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Resilience, Wellbeing, Depression Symptoms and Concussion Levels in Equestrian Athletes

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Abstract

Purpose: To conduct the first cross sectional survey on depression, resilience, wellbeing and concussion levels of equestrian athletes, and to assess whether past concussion rates were associated with depression, resilience, and wellbeing.

Design, Methodology, Approach: 511 participants from Canada, Republic of Ireland, United Kingdom, Australia and United States of America took part in an international cross-sectional, online survey evaluating concussion history, depression symptoms, resilience, and wellbeing.

Findings: 27.1% of athletes met clinically relevant symptoms of Major Depressive Disorder (MDD). Significant differences were shown in wellbeing and resilience scores between countries. Significant relationships were observed between reported history of concussion and both high depression scores and low wellbeing scores.

Practical Implications: Findings highlight the need for mental health promotion and support in equestrian sport.

Social Implications: Results support previous research suggesting a need for enhanced mental health support for equestrians. There is reason to believe that mental illness could still be present in riders with normal levels of resilience and wellbeing.

Originality/Value: This study examined an understudied athlete group: equestrian athletes and presents important findings with implications for the physical and mental health of this population.

1. Introduction

Throughout history, athletes have been perceived as exemplars of human strength and mental resilience (Uphill, Sly & Swain, 2016). Unfortunately, a more realistic understanding of athletes and athleticism has seldom been examined until the recent surge of interest in athlete mental health (Shinke et al., 2018; Breslin et al., 2019). Growing evidence demonstrates widespread mental illness and challenges in athlete populations, and serious consideration is now being given to promoting a positive mental health culture in sport (Breslin et al., 2019).

Equestrian athlete refers to all athletes participating in the sub-disciplines of equestrian sport. In equestrian sport athletes uniquely depend on a partnership with a horse for success (Meyers et al., 1999). Equestrian sport culture, like many others, has only recently begun to appreciate the mental health challenges associated with the sport (Butler-Coyne et al., 2019). This research seeks to develop current awareness of mental health in equestrian athletes and inform efforts to promote positive mental health for this athlete population.

Mental health is a multifaceted construct (Uphill et al., 2016). Specifically, Keyes' (2002) model of mental health comprises mental illness and mental health (i.e., social, psychological, and emotional wellbeing) as two distinct, but correlated continuums. Optimal mental health is characterised by the coexistence of high mental health, and low mental illness (i.e., flourishing). It is also possible to have both high mental health and high mental illness (i.e., flourish with mental illness), or both low mental health and low mental illness (i.e., languishing), or high mental illness and low mental health (i.e., languishing with mental illness). Thus, Keyes' (2002) model highlights the need to both promote mental health and reduce mental illness. Adopting this perspective in a recent *mental health in sport* consensus statement, Breslin et al. (2019) described a sport sensitive definition of mental health as; "mental health is not merely the

absence of illness, but a state of wellbeing in which those involved in competitive sport realize their purpose and potential, can cope with competitive sport demands and normal life stressors, can work productively and fruitfully, can act autonomously according to their personal values, are able to make a contribution to their community and feel they can seek support when required” (p.4). Hence, supporting athlete mental health is crucial considering growing evidence that athletes can struggle with mental illness (Wolanin et al., 2015).

Wellbeing is an individual’s experience of social connectedness, personal competence and functioning, and overall satisfaction with their life (Silva et al., 2019). One should consider the potential negative impact of sport on wellbeing alongside the positive. Butler-Coyne et al. (2019) found that participation in equestrian sport negatively impacted equestrian athletes’ wellbeing in several ways. Maintaining a ‘sport-life’ balance was particularly challenging due to high time demands for training and associated financial pressures. The risky nature of the sport influenced wellbeing via the perceived risk to the rider, and secondly through the psychological impact of horse injury and occasional mortality (Butler-Coyne et al., 2019). A perceived ‘wellbeing imbalance’ in the equestrian athlete may contribute to higher perceived pressure, negative thoughts and emotions, and inhibited performance (Butler-Coyne et al., 2019, p.7). Participants also perceived that involvement in equestrian sport enhanced their emotional resilience, through navigating the challenges of competitive equestrian sport and having to embrace adaptability in the face of these demands (Butler-Coyne et al., 2019). Resilience is the capacity to adapt successfully despite adversity and is considered a crucial element of an equestrian athlete’s ability to persevere through the inherent risks and adversities in their sport (Lungano et al., 2019). Similar themes have been reported amongst jockeys. Despite significant rewards associated with professional horse racing, such as status and mastery, jockeys’ wellbeing

was negatively impacted by the extreme amounts of time and physical and cognitive demands of the sport (Landolt et al., 2017). This reflect both a positive and negative impact on wellbeing from participation in equestrian sport.

