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1 **A Preliminary Study to investigate the prevalence of pain in elite Dressage Riders during** 2 **competition, in the United Kingdom**

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4 *Lewis, V. and Kennerley, R.

5 *Performance in Equestrian Sport Group*

6 *Hartpury University Centre, Hartpury, Gloucestershire, England, GL19 3BE;*

7 * Corresponding author Victoria.lewis@hartpury.ac.uk

8 9 **Abstract**

10 *Equestrianism is more dangerous than many sports including motorcycle riding, skiing,*
11 *football, and rugby with one in five equestrians seriously injured during their riding career.*
12 *Current research has focused on acute riding injuries but as seen in other sports over-use*
13 *injuries, repetitive strain and lifestyle could aggravate symptoms causing chronic pain. An elite*
14 *rider suffering from pain may still choose to compete with pain due to the pressures from*
15 *sponsors and owners and the need for competition success. The aim of the study was to*
16 *investigate the prevalence of riders at the elite level competing with pain, and whether they*
17 *perceived this pain to have a negative effect on their performance. A quantitative approach*
18 *was used due to the experimental nature of the study. Fifty questionnaires were distributed to*
19 *elite dressage riders (British Dressage Group 3 and above) at the Festival of Dressage,*
20 *Hartpury College to establish the prevalence of riders competing with pain. Seventy-four*
21 *percent of elite dressage riders competed while experiencing pain, 62% of this pain was classed*
22 *as chronic and 76% of riders stated that this pain was in the low back. Over half (51%) relieved*
23 *the symptoms of pain by using over the counter pain medication. There was a highly significant*
24 *relationship between riders competing with pain and the perception that this pain affecting*
25 *negatively on performance ($X^2= 16.216^a$, $df= 1$, $p= 0.001$). This high incidence of elite*
26 *dressage riders who compete with pain, particularly lower back pain (LBP), could be*
27 *problematic given the longevity of a rider's career which can span over four decades. This*
28 *research reports rider's perceptions and self-reported pain and management options, which*
29 *may affect the data. Further research is needed to establish the causes of back pain and*
30 *appropriate management strategies.*

31 **Keywords:** Equestrian, Dressage riders, chronic pain, lower back pain

32 33 **Introduction**

34 Equestrian sport is more popular than rugby, fishing, or cricket in the UK and dressage is the
35 fastest growing discipline with British Dressage having over than 14,000 members, 10,000
36 registered horses and more than 2,000 days of competition per year, (British Dressage, 2016).
37 Equestrianism is a hazardous activity, and is arguably more dangerous than many sports
38 including motorcycle riding, skiing, football, and rugby (Ball *et al.*, 2007). One in five riders
39 experience a serious acute injury during their riding career (Ball *et al.*, 2007; Mayberry *et al.*,
40 2007). Although most equestrian injuries occur as a result of rider falls (Sorli, 2000; Paix,
41 1999; Bixby-Hammett and Brooks, 1990; Lloyd, 1987), approximately 15% of injuries occur
42 in non-riding activities such as feeding, handling, shoeing and saddling (Maffulli, 2005).
43 Approximately 100 hours of riding experience are required to achieve a substantial decline in
44 injury rate, implying that an elite dressage rider will have endured an injury at some point due
45 to the duration of training a rider must complete in order to reach the elite level (Maffulli,
46 2005; Mayberry *et al.*, 2007; Sorli, 2000).

47 Anecdotal evidence suggests that overuse musculoskeletal injuries are common in the elite
48 dressage rider due to the repetitive nature of the training programmes involved; and the

49 incidence of lower back pain has been reported as high (72%) in horse-riders (Kraft, 2007;
50 Feucht and Patel, 2010; Greve and Dyson, 2013). Kraft (2009) corroborated high prevalence
51 of back pain in equestrians (88%) compared to a non-equestrian control population (33%).
52 To date there are no reports of the prevalence of back pain amongst elite riders of various
53 equestrian disciplines.

54 Elite dressage riders need to have strong abdominal and back musculature to maintain
55 positional stability. Lower back and/or pelvic pain can reduce the ability to stabilize the lumbar
56 pelvic hip complex around the central longitudinal axis and maintain the correct riding position
57 (Munz et.al 2013; Pelham et al. 2010; Tereda et al. 2000). A strong 'core' anatomy enables the
58 torso to return to equilibrium after perturbation and allows for disassociation of movement
59 between the upper and lower body required for successful application of the 'aids' or signals
60 to the horse. Thus, lower back pain (LBP) can reduce the rider's ability to synchronize with the
61 horse's movement (Tereda *et al.*, 2000).

