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A Study to Investigate Dressage Riders Perception of the use of Dynamic Neuro-Cognitive Imagery™ on their awareness of their Riding Position

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Abstract

Equestrian performance requires the rider to be stable and balanced for the riders safety and the welfare of the horse. This study explored the riders' perception of Dynamic Neuro-Cognitive Imagery (DNI™) on riders' position of seven competitive dressage riders. The DNI™ intervention has been shown to significantly improve the performance of university-level dance students. However, there is no empirical evidence to suggest that DNI™ would significantly improve rider position. This research study aims to address this. A qualitative method using semi-structured questionnaires and focus group interviews were conducted. A sample of intermediate and elite dressage riders (N=7). Riders were asked to attend three sessions of DNI™, which were held over Zoom. Each session lasted for one hour and thirty-minutes and was held over three consecutive days. After the sessions, the riders completed an online questionnaire and attended a focus group interview. The riders were asked to describe their experiences of the DNI™ intervention and how the riders perceived the intervention impacted their ridden position. Analysis of the transcripts grouped meanings into 1st order themes, 2nd order themes, general themes, and categories. The participants preferred visual and kinesthetic imagery. The riders found that the femur and pelvic bones aided their visual imagery and enhanced the experience. Riders self-reported improvements in their ridden position, included more body awareness and movement through their lower back and pelvis. The results from this study should be interpreted with caution. This study was qualitative, which is the riders subjective experience of the DNI™ intervention. It would be recommended to use both qualitative and quantitative methods for future research.

Keywords: Mental imagery; Body awareness; Balanced; Confidence

Introduction

Horse riding is widespread in the United Kingdom, with approximately 1.8 million regular horse riders (British trade Association, 2019). Compared to other sports, per hour of participation, horse riding is classed as one of the most dangerous sports to partake in [1] with the common cause of injury being falls from a horse [1-4]. The rider's seat is integral to a rider's performance and safety [5,6]. A seat that is symmetrical, balanced, and stable enables the rider to apply cues effectively [6-9] from pressure applied through the seat bones of the pelvis [10] either bilaterally or unilaterally. Further, as the horse progresses through the gaits, there is more significant dorsoventral displacement, increasing the rider's pelvic range of motion [11]. This increased movement is absorbed through the hip joints of the rider [12]. Any reduced mobility in this area will prevent the rider from absorbing the horse's movement effectively [12], translating pressure to the rider's lumbopelvic region, and potentially predisposing the rider to back pain. AI-Eisa et al, (2006) found that 60-80% of the average population had lower back pain associated with pelvic asymmetry.

For the rider to have a good seat strategy, awareness of their posture and balance is essential, which requires the rider to be interpreting sensory input correctly [5]. Interpreting this input involves integrating visual, vestibular, and somatosensory systems [15]. Dynamic Neuro-Cognitive Imagery (DNI™) is a systematic imagery-based method for improving movement and postural retraining through multisensory processing and somatosensory integration [16]. DNI™ enhances kinesthetic and proprioceptive Imagery [17], self-awareness and perception through movement and Imagery [18]. Several studies researching dancer performance have reported that imagery intervention improved dancers' performance [18]. Amit et al, (2019) investigated the effect of DNI™ training on developpe performance. As with riding, dynamic pelvic alignment and pelvic control are essential factors for dancers to perform a developpe [18]. Yet, there is no empirical evidence to support the intervention in equestrianism.

This study will investigate riders' perception of Dynamic Neuro-Cognitive Imagery (DNI™) on the ridden position of competitive dressage riders. The study will adopt the research paradigm interpretive. The data collected will be through a qualitative approach. The knowledge gained from this type of research is intrinsically linked to the participant's experience McChesney & Aldridge 2019 of the intervention, giving an understanding of how the riders perceived and benefited from the DNI™ intervention.

Aims & Objectives

This study aims to identify whether using DNI™ can influence the rider position of competitive dressage riders.

The aims will be achieved by meeting the following objectives:

a) Objective 1-To investigate if riders perceive that Dynamic Neuro-Cognitive Imagery™ improves their position whilst riding.

b) Objective 2-To analyse the data for trends and quantify them, looking for meanings and trends.