Major Depression Disorder (MDD) is experienced by about 16% of the world's population (Biesheuvel-Leliefeld, 2015). Individuals with MDD can spend as much as 21% of their lives in a depressive state characterised by low mood, feelings of hopelessness, low energy, and negative thoughts (Biesheuvel-Leliefeld, 2015). Higher-than-average rates of MDD and depression symptoms in elite athlete groups have been reported compared to the general population (Beable et al., 2017).

Sport related concussion is defined as “a traumatic brain injury induced by biomechanical forces” (McCrory et al., 2017, p.839). Concussion can be followed by a variety of symptoms such as: headache, dizziness, feeling foggy, memory problems, nausea, or throwing up (Kerr et al., 2012). Equestrian athletes may experience comparable or higher concussion rates to those in American Football, Hockey, and Rugby (Srinivasan et al., 2014; Kuhl et al., 2014). Research by O'Connor et al. (2018) reports that 32.4% amateur and 19.6% professional jockeys suspect they have had a concussion, and one in two jockeys would return to riding on the same day, even if they suspected a concussion.

Kerr et al. (2014) found that athletes with one or more concussions could be 2.4 times more likely to experience symptoms of MDD than athletes with no history of concussion. In a systematic review of potential long-term effect of sport-related concussion, researchers highlighted that although most athletes do not seem to suffer long-term consequences as a result of their concussion history, a small percentage do seem to be at risk of depressive symptoms and/or cognitive decline (Manley et al., 2017). Given the documented link between concussion

and MDD rates in sport (McCrory et al., 2017; Didehbani et al., 2017; Rice et al., 2018), research is needed to establish evidence of this risk-factor for equestrian athletes. Dams-O'Connor et al. (2014) assert that self-report screening for concussion is the best method of estimating concussion incidence and prevalence, as it is common for concussions to result in mild symptoms and/or not be reported to medical professionals. This could be especially common in equestrian sport due to a culture of getting back on the horse quickly after a fall (O'Connor et al., 2020), which may discourage riders from acknowledging and reporting symptoms.

Hence, the present study was a response to the limited research on mental health in equestrian sport. The main purpose was to assess levels of depression symptoms, wellbeing and trait resilience in equestrian athletes, both elite and non-elite, across five countries to develop a coherent and evidence-based view of the state of mental health in equestrian sport. Additionally, this study examined the relationship between self-reported concussion history and mental health outcomes.

2. Materials and Methods

2.1 Design and Participants

540 participants took part. Data for 29 were removed as they were under 18. Statistical analysis was calculated on 511 participants (mean age = 39.42: SD = 14.08: female= 93.6%, male = 6.2%). Participant demographics are outlined in Table 1. All equestrian athletes from any category of equestrian sport were eligible to participate from Canada, Australia, United Kingdom (England, Scotland, Wales, Northern Ireland), Republic of Ireland and the United States of America. These five countries were chosen based on (1) a high level of equestrian sport participation, and (2) author connections in the equestrian industry which facilitated spreading

knowledge of the study to equestrian athletes within those countries. Participants completed an online, anonymous, cross-sectional survey, which took approximately 10 minutes to complete via Survey Monkey (Survey Monkey Inc.)

2.2 Procedures

Ethical approval was granted by Ulster University. Recruitment was achieved through equestrian sport organisations in U.K., Ireland, and Canada, as well as through Facebook, Twitter, and via professional riders in Australia, the USA, Ireland and Canada who promoted the survey link to their equestrian contacts. Participants were informed that they were participating in a study investigating mental health levels and the impact of concussion in equestrian athletes. Informed consent was obtained from all participants.