62 Additionally, once a professional rider becomes injured, riding, stable duties and lifestyle
63 may aggravate the injury further leaving the rider with regular symptoms of pain (Paix, 1999).
64 Furthermore, Moss *et al.*, (2002) suggested that a rider might still compete with an injury due
65 to the pressures from sponsors and owners and the need for competition success to promote the
66 rider and support the rider financially (Robbins, 2012). The aim of the study was to investigate
67 the prevalence of riders at the elite level competing with pain and whether they perceived this
68 pain to have a negative effect on their performance

69

70 **Materials and Methods**

71 *Participants*

72 Fifty questionnaires were distributed to elite female, dressage riders at the Hartpury Festival of
73 Dressage, CDI ***, 3rd-7th July, 2014. Age range 19-52 years. Riders were approached by the
74 researcher and asked to complete the questionnaire post competition. Due to the nature of the
75 purposeful sampling method, all participants were elite dressage riders, who were of British
76 Dressage Rider group 3 and above, ridden to Advanced level and represented their country at
77 either Small or Big Tour (British Dressage, 2015).

78

79 *Measure*

80 A four section survey was developed containing a mix of closed – response (e.g. Yes/no and
81 Likert scale) and open-response items (Bruce, 2008). Section 1 asked respondents to state their
82 dressage competition level and BD ranking level. Section 2 asked questions related to previous
83 injury and level of pain, location and cause of this pain. Section 3 was specific to the perceived
84 impact this pain had on their performance. Section 4 asked what factors contributed to
85 increased levels of pain when riding (e.g. saddle, movement of the horse, cold weather, yard
86 work). The final section solicited information related to the participants management strategies
87 for dealing with this pain (e.g. over the counter pain medication, prescription pain medication,
88 manual therapy such as physical therapy, chiropractic treatment and other strategies). Validity
89 evidence for the instrument was provided by reviewing the questionnaire for: (1) clarity of
90 wording, (2) use of standard English and spelling (3) reliance of items, (4) absence of biased
91 words and phrases, (5) formatting of items, and (6) clarity of instructions (Fowler, 2002). Two
92 faculty Senior Lecturers experienced in survey design were asked to use these guidelines to
93 review the instrument. Based on the reviewers' comments the instrument was revised and as a
94 pilot study the questionnaire was distributed to 10 competition dressage riders before further
95 revisions were made prior to final administration.

96

97 *Data analysis*

98 Descriptive statistics were used to report frequencies and percentages within data. A Chi-square
99 test was conducted to assess associations between variables. An alpha value was set at $p < 0.05$
100 (confidence interval 95%) throughout unless otherwise stated. Data were analysed using SPSS
101 for Windows version 19.

102

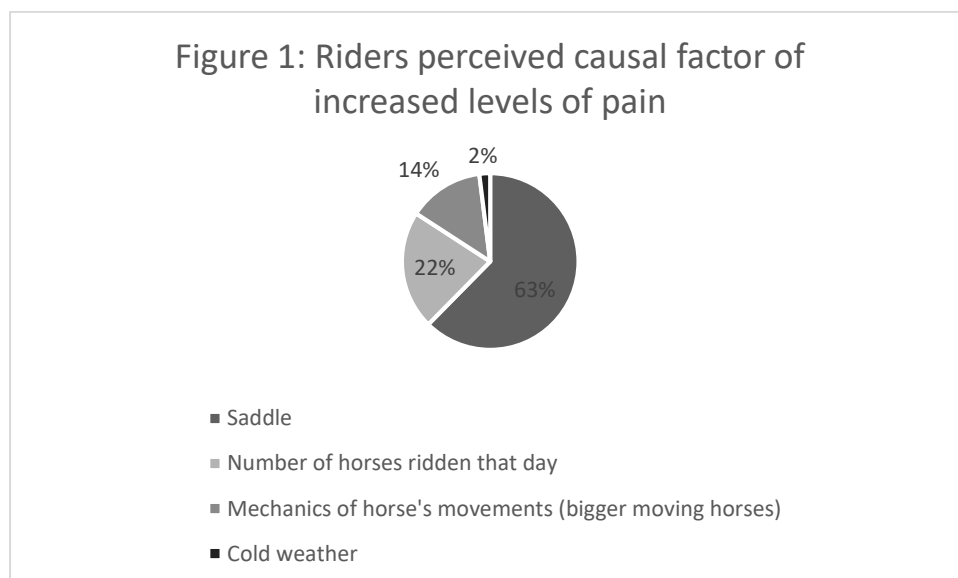
103 **Results**

104 Seventy-four per cent of riders (37/50) reported competing with back pain, additionally, 27
105 riders (54%) reported having sustained a severe injury (fracture or dislocation) in their career.