Materials & Method

The study takes a qualitative approach, collecting responses from questionnaires, a focus group discussion, and demographic data. The demographic questionnaire included the age, weight, and level at which the rider competes. Each of these demographic questions can yield insights into the rider's level of proprioception [19-21]. The data from the questionnaires used open-ended questions. Open questions though harder to analyse, the participants can provide more in-depth answers [22].

Subjects

When selecting a sample, a homogenous purposive sampling method [23] was implemented. The sample consisted of a population with the characteristics required for the research [24] (Table 1). However, this cannot be attributed to the broader population. An advertisement was placed on local equestrian Facebook groups, which listed the requirements of the participants. A factor in the selection was the rider's ability to commit to and perform the DNI™ protocol for three consecutive days [25]. The study was all-female to remove any participant variability (anon, 2021) as pelvic anatomy differs between male and female riders [26]. The riders will be of similar levels and aged 18 and over. A total number of seven Intermediate to elite female dressage riders participated in the research, with a mean age of 39 (range: 26 -57) and a mean weight of 65kg (range: 59-72).

Table 1: The Inclusion and Exclusion criteria are required for each rider (Alexander, 2009).

Inclusion Criteria	Rider participates in British Dressage	The rider is aged 18 years and over	Rider is female	Riders able to commit to DNI™ intervention
Exclusion Criteria	Riders who have participated in Franklin Method Equestrian DNI™ previously	Injuries		

A total number of seven Intermediate to elite female dressage riders participated in the research, with a mean age of 39 (range: 26 -57) and a mean weight of 65 kg (range: 59-72).

The intervention

The intervention will consist of three sessions of one hour and thirty minutes over three consecutive days of Dynamic Neuro-Cognitive Imagery (DNI™). The sessions will embody correct pelvic biomechanics through Imagery, proprioception, and positive self-talk, specifically related (Abraham et al., 2019) [18] to the equestrian (Table 2). The DNI™ sessions will be conducted by a specialist-trained coach from Franklin.

Method Equestrian

DNI™ intervention

Objectives: To improve the body schema of the pelvis, increase proprioception and sensory awareness of the pelvis (especially in the ischial tuberosities), and introduce imagery and embodiments for movement in the pelvis Figure 1-4.

Data collection

The riders involved in the study completed an online questionnaire 48 hours post-intervention and a focus group interview, which suited the interviewee. The interviews were carried out via Teams and recorded with the consent of the participants. The interviews lasted from six to twelve minutes. The sections covered are listed in Table 3. The interviews were transcribed verbatim into a table in a word document.

Pilot study

The pilot study was carried out before the research project, going through the procedures of the primary research enabling the purpose, methods, and procedures to be understood (Alexander, 2009; In, 2017).

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Table 2: The Franklin Method Intervention for the Participants of the Study.

Day 1	DNI™ Warmup (15-20 Minutes)
	Concentration exercise.
	Imagery categories.
	Tapping exercise.
	Introduction to the Pelvis (25 Minutes)
	The function of the pelvis.
	A brief overview of the bones and joints.
	Touch boney landmarks.
	Embody movements of the pelvis. Movement in the sagittal, frontal, transverse planes and translation.
	The Hip Joint (25 Minutes)
	Discover the location of the hip joint.
	Osteokinematics and arthrokinematics of the hip joint.
	Embody force transfer of the femur heads with buoy image (Image 2).
	Movement with Franklin Method Balls or Alternative (20 Minutes)
	Sitting class and seated exercises with imagery.
Day 2	DNI™ Warmup (15-20 Minutes)
	Concentration exercise.
	Imagery review.
	Tapping exercise.
	Internal Movements of the Pelvis (35 Minutes)
	Reasons why the pelvis has internal movement.
	Movement of the pelvic halves in a closed chain.
	Bone rhythms of the pelvic halves (Figure 3). Image of the pelvic halves spiralling in hip flexion and extension.
	The Sacrum (15 Minutes)
	Embody sacral nutation.
	Movement with Franklin Method Balls (20 Minutes)
	Sitting class and seated exercises with imagery.
Day 3	DNI™ Warmup (15-20 Minutes)
	Review Content from Previous Days (50 Minutes)
	Introduction to the Pelvis (Image 4)
	The Hip Joint
	Internal Movements of the Pelvis
	The Sacrum
	Movement with Franklin Method Balls (20 Minutes)
	Sitting class and seated exercises with imagery.
	Focused Attention: The participants will focus for one minute on the feel of their body - the body awareness gives the rider a baseline to know where they are starting from
	Tapping: An introduction to tapping and how it makes an area of the body feel – the rider carries out tapping under instruction from the Franklin Method Trainer, tapping the whole body (Image 1).