2.3 Measures

Depression, wellbeing, resilience, and concussion were assessed.

2.3.1 Depression

The Patient Health Questionnaire (PHQ-8) (Kroenke et al., 2009) uses 8 questions (e.g., ‘Over the past two weeks how often have you been bothered by any of the following problems: Little interest or pleasure in doing things’) Responses were measured on a 4-point scale (0-*not at all*, to 3-*nearly every day*). Consistent with scoring methodology indicating an 88% sensitivity and 88% specificity for classification of Major Depressive Disorder (MDD) (Kroenke et al., 2009; Razykov et al., 2012), scores of ≥ 10 were used to classify the athletes with a clinically relevant diagnosis of MDD. The PHQ-8 has sound psychometric properties in clinical and non-clinical samples (Wu et al., 2019).

2.3.2 Wellbeing

The Mental Health Continuum Short Form (MHC-SF) (Lamers et al., 2011) is based on Keyes' (2002) two-continuum model, and evaluates emotional, psychological and social wellbeing through 14 questions e.g., How often over the past month did you feel that your life has a sense of direction or meaning to it?). Responses were measured on a 6-point Likert scale (0-*never* to 5-*every day*), with all 14 questions being summed for a total score. This score can range from 0-70, with higher scores indicating higher wellbeing. The MHC-SF has good internal consistency (Cronbach $\alpha \Rightarrow 0.80$, Lamers et al., 2011), and is valid for use with clinical and non-clinical populations (Ferentinos et al., 2019).

2.3.3 Resilience

The Brief Resilience Scale (BRS) (Smith et al., 2008) assesses the 'bounce-back-ability' to recover from health-related stress through six questions (e.g., I tend to bounce back quickly after hard times). Responses were made on a 5-point Likert scale (1-*strongly disagree* to 5- *strongly agree*). Scores range from 0-5, with 0-2.99 showing low resilience, 3.00 to 4.30 normal resilience and 4.31-5.0 high resilience. The BRS has internal consistency (Cronbach $\alpha = 0.80$ -0.91) (Smith et al., 2008) and has demonstrated validity and reliability across cultures (de Holanda Coelho et al., 2016).

2.3.4 Concussion

Incidence of concussion was assessed using adapted questions from the General Health Survey administered to retired American Football players (Kerr et al., 2012). Questions were adapted to better simulate equestrian sport characteristics. Participants were provided with a concussion

definition. A self-report style of assessment was chosen intentionally to obtain the most accurate estimation of concussion rates possible (Dams-O'Connor et al., 2014).

2.3.5 Statistical Analysis

Mean average scores and standard deviations as a measure of distribution or spread of scores from the mean were calculated for the PHQ-8, BRS, MHC-SF and concussion scores as a whole sample and by country. Separate one-way Analysis of Variance (ANOVA) with five levels (country) was calculated to determine statistical differences in mean scores between countries. Tukey's HSD Post-Hoc tests established which countries showed significant differences. Concussion scores were analyzed in three groups: (1) no concussions, (2) 1-5 concussions, (3) 6 or more concussions. Mean average scores and standard deviations of the PHQ-8, BRS and MHC-SF were calculated for the three concussion groups. Separate one-way Analysis of Variance (ANOVA) were calculated to determine statistical differences in mean scores between concussion groups. Statistical significance was set at $p \leq .05$. Partial Eta Squared (η_p^2) values determined the strength of effects. All statistical analysis was calculated using the Statistical Package for Social Sciences (SPSS) Version 24.

3. Results

The sample demographic scores for age, gender, years of experience in equestrian sport, country of origin and equestrian discipline are described in Table 1. Participant mean scores across measures are reported in Table 2. The mean depression scores was in the 'mild' range (Kroenke et al., 2009). However, 27.1% of the sample reached the ≥ 10 cut off score for experiencing major depressive disorder (MDD). The mean score for participants above the cut

off for MDD was $M = 13.89$. The mean score for participants below the cut off for MDD was $M = 4.64$.

The mean wellbeing score was categorized as moderate by the MHC-SF scoring system (Lamers et al., 2011). Further, the mean resilience score is categorised as “normal resilience” by the BRS scoring system (Smith et al., 2008).

