Pre-competitive levels of arousal and self-confidence among elite and non-elite equestrian riders

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Research Paper

Abstract

Research into other sports has shown that excessive levels of anxiety can undermine motor function during performance. This study aims to investigate the effects of anxiety and self-confidence on equestrian performance. Forty riders (12 male, 28 female; 15 elite, 25 non-elite; 12 dressage, 17 showjumping, 11 eventing) completed the Revised Competitive Sport Anxiety Inventory 2 (CSAI-2R), which measures the levels of somatic and cognitive anxiety (arousal) as well as levels of self-confidence. Two-way between-subjects MANOVA tests were used to examine competence-by-discipline interactions and gender-by-discipline interactions in CSAI-2R scores. *Post hoc* analysis was conducted using one-way univariate ANOVA tests. Spearman's rank correlation tests were conducted between each of the CSAI-2R subscales according to competence, discipline and gender. Most important findings include lower somatic arousal and higher self-confidence in elite compared with non-elite riders, with 15.2 ± 4.4 *vs.* 19.0 ± 5.0, $F_{1,34} = 5.8$, $P < 0.05$; 31.5 ± 4.8 *vs.* 25.1 ± 7.4, $P < 0.01$, respectively. Negative correlations between cognitive arousal and self-confidence were found among elite riders, non-elite riders, showjumpers and female riders ($r = -0.69$, $P < 0.005$; $r = -0.41$, $P < 0.05$; $r = -0.52$, $P < 0.05$; $r = -0.33$, $P < 0.05$). Greater riding-specific skills in the elite rider may result in increased self-confidence. Lower levels of somatic anxiety may further increase fine motor skills in elite riders. Practical implications are that non-elite riders would benefit from sport psychological interventions increasing levels of self-confidence and reducing symptoms of somatic arousal to improve performance.

Keywords: arousal; self-confidence; equestrian; sport psychology

Introduction

Equestrian sports are unique because, compared with other sports, performance does not depend solely upon human ability and skill but also upon that of the horse and, most importantly, the quality of the interaction between horse and rider[1-3]. Highly effective horse–rider interactions are difficult to establish because both the rider and the horse are accustomed to quite different modes of social interactions. Humans mainly depend on verbal communications, whereas, according to Dierendonck and Goodwin[4], there is a greater dependence among horses on non-verbal communication expressed through body language because of the danger associated with

vocal communication of attracting the attention of predators. Brandt[5] stated that,

> '... horses, in general, have highly sensitive bodies because their bodies are their vehicle for communication. Because horses rely on their bodies to transmit and receive information, they are highly skilled at reading (and using) body language.'

Such awareness on the part of the horse implies that any minute changes of body position, muscular tension, respiration and even heart rate from the rider will be picked up and reacted upon by the horse.

A study by Trotter and Endler[6] examined the validity of the multidimensional interaction model of anxiety

by measuring trait and state anxiety in adolescent female competitive riders. The authors found a significant interaction between trait anxiety and situational stress components to induce A-state arousal. The authors conclude that competitive equestrian sports may lead to increased levels of state arousal due to stressors involving social evaluation. The subject group of this particular research focuses only on adolescents who may be more susceptible to the stressors associated with social evaluation and only seem to measure cognitive levels of arousal. Further research should investigate levels of arousal in adult equestrians.

Additional research into equestrian riders focuses primarily on the use of psychological skills. In a study investigating mood and psychological skills in elite and sub-elite equestrian riders competing in the disciplines of showjumping and dressage, Meyers et al.[7] found that elite riders scored significantly higher in anxiety management than non-elite riders. Their results suggest that one of the contributing factors to better performance among elite riders is their ability to control the physiological and psychological symptoms of anxiety. One of the possible mechanisms is the effect that anxiety can have on horse–rider interactions. For instance, it is quite likely that a horse will be sensitive to the pattern of non-verbal communication associated with an anxious rider, even if such behaviour is quite subtle. However, the authors did not discriminate between types of anxiety and self-confidence, thus providing only a limited understanding of the extent and type of anxiety riders experience and whether there exists a correlation with the levels of self-confidence. In this respect, the distinction between cognitive and sport anxiety among riders, including the relationship to self-confidence, needs to be examined more closely.