106 Out of the 37 elite dressage riders that experienced pain when competing, 43% of riders
107 experienced pain in relation to a previous injury and 62% of riders reported this pain to be
108 chronic, compared to 38% of riders that reported their pain to be acute.

109 Lower back pain was reported in 76% of dressage riders, 8% of riders reported pain in the hips,
110 8% reported pain in the ankle, 5% experienced pain in the shoulder complex and 3%
111 experienced pain in the legs.

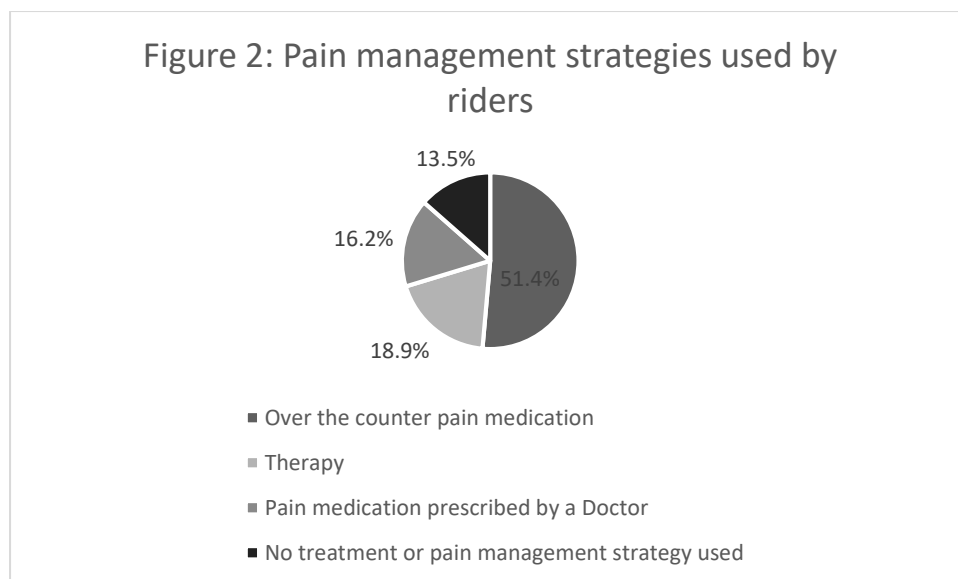
112 The saddle was reported as a causal factor for pain by 62% of riders, 22% of participants
113 believed the number of horses ridden contributed to the pain, 14% to the mechanics of the
114 horse's movement (big moving horses) and 2% felt the cold weather contributed to the pain
115 (Figure 1).



116

117 Fifty-nine per cent of elite dressage riders perceived that their pain affected their performance
118 negatively. There was a statistically significant association between those experiencing pain
119 and perceptions of pain affecting negatively on a rider's performance ($X^2(1) = 16.216$, $p < 0.001$).
120 For those riders that perceived their pain negatively affected their performance 55%
121 reported this pain as a distraction when competing, 22% perceived that this pain caused earlier
122 onset of fatigue, and 24% reported this pain specifically affected their effectiveness in 'sitting
123 trot'.

124 There was a statistically significant association between riders reporting pain and the treatment
125 of pain ($X^2(4) = 50.000$, $p < 0.001$). Out of the 37 riders who experience pain when competing
126 51.4% used medication that was bought over the counter to treat the symptoms of pain, 18.9%
127 used therapy and 16.2% used medication that was prescribed to the rider by a doctor (Figure
128 2).



129

130

131 Discussion

132 The present study identified that, of the 50 elite dressage riders who took part in the study 74%
133 were competing with pain; 54% had sustained a serious fall, resulting in a bone fracture,
134 dislocation or concussion, at some point in their career, similar to the incidence reported by
135 Mayberry *et al.*, (2007); Ball *et al.*, (2007) and Moss *et al.*, (2002). However, 57% of the elite
136 dressage riders that experienced pain while competing felt that the pain was not in association
137 with an old or existing injury resulting from a fall. Kraft *et al.*, (2009) determined that most
138 orthopaedic problems experienced by riders related to pain in the lower back and hip joints,
139 which reflects the most common locations of pain reported in the present study. The high
140 proportion of elite dressage riders experiencing chronic LBP is unsurprising due to the cyclic
141 loading nature involved in the training of dressage and the large mechanical forces, which are
142 imposed in the vertical axis of the body from the horse (Kraft *et al.*, 2009). Shephard (1997)
143 reported chronic pain in elite sailors was highly prevalent due to the mechanical forces received
144 from the boat and this information may be translated to the dressage rider due to both sports
145 being classified as travel sports where the trunk is required to absorb large forces to remain
146 stable (Douglas *et al.*, 2012). Work by Shephard (1997) reported that sailors are often treated
147 for the symptoms of chronic lower back pain resulting from damage cause by stabilization and
148 endurance based isometric muscular contraction.