The mental health outcomes data consisting of the PHQ-8, MHC-SF and BRS were analysed by country. There was no significant difference in PHQ-8 scores between countries. However, there were significant differences in MHC-SF scores between countries $F(5, 495) = 5.265, p < .001$, with a small-to-moderate effect size ($\eta_p^2 = 0.05$, Field, 2013). Tukey post-hoc test clarified this result, with Australia significantly higher than the UK ($p = .001$), Canada significantly higher than the UK ($p = .012$), the USA significantly higher than the UK ($p = .026$) and Australia significantly higher than the Republic of Ireland ($p = .008$). There were significant differences in BRS scores between countries, $F(5, 501) = 2.87, p = .01, \eta_p^2 = 0.03$. Tukey post hoc test clarified this result, with Australia scoring significantly higher than the Republic of Ireland ($p = .007$).

PHQ_8 scores were negatively correlated with BRS scores $F(24, 508) = 7.435, p < .001$ with a medium effect size of $\eta_p^2 = .26$. PHQ_8 scores were negatively correlated with MHC-SF scores $F(61, 464) = 7.524, p < .001$ with a large effect size of $\eta_p^2 = .49$.

81.8% of the sample reported experiencing one or more concussions, 71.2% reported between 1 and 5, and 10.8% reported six or more. 50% of respondents returning to riding on the same day as a suspected concussion occurred. The mental health scores consisting of the PHQ-8, MHC-SF and BRS were analyzed based on concussion history across three groups. Group one

had experienced no concussion, while Group two had experienced one to five concussions. Group three had experienced six or more concussions.

There was a significant difference in PHQ-8 scores across three concussion groups, $F(2, 519) = 8.03$ $p < .001$. Tukey post hoc test determined that there was a significant difference between all three groups. Between group one and two $p = .02$, between group one and three $p < .001$, and between group two and three $p = .03$.

There was a significant difference in MHC-SF scores across three concussion groups, $F(2, 486) = 5.05$ $p < .001$. Tukey post hoc test clarified a significant difference between the first and third group, $p < .001$.

There was no significant difference in BRS scores across the three concussion groups.

Discussion

We report depression, resilience, wellbeing, and concussion levels in equestrian athletes from five countries. Results suggest a relationship between the experience of concussion, with both depression and wellbeing scores. 27.1% of the sample classified as having scores at the level of major depressive disorder. This result supports previous studies assessing depression levels in equestrian athletes, specifically jockeys, which have found depression symptoms as high as 57% (Losty et al., 2018) and 35% (King et al., 2020). According to the current data, equestrian athletes, therefore, experience symptoms of depression at a rate slightly above that estimated in the general population, as has been found in other athlete groups (Beable et al., 2017). These findings indicate a need to help equestrian athletes to prevent, manage, and treat depression.

Despite the possible mental health concerns demonstrated by high depression scores, the mean MHC-SF score indicated “moderate” wellbeing and the mean BRS score indicated “normal” levels of resilience according to established norms, which resonates with the views by Butler-Coyne et al., (2019) of the coexistence of the rewards of equestrianism on wellbeing, while the demands, stresses and risk of equestrian sport were high. These findings, and those of the current study, highlight the relevance of Keyes’ (2002) two-continuum model of mental health and support the idea that equestrians may concurrently struggle with negative mental illness and experience positive mental health as a result of their sport.

One of the novel contributions of the current survey to our understanding of equestrian athlete mental health and wellbeing was the international composition of the sample from five countries. However, it is important to highlight, effect size for the differences in scores between countries were small-to-moderate (i.e., 0.03 and 0.05 respectively). Australian participants scored highest in resilience and wellbeing and reported the lowest depression scores overall. Future research should explore why Australian equestrians seem to experience stronger overall mental health in comparison to other countries, we speculate that this maybe due to established mental health awareness programmes, but empirical evidence is required to support the legitimacy of this view.