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Figure 1: Tapping.
Alysen Starko-Bowes Franklin Method Equestrian Founder demonstrates tapping of the body using Franklin balls. Tapping is used for proprioception to stimulate the sensory nerves.

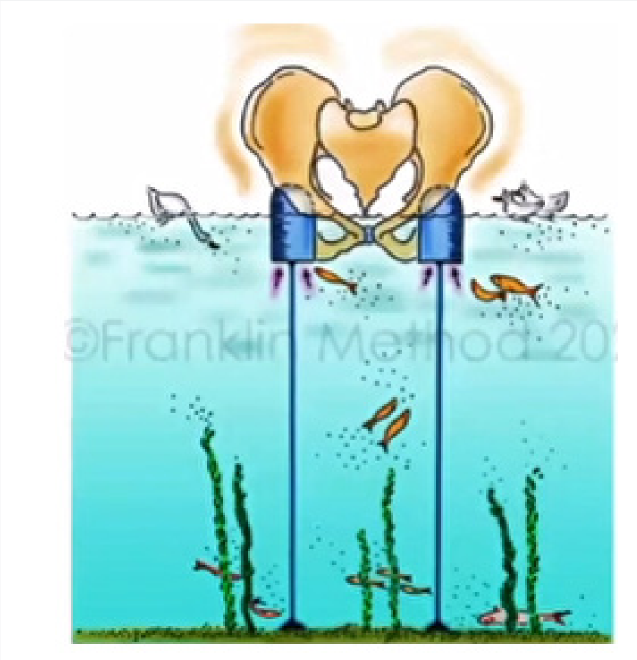

Figure 2: Metaphorical Imagery.
Metaphorical buoy image to raise and lower the pelvis. The instructor describes the image to the participant. All images property of Institut für Franklin-Methode GmbH.

The pilot study was conducted to assess the effectiveness of the questionnaire post-intervention, check the smooth running of the DNI™ intervention conducted via zoom and get feedback on the effectiveness of a focus group discussion. Three participants

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were selected, matching the required criteria for the study. The participants recruited had responded to an advert placed in a local equestrian Facebook group. The participants were emailed a link for the Zoom DNI™ intervention, which was conducted over three consecutive days for one hour and thirty minutes. Then 48 hours post-intervention, the participants were sent another link and asked to complete the follow-up questionnaire. Then again, post-intervention, the participants took part in a focus group discussion, which enabled the researcher to draw out from the individuals, personal beliefs, experiences, perceptions, and attitudes about the research conducted [27].

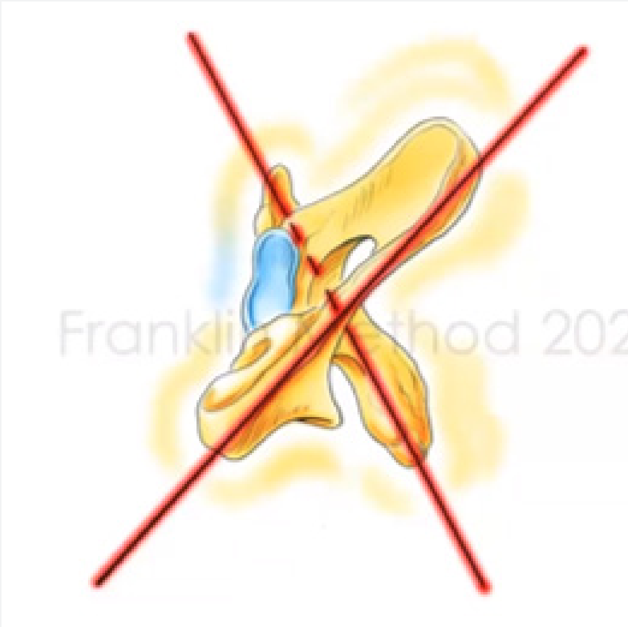

Figure 3: Tactile Imagery.
Pelvic ½ Imagery used in conjunction with self-touch. All images property of Institut für Franklin-Methode GmbH.