A study by Beauchamp and Whinton[8] investigated the relationship between self-efficacy and perceptions of their horse's abilities (other efficacy) in inter-mediate-level 1-day eventing, results suggesting that levels of self-efficacy in the rider are in fact closely related to their perception of their horse's ability and willingness to perform. Riders with low levels of confidence are thus also more likely to feel that they are unable to control their horse, further increasing the debilitative interpretation of cognitive anxiety levels. This notion that self-confidence acts as an important moderator in riding performance is further supported by Lazarus and Folkman's[9] model of stress, which designates confidence, or the perception to be able to cope with a certain situation, as one of the moderating factors of anxiety versus more positive emotions such as challenge or excitement. He argues that any conditions that raise perceptions of threat

or decrease coping appraisal may lead to both an increase in anxiety and a decrease in performance. This suggests that, despite a certain amount of cognitive anxiety, e.g. debilitating thought processes, such as negative self-talk, higher levels of self-confidence allow the elite rider to perform without performance impairment.

Cognitive anxiety can be described as the mental component of anxiety, caused by, for example, the fear of bodily harm, negative social evaluation or fear of failure. Somatic anxiety is the physical component of anxiety, reflecting physiological responses such as increased heart and respiratory rates, muscular tension and perspiration[10]. It is speculated that a horse, dependent on non-verbal communications, will be sensitive to increases in a rider's levels of somatic arousal, which is likely to have an adverse effect on the horse–rider interaction and subsequent performance. Furthermore, Hardy[11] purports that self-confidence increases the likelihood that cognitively anxious performers will be better able to deal with higher levels of arousal before experiencing a decrement in performance.

In his review on equitation science, McGreevy[2] highlights that horses learn required responses, such as desired changes in tempo or direction to stimuli given by the rider (e.g. through muscular contractions of the hand, legs and seat) through classical and operant conditioning. Operant conditioning enables the horse to associate a certain stimulus and the desired response through reinforcement. In the relaxed, confident rider, this will normally result in the correct execution of desired movements. In the rider suffering from symptoms of somatic arousal, however, previously trained signals will appear 'distorted' due to muscular tension or increased respiratory and heart rates (which the horse, whose primary communication is non-verbal, is able to detect). The horse will thus respond in a way desired or intended by the rider, generally leading to a decrease in performance. At the more advanced levels of equestrian sport, demands on the horse–rider dyad become increasingly more challenging, demanding greater fine motor control and differentiation between different types of aids. In order to be riding at an advanced level, riders would therefore have to be able to communicate their aids in a relaxed, confident manner to enable the horse to respond appropriately.

Considering the importance of anxiety, arousal and self-confidence in defining horse–rider interaction and their potential implications on performance, the current study aims to investigate pre-competitive levels of anxiety (arousal) and self-confidence in elite and non-elite riders of different equestrian disciplines and across gender.

Methods

Participants

Forty German riders (12 male, 28 female) were recruited for this study from the three equestrian disciplines dressage ($n = 12$), showjumping ($n = 17$) and eventing ($n = 11$). Fifteen of the participants were elite riders competing up to international (Fédération Équestre Internationale, FEI) level either as professionals or national squad members (mean age 24.14 ± 1.74). According to international (FEI) rules, dressage riders compete up to Grand Prix, showjumpers compete up to a height of 1.60 m and event riders compete over cross-country fences up to a height of 1.20 m (fixed fences) or 1.45 m (brush fences). Twenty-five of the participants were non-elite riders (mean age 23.48 ± 2.93). Dressage riders compete at the German levels of A = 'anfänger' (beginners), = 'leicht' (easy) and M = 'mittelschwer' (medium). Showjumping riders compete over fences up to 1.30 m, and event riders compete over cross-country fences up to 1.10 m (fixed fences) or 1.30 m (brush fences). All of the participants provided their written consent to participate in the study and all of the procedures used were approved by the University of Essex ethics committee.

Design

A between-subjects design was used in which levels of competitive state anxiety were compared according to competence (elite vs. non-elite), discipline (dressage vs. showjumping vs. eventing) and gender (male vs. female). Within 1 h of competing in a regular competition (e.g. no qualifier or championship), all of the riders completed the revised version of the Competitive State Anxiety Inventory 2 questionnaire (CSAI-2R), which was developed by Cox et al.[12]. The CSAI-2R is a 17-item questionnaire that measures subscales of somatic anxiety (arousal), cognitive anxiety (arousal) and self-confidence. Riders were asked to complete the questionnaire at the competition approximately 1 h before competing and prior to warming up their horses in order not to interfere with their usual warm-up routine. Each CSAI-2R item is rated on a 5-point Likert scale and scoring was carried out manually in accordance with the instructions[12].

Data analysis

Two-way between-subjects MANOVA tests were used to examine competence-by-discipline interactions and gender-by-discipline interactions in CSAI-2R scores. Post hoc analysis was conducted independently for each CSAI-2R subscale using one-way univariate ANOVA tests. An α level of 0.05 was used to indicate statistical significance, and partial eta squared effect sizes (partial η^2) were calculated for significant results. Spearman's rank correlations tests were conducted between each of the CSAI subscales according to competence, discipline and gender.