4.1 Clinical Implications

When designing interventions for equestrians it will be important to consider the interrelated continuums of mental health and mental illness in the equestrian athlete (Keyes, 2002). The growing body of research on equestrian athletes reflects a complex reality where equestrianism

both helps and hinders wellbeing and may simultaneously contribute to mental illness (Butler-Coyne et al., 2019; Lungano et al., 2019; McGuane et al., 2018)

4.2 Concussion in Equestrian Sport

This study contributes evidence to the position that concussions are a common and significant risk factor to the physical and mental health of equestrian athletes. O'Connor et al. (2018) found that 14.81% of injuries sustained by jockeys in point to point racing between 2007 and 2015 were concussions (45.09% were soft tissue and 38.55% were fractures). In the current study, 82% of participants had experienced at least one concussion, compared to 38.8% of 797 former collegiate athletes in a study of self-reported concussion history and mental health (Kerr et al., 2014). The high frequency of concussion in equestrian sport is concerning, especially as the results of this study support previous findings which have linked increased concussion rates with an increased risk of depression (Didehbani et al., 2017; Rice et al., 2018). This high incidence of concussion may be influenced by the large proportion of amateur/leisure riders in our sample. O'Connor et al. (2018) reported that amateur jockeys experience more falls and injuries than professional jockeys. It is reasonable that a similar effect may exist in other subdisciplines within equestrian sport.

Previous research has suggested that concussion negatively impacts athlete wellbeing due to an experience of increased anxiety and stress for the athlete post-concussion (McGannon et al., 2013). Research has also reported that loss of identity, pressure to heal quickly, and a lack of perceived social support all negatively impact athlete wellbeing post concussion (Caron et al., 2020).

Overall, the concerning links between concussion history and depression, and wellbeing warrant further investigation into reducing concussion levels in equestrian sport and should encourage equestrian sport organizations to implement and/or increase the availability and scope of concussion education in order to encourage safe practice (e.g., helmet use) while riding and handling horses.

4.3 Limitations

Despite the novel contributions of this study, including the assessment of a theoretically informed mental health model (Keyes, 2002) using validated psychometric measures, and recruitment of a large international sample of equestrian athletes, there were limitations. The cross-sectional research design limits the ability to draw causal inferences. The self-reporting, rather than direct medical diagnosis of depression and concussion by a medical professional requires a degree of caution. The self-report concussion measure leaves much interpretation to the participant, which may have impacted the results. Although five countries were sampled, gender, sport type and response rates may have been influenced by respondents' interest, perceptions, and experience of mental health and concussion. Varying sample sizes from different countries may limit the conclusions drawn from comparisons between these groups. A predominantly female sample may contribute bias to the results and indicates a lack of male participation. Lastly, a lack of information of the timeframe of concussions experienced prevents a deeper understanding of any possible relationships between concussion, depression, and wellbeing.

4. Conclusion

Our study found that 27.10 % of a large international equestrian athlete sample reached clinically defined cut-offs for MDD (American Psychiatric Association, 2013), despite the sample demonstrating average/normal wellbeing and resilience. Results are similar to those found in other athlete populations (Beable et al., 2017) and consistent with Keyes' (2002) model of mental health. Results suggest that, despite presenting with moderate levels of mental health (i.e., wellbeing, resilience) equestrian athletes concomitantly experience levels of depression symptoms, that are slightly higher than the general population (Beable et al., 2017), and are at the higher range of mental illness as reported in previous studies. There is potential for improvement in equestrian athlete mental health and reduction of ill-being. Therefore, future research should consider the interaction of mental health factors (i.e., social, psychological and emotional) and how all three could be enhanced through evidence-based mental health interventions (e.g., mindfulness, awareness raising). Our findings also indicated that athletes who have experienced one or more concussions, have higher depression scores and lower wellbeing scores than those athletes who have experienced no concussion. Further research with controlled experimental designs is needed to determine potential causal links and underlying mechanisms between concussion and mental health outcomes. Finally, we recommend that equestrian sporting bodies urgently need health and safety provisions to reduce concussion prevalence in equestrian athletes, such as delaying the return to riding after suspected concussion. Ultimately, this research joins a growing body of evidence (e.g., Beable et al., 2017; McGuane et al., 2018; Losty et al., 2018; Butler-Coyne et al., 2019; King et al., 2020) outlining ethical considerations and risk factors for mental health in equestrian sports, wherein athletes could benefit from evidence-based mental health awareness and self management interventions, specifically those

319 targeting depression, and provisions to provide additional rider safety for the prevention of
320 concussion.

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