-.507($p=.077$)	.229($p=.451$)
Second Italian Qualifying		1.00	.889($p<.0001$)	.722($p=.005$)	-.562($p=.046$)	.296($p=.326$)
Italian Final			1.00	.750($p=.003$)	-.556($p=.049$)	.175($p=.568$)
European Qualifying				1.00	-.827($p<.0001$)	.656($p=.015$)
Self-efficacy					1.00	-.595($p=.032$)
Fear of Injury						1.00



Sobel values (z) and square correlations values (r^2) are reported, with initial r^2 in parentheses.

* $p < .05$, ^A $p < .01$, ^{ns} non-significant.

Figure 2. Mediator model for associations between fear of injury and state anxiety as mediated by self-efficacy.

Discussion and conclusions

This study contributes to the understanding of the relationship between anxiety, self-efficacy and fear of injury in TeamGym competitors. The present findings indicate that self-efficacy moderates the anxiety level in elite TeamGym athletes prior to their competition, especially when they are more confident in their technical abilities and experience, then fear of being injured is low. A good confidence in their high levels of technical executions provides elite athletes with a perception of behavioral control, which contributes to coping with fearful and anxious competitive situations (Witting, et al., 1987; Scholz, et al., 2002). In fact, TeamGym athletes were not so afraid of being injured, despite previous negative experiences and well-documented sport-related injury rates (Harringe, et al., 2007; Kolt & Kirkby, 1994). It is possible to speculate that this sport tends to select athletes who are willing to overcome these risks (Cartoni, et al., 2005). In fact, the need for perfect body control during acrobatic elements is obvious for TeamGym athletes, who repeat their routines hundreds of times to achieve fine automatic motor control programs that can, nevertheless, be taken for granted (Galley & Forster, 1987). Thus, athletes are well aware that the risk of injury is always forthcoming and are used to coping with it especially when enhancing the difficulty level of their performance which increases the possibility of reinjury (Harringe, et al., 2004).

Despite athletes reported the highest occurrence rate of past injuries and the present fear of potential danger when performing tumbling exercises, this event has been reported as the preferred one. Because the TeamGym athletes were ex-elite artistic gymnasts, it could be hypothesized that tumbling performances resemble technical skills experienced during their gymnastics career. Conversely, the least preferred event is the floor, which mainly requires artistic movements and transitions with a few, simple, and not dangerous enough acrobatic elements (Union Europeenne de Gymnastique, 2007). The present findings substantiate that previous injury experiences significantly increase

the fear levels in TeamGym athletes, but it does not influence their predilection for this event.

On average, the TeamGym athletes showed lower anxiety levels than those reported for artistic gymnasts (Cheung & Lo, 1996; Bejek & Hagtvet, 1996). These results have to be interpreted in light of the age differences between the groups (Woodman & Hardy, 2003). However, the relevance of the event probably explains the differences in pre-competitive anxiety (Eubank & Collins, 2000; Murray & Janelle, 2003). At a national level, higher anxiety has been found for the first qualifying and the final competitions, respectively due to the unknown level of the opponents and the high expectancy for the European qualification (Mellalieu, et al., 2009). As expected during the European Championship, the athletes showed the highest anxiety levels due to the high relevance of the event, the high quality level of the opponents, and the high expectations of performance (Hanton, et al., 2004; Mellalieu, et al., 2004). TeamGym athletes exhibited intra-individual variability in state anxiety and self-efficacy scores. The findings are in accordance with previous results proposing that considerable variability in pre-competition anxiety should be observed in similarly skilled athletes competing in the same sport (Hanin, 1989; Hassmen, Raglin, & Lundqvist, 2004). The finding that athletes displaying a lower variability in pre-competitive anxiety scored higher in self-efficacy and lower in trait anxiety than those displaying higher variability suggests that confidence in one's own capacities and positive thoughts and feelings reduce fluctuation of state responses to the perceived threatening situations. It may be speculated that self-confident athletes, being emotionally less responsive to situational characteristics as the importance of the event, might show a more stable performance outcome across competition levels. Nevertheless, in TeamGym competitions the only available result is the average value of the individual performances within the team. Thus, we can neither evaluate the extent to which state anxiety may affect the individual performance outcomes, nor estimate

whether more stable anxiety levels translate in better performance outcomes within the individual success-failure performance range (Hanin, 2010).

Unfortunately, considering the unidimensional interpretation of the STAI-state anxiety as a unitary emotion, the present findings may explain only partially, for example, similar or different inter- and intra-individual intensity levels of competition anxiety (Cerin, 2003). The reason for using a general and unidimensional measure of anxiety relies upon the statement that the STAI is specific for a situational context of the pre-competitive state (Spielberger, 1983; Cox, Russel, & Robb, 1998; Wilson, Raglin, & Pritchard, 2002) and that adult athletes are more accurate in predicting pre-competition anxiety using the STAI compared with other anxiety questionnaires (i.e. Competitive State Anxiety Inventory-2; CSAI-2) (Raglin & Turner 1993). Furthermore, from a practical viewpoint, we have to remind ourselves that the administration of self-reported questionnaires immediately prior to competition may be perceived as intrusive by the athlete (Wilson, Raglin, & Harger, 2000). For this reason, for example, Cox and colleagues (1998) developed a short form of one of the most popular anxiety inventory, the CSAI-2; its length was considered far too long to use as a nonintrusive measure of anxiety immediately prior to performance. However, the STAI is a relatively short questionnaire that the interviewed TeamGym athletes declared as "not intrusive". From a theoretical point of view, despite the contention that the Spielberger's questionnaire may not be considered a "proper" measure of anxiety (Cerin, 2003), previous findings (De Pero, Capranica, & Piacentini, 2011) showed that the unidimensional measure of anxiety was a better predictor of TeamGym performance, with respect to the multidimensional one. In particular, it was outlined that the state anxiety inventory seemed to better predict how athletes appraise a competition as a source of threat with respect to somatic and cognitive anxiety and self-confidence (Cerin, 2003), and how this appraisal could really affect competition and the athletes' failures.