Results

Competence and discipline effects

A competence main effect was found for CSAI-2R scores ($F_{3,32} = 4.8$, $P < 0.01$, partial $\eta^2 = 0.31$), but there was no discipline main effect ($F_{6,64} = 0.3$, $P > 0.05$) or discipline-by-competence interaction ($F_{6,64} = 0.8$, $P > 0.05$). Elite riders were found to have lower somatic anxiety than non-elite riders (15.2 ± 4.4 vs. 19.0 ± 5.0; $F_{1,34} = 5.8$, $P < 0.05$, partial $\eta^2 = 0.15$) and higher self-confidence (31.5 ± 4.8 vs. 25.1 ± 7.4; $F_{1,34} = 8.9$, $P < 0.01$, partial $\eta^2 = 0.21$), but there was no difference between elite and non-elite riders in the levels of cognitive anxiety (18.9 ± 6.8 vs. 19.0 ± 7.4; $F_{1,34} = 0.1$, $P > 0.05$). Competence main effects for CSAI-2R scores are presented in Fig. 1.

Gender and discipline effects

There was no gender main effect for CSAI-2R scores ($F_{3,32} = 2.3$, $P > 0.05$), no discipline main effect ($F_{6,64} = 0.3$, $P > 0.05$) and no discipline-by-gender interaction ($F_{6,64} = 0.9$, $P > 0.05$). CSAI-2R scores for gender and discipline are presented in Figs 2 and 3, respectively.

Correlations

A negative correlation between cognitive anxiety and self-confidence was found among elite riders ($r = -0.69$, $P < 0.005$), non-elite riders ($r = -0.41$, $P < 0.05$), showjumpers ($r = -0.52$, $P < 0.05$) and female riders ($r = -0.33$, $P < 0.05$). A negative correlation between somatic anxiety and self-confidence was also found among female riders ($r = -0.37$, $P < 0.05$).

Discussion

Findings reveal no significant correlations between cognitive and somatic CSAI-2R scores, allowing for the analysis and discussion of both aspects of anxiety as separate components. In addition, the relatively low CSAI-2R scores both in elite and non-elite riders suggest that it may be more prudent to speak of arousal rather than of 'true' anxiety. Results further reveal that elite riders appear to experience lower levels of somatic arousal and higher levels of self-confidence compared with non-elite riders, with levels of cognitive arousal that do not differ between the groups. Somatic arousal, or at least the ability to control associated symptoms, and a greater belief in
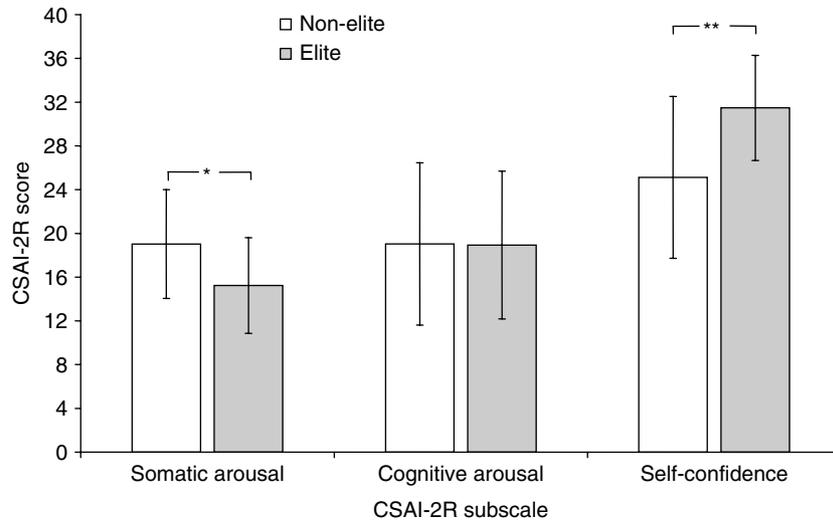
FIG. 1 CSAI-2R competence main effects for elite *vs.* non-elite riders with *denoting $P < 0.05$; **denoting $P < 0.01$

one's own abilities thus seem to be important factors differentiating elite from non-elite riders. Previous research into the use of psychological skills by equestrians led to similar findings, suggesting that elite riders seem to exhibit greater anxiety management skills than their non-elite counterparts[7]. Important issues to consider are the mechanisms by which somatic arousal and levels of self-confidence could affect riding ability and thus different competitive levels.