149 Poor endurance of the hip extensor muscle (*Gluteus maximus*) and hip abductors (*Gluteus*
150 *medius*) has been previously noted in LBP (Nadler, 2000; Kankaanpaa *et al.*, 1998; McGill ,
151 1997). This suggests that fatigue in these muscle groups in connection with LBP may have an
152 impact on the rider maintaining an effective dressage position. Both Symes and Ellis (2009)
153 and Largarde *et al.*, (2005) have suggested that rider pain or stiffness induces rider crookedness
154 and diminishes the rider's ability to follow the movement of the horse both of which are
155 negative to the performance of the dressage rider. Pain during competition is also likely to
156 reduce the rider's ability to ride symmetrically, in rhythm and harmony with the horse (Greve
157 and Dyson, 2013; Kraft *et al.*, 2009). Pain experienced in the hip region would decrease the
158 rider's ability to stabilize and control the movement of the pelvis and the dissociation of leg
159 movements when applying the leg aids (Munz *et al.*, 2014), thus impacting on performance.

160 Fifty-five percent of the riders believed that the pain affected negatively on their performance
161 by causing a distraction to the rider when competing. This result is predictable due to the

162 repetition of movements that is required at elite level dressage, therefore the rider is likely to
163 continually feel pain throughout their performance. In elite level sports, it is essential that the
164 athlete remains focused throughout the competition so that optimum performance can be
165 achieved (Bernier and Fournier, 2010). If an elite dressage rider is not completely focused, then
166 this increases the risk of mistakes occurring during the test (Bridgman and Terry, 2013).

167 This study reported that saddle design was perceived to be the main cause of pain experienced
168 by elite dressage riders. This result supports the findings of the study by Quinn and Bird (1996)
169 who also found that saddle design can influence experience of pain in the dressage rider.
170 Further research in saddle design for the dressage rider is needed, as the majority of saddles
171 are designed to suit the shape of the horse and not the conformation of the rider (Greve and
172 Dyson, 2013), suggesting that riders are possibly sacrificing their comfort, for the wellbeing of
173 their horse. It is established that elite dressage riders will need to keep their pelvis closer to the
174 mid-position and further forward in the saddle, in all gaits in comparison to the novice rider
175 (Munz *et al.*, 2014). Therefore, the design of the saddle must allow for the rider to adopt a
176 neutral pelvic tilt to allow for maximum interaction between horse and rider (Munz *et al.*, 2014;
177 Clayton and Hobbs., 2017), whilst limiting the level of pain felt.

178
179 Most (86.5%) riders did attempt to manage their pain. The most common method of treating
180 pain stated by the dressage riders in this study was the use of over the counter pain medication.
181 This result is not surprising due to the ease, cost and accessibility that using medication
182 provides (Bahr, 2009; Tsitsimpikou, 2009; Abahussain *et al.*, 2005; Baker and Patel, 2005;).
183 However, the World Anti-Doping Agency (WADA) mission is to achieve clean sport and in
184 order for WADA to achieve this goal, acknowledging the number of dressage riders currently
185 competing with pain would help to evaluate a treatment strategy to ensure that riders have
186 access to therapists and other methods of treating pain rather than self-medicating (WADA,
187 2014). Currently, some elite dressage riders will have access to physiotherapists through the
188 World Class Programme which is funded through the UK Sport Lottery (BEF 2016). However,
189 regular access and the presence of the physiotherapist at national and international competitions
190 are limited (BEF, 2015).

191 Equestrian sport is categorized as an early start, late specialization and late maturation sport
192 (BEF, 2015). Considering the longevity of a competitive career in Dressage, the potential for
193 chronic pain issues leading to burnout and dropout need to be carefully considered (Balyi, *et*
194 *al.*, 2013; Bompa, 2009). Therefore, prevention, treatment and management of chronic pain
195 issues are needed for riders, not only in the competition environment but also at home and
196 whilst training.

197

198 **Conclusion**

199 This study has provided information, which establishes that there is a high incidence of elite
200 dressage riders who compete with pain, particularly lower back pain, which is problematic
201 given the longevity of an equestrian athletes' career, which can span over four decades. This
202 research reports rider's perceptions and self-reported pain and management options, which may
203 affect the data. So further research is needed to establish the causes of back pain and appropriate
204 management strategies.

205

206 **Acknowledgements**

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