Athletes' subjective emotional responses to stressful and demanding competitive settings are dynamic and complex (Cerin, 2003) and cannot be limited to the presence or lack of anxiety symptoms.

In this study, the correlation and regression findings suggested that self-efficacy may dampen state anxiety, being specifically linked to a higher level of positive emotions. This is in line with the notion that self-efficacy exerts strong influence on situational appraisals and in the way in which an individual responds to these appraisals such as anxiety (Nicholls, Polman, & Levy, 2010). The results of the mediation analysis reinforce the notion

that self-efficacy is a positive cognitive mechanism mediating behavioral outcomes (Bandura, 1997; Martinent & Ferrand, 2007). Specifically, we could demonstrate that the fear of injury inherent in sports such as TeamGym is not a direct determinant of pre-competitive anxiety, since there is a mediational chain linking lower fear of injury to higher physical self-efficacy which, in turn, leads to higher state anxiety before competition.

The athletes' capability to deal with environmental demands is such a crucial factor (Woodman & Hardy, 2003) that it could be considered one of the parameters for selecting talented athletes (Bejek & Hagtvet, 1996; Waples, 2005) and a useful predictor of gymnastics performance (Weiss, Wiese, & Klint, 1989).

The present findings should be interpreted with some caution, because of the relatively small sample size. However, research on high-level performers will necessarily imply small sample sizes. Thus, future studies are needed to provide information regarding, for example, the relationship between TeamGym performances and the psychological profiles of athletes competing at different levels (i.e. novice and elite). Furthermore, the results highlight the need to perform further research on the psychological determinants of anxiety in less investigated sports that have unique characteristics distinguishing them from more commonly studied sports. TeamGym is a closed-skills sport that, similar to artistic gymnastics, does not involve social interaction and interdependence for a common performance outcome as in strategic sports, but in contrast to gymnastics, team building is necessary to synchronize individual performances. Therefore, it will be interesting to perform further research on the role self-efficacy plays in reducing intrapersonal, interpersonal and intra-group anxiety (Hanin, 1989) in TeamGym as compared to other team sport settings characterized by situational uncertainty and time pressure that are absent from TeamGym.

Coaches, sport psychologists and therapists could benefit from the information regarding psychological responses of athletes in competitive settings. In particular, according to the psychological needs of their athletes, coaches could design and implement their training programs to prevent injuries, athlete's burnout, mental blocking, or negative stress responses to competition (Cremades & Wiggings, 2008; Cartoni, et al., 2005; Giotis, 2007). Furthermore, sport psychologists could develop and implement systematic psychological training and counseling for TeamGym athletes based on the relationship between anxiety, self-efficacy and fear of injury. Finally, therapists could plan reinjury prevention programs for this population.

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POVEZANOST PREDNATJECATELJSKE ANKSIOZNOSTI, SAMOUČINKOVITOSTI I STRAHA OD OZLJEĐIVANJA U VRHUNSKIH NATJECATELJA GRUPNE GIMNASTIKE (TEAMGYM)

Cilj je ovog istraživanja bio istražiti povezanost između stanja anksioznosti, samoučinkovitosti i straha od ozljeđivanja u gimnastičara koji nastupaju na nacionalnim i europskim natjecanjima u grupnoj gimnastici (TeamGym). Provedeno je transverzalno istraživanje korištenjem mjera anksioznosti, samoučinkovitosti i straha od ozljeđivanja. Četrnaest talijanskih natjecatelja u grupnoj gimnastici (7 muškaraca i 7 žena) u dobi od 26 ± 3 godine testirano je sljedećim upitnicima: *Self-efficacy for Physical Abilities Scale* te *Gymnastics Fear Inventory*, tijekom prednatjecateljskog perioda, te State Anxiety Inventory neposredno prije svakog natjecanja. Pokazalo se da je razina natjecanja pozitivno povezana sa stanjem anksioznosti s najvišim vrijedno-

stima zabilježenima tijekom europskog prvenstva. Pomoću *straha od ozljeđivanja* i *samoučinkovitosti* objašnjeno je ukupno 43% odnosno 68% varijance sportaševih stanja anksioznosti. Rezultati ovog istraživanja pokazuju da samo-učinkovitost snižava razinu anksioznosti u natjecatelja u grupnoj gimnastici. Nadalje, samoučinkovitost postaje posrednik između straha od ozljeđivanja i anksioznosti prije natjecanja na način da se natjecatelji koji osjećaju manje straha od ozljeđivanja više pouzdaju u svoje tehničke kvalitete te stoga pokazuju i manju razinu prednatjecateljske anksioznosti.

Ključne riječi: anksioznost, samoučinkovitost, strah od ozljeđivanja, izvedba