Communicating with a horse involves a combination of seat, leg, weight and rein 'aids' and consequently requires fine motor control and accuracy, for which it has been suggested that low levels of arousal are probably advantageous[13]. Physiological manifestations of somatic arousal can include increases in muscular

tension, respiratory rate and heart rate, which are all likely to affect the transmission of a rider's non-verbal communication that their horse may be sensitive to. The horse will have been trained using principles of classical and instrumental conditioning[1,14] to associate certain aids with changes in tempo and direction. At elite level, many of the exercises the horse has to perform require similar aids from the rider, with only very slight changes in muscular tension or repositioning of the body for each exercise. The lower levels of somatic arousal displayed by elite riders on the other hand indicate that they may be less susceptible to the adverse physiological effects of somatic arousal and are able to transmit every aid correctly. The horse is trained in a consistent manner, as the rider is able to apply the correct aid every single time, thus facilitating
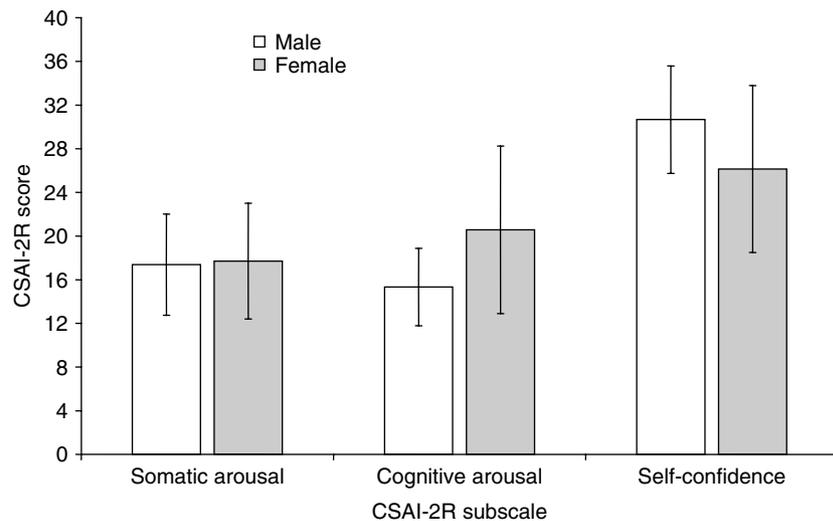

FIG. 2 CSAI-2R outcomes for male and female riders with no significant differences found
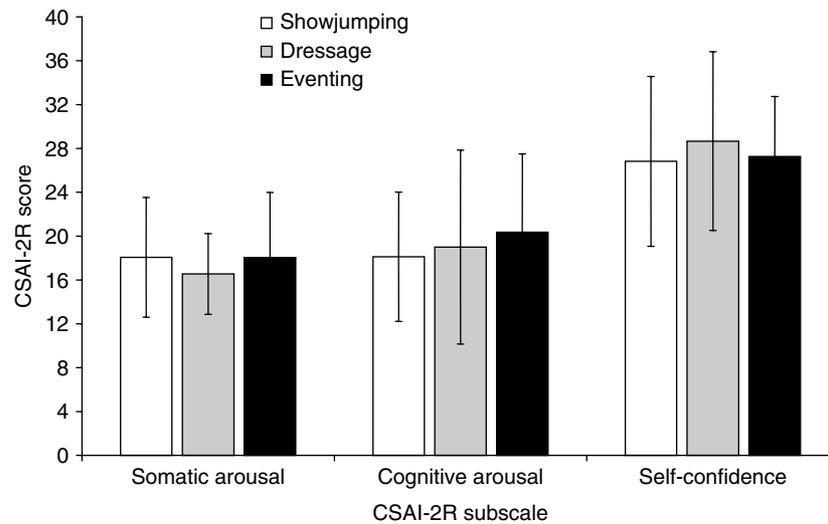
Fig. 3 CSAI-2R outcomes for each discipline with no significant differences found

the progression in training towards advanced exercises. The elevated levels of somatic arousal observed among the non-elite riders in the current study are likely to lead to a disruption of the fine motor control necessary to perform more complex exercises. A rider experiencing muscular tension may still be able to communicate with a horse at a basic level, getting the horse to perform simple changes in pace and direction. Yet those riders would be unable to train a horse to reach a more advanced level, due to a lack of sufficient fine motor control and subsequent distinction between different sets of aids required to perform more complex exercises.

While there was no significant difference in levels of cognitive arousal between elite and non-elite riders, findings also indicate that elite riders show greater levels of self-confidence than non-elite riders. Previous research[15,16] suggests that the interpretation of cognitive arousal as being facilitative or debilitative to performance is an important moderating factor. Jones et al.[17] found that high-performance gymnasts did not differ significantly in levels of cognitive anxiety from low-performance gymnasts. The high-performance gymnasts, however, did report their cognitive anxiety as more facilitative. While cognitive anxiety and self-confidence are not considered to lie at opposite ends of the same construct[18,19], it may be reasonable to assume that higher levels of self-confidence would predispose an athlete to view their cognitive arousal as facilitative. Even though the current study did not investigate performance per se, findings are nevertheless indicative of an important interactive effect of self-confidence and cognitive arousal in riders.

Bandura's[20] model of self-confidence purports the notion that beliefs regarding self-confidence are determined by mastery enactment, modelling, persuasion and perception of one's own physiological state. In elite riders, it is likely that previous successful performances heighten self-confidence perceptions of the rider, supported also by positive interpretations of low levels of physiological arousal. Levels of self-efficacy in the rider are closely related to their perception of their horse's ability and willingness to perform[8]. Riders with low levels of confidence are thus also more likely to feel that they are unable to control their horse, further increasing the debilitative interpretation of cognitive arousal levels. This notion that self-confidence acts as an important moderator in riding performance is further supported by Lazarus and Folkman's model of stress[9]. This model designates confidence, or the perception to be able to cope with a certain situation, as one of the moderating factors of anxiety versus more positive emotions such as challenge or excitement. Conditions that raise perceptions of threat or decrease coping appraisal may lead to an increase in anxiety and lead to a decrease in performance[9]. This suggests that, despite a certain amount of cognitive anxiety, e.g. debilitating thought processes, such as negative self-talk, higher levels of self-confidence allow the elite rider to perform without performance impairment.

Research has shown that cognitively anxious performers, who show higher levels of self-confidence, are still able to perform under stressful conditions, such as competitions, without a decrement in performance[21]. Those performers that have the least confidence in their own ability to control themselves and their immediate environment are most likely to experience debilitative symptoms[22]. Equestrian sport depends considerably on a rider's ability to control his horse, arguably a rider's most immediate environment. Findings from this study suggest that elite

riders demonstrate higher levels of self-confidence prior to competition, despite similar levels of cognitive arousal, than non-elite riders. Elite riders may therefore be said to be confident in their ability to control immediate environmental factors at a competitive event, including the horse. Even under stressful conditions, such as a competitive environment, they may be much more likely to interpret cognitive arousal as facilitative, having enabled them to progress through the levels to ride at elite level. Their non-elite counterparts on the other hand, who show lower levels of self-confidence, may be more inclined to interpret cognitive arousal prior to competition as debilitative.

Research results relating to differences between male and female riders lend further credibility to earlier findings[23] that male competitors exhibit higher levels of self-confidence and lower levels of cognitive anxiety than females. Meta-analytic research revealed that mean effect sizes for self-confidence on performance in males was significantly greater than that in females, suggesting that men generally exhibit greater self-confidence scores than females[22]. Earlier research into the relationship and direction of competitive trait anxiety between males and females found that males reported a more facilitative interpretation of anxiety than females[24]. In the light of these findings, higher levels of self-confidence in male riders may allow for more facilitative interpretation of cognitive anxiety[20].

Furthermore, differences in cognitive anxiety scores in male and female riders could also be interpreted in the light of processing efficiency theory. When worrying, performers use up their cognitive resources, meaning that they have less attentional capacity 'left over' for the task at hand[25]. Anecdotally, it is commonly acknowledged that female riders spend more time worrying over social evaluation and risk of injury to themselves or their horse. The findings relating to levels of self-confidence and cognitive anxiety may provide some indication as to why, in elite ranks of equestrian sports, the ratio of female to male riders is much lower than at grassroots and even at non-elite level. However, the current investigation is insufficient to test whether differences in male and female scores of cognitive anxiety have an immediate effect on the levels of performance, and such conclusions may be premature at this point.

Conclusion

In conclusion, considerable differences exist in pre-competitive states of somatic arousal and self-confidence between elite and non-elite riders. Considering equine learning theory and the need for fine motor control in equestrian sport, it is likely that low levels of somatic arousal greatly facilitate riding performance. Furthermore, it can be argued that elite riders also interpret pre-competitive levels of cognitive anxiety as more facilitative, due to greater levels of self-confidence. Differences in cognitive anxiety and self-confidence between male and female riders also suggests a more positive interpretation of anxiety, and may offer a preliminary explanation as to why male riders are proportionally over-represented at elite level. We suggest that future research needs to investigate the effect of levels of cognitive and somatic arousal on competitive performance, including the potentially moderating variable of self-confidence in riders from different levels and disciplines.

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