Figure 4: Anatomical Imagery.
Parts of the pelvis are demonstrated to participants. This enables them to embody the pelvis structure, therefore improving the anatomical imagery and the sense of body position.

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Ethics

Hartpury University Centre Ethics Committee approved this study. Informed consent from the participants was granted before the interviews were recorded. All interviewees remained anonymous and confidential throughout the study. Questioning topics did not cover intrusive or overtly personal subject areas. All participants were over the age of 18 and chose to take part of their own free will and were able to withdraw from the study at any time. The audio recordings and transcripts data were stored per the Data Protection regulations 2018.

Table 3: Sections of questions the riders are requested to answer post-intervention via an online questionnaire and Teams interview.

Questions Post-Intervention	Thoughts on DNI™
	Impact on rider's body
	mpact on horse's way of going
	Anything further to add

Table 4: Thematic data analysis.

Stage 1	This was achieved by reading the transcript of the focus group discussions and the questionnaires to get a general feel of the interview. Themes relating to the study's aims were identified in the second reading.
Stage 2	Data categories were identified from the initial review. A descriptor was developed using the literature review and considering the aims and objectives of the study for each category.
Stage 3	The transcripts were then re-read, and data coded. This was done by identifying meaningful data with keywords or phrases. The transcripts were then analysed, underlining each significant unit
Stage 4	The data collected was then sorted and categorised. A hierarchy of responses moving from specific (raw data units) to general levels (first-order themes, second-order themes and general categories) was established for each. The hierarchical organisation of raw data units into higher-order themes was constructed to identify common themes of greater abstraction. Both results were analysed to determine common patterns and condensed to formulate the overall result.
Stage 5	Frequency analysis was utilised to quantify participants' responses who cited a theme within the raw data themes. Quantifying the data aimed to condense the results to make them easily comprehensible and allow patterns to emerge.

Body awareness

An objective of the study was to identify if Dynamic Neuro-Cognitive Imagery (DNI™) influenced rider position. The imagery for the intervention was for the lumbopelvic region. This area is essential for postural stability and control [28]. Further, any pelvic asymmetry may result in pain for the rider and impact a horse's performance and welfare. Analysis of the data from the study suggests that the DNI™ intervention was beneficial for the participants riding position. A finding from the thematic research is that all the riders in the study identified that body awareness as the most impactful insight after the intervention. Participant 3. from the focus group stated, 'been trying to have more of an awareness, so this imagery has helped that'. Body awareness is the awareness of where the body is in space and what it is doing. In a study, Guire et al (2017) conducted, it was evident that riders' body awareness of laterality was poor, as the riders favoured the left seat bone more than the right. The pelvis is the interface between the horse and the rider [11]; therefore, riders awareness of seat bones is essential. The findings in the present study suggest that riders, post-intervention, had become more aware of the position of their their seat bones, with three participants stating this. Participant 5. from the focus group states, ' much more aware of my symmetry [...] I'm sitting much more even on each seat bone'. Participants said they were more aware of their symmetry and felt more centered when riding.

Pain in riders

When riding, the highest forces are absorbed in the seat bones, pelvis, sacrum, and lumbar spine region of the rider [29]. These forces can potentially contribute to lower back pain. A study investigating pain in dressage riders identified a high prevalence of riders competing with pain in the lower back and hip joints [30]. These findings are consistent with Kraft et al. [31], who reported that most orthopaedic issues are due to pain in the lumbopelvic region. Interestingly, two of the participants who competed at an elite level in dressage suffered hip, and pelvic pain, and asymmetry. Participant 5 commented that she suffered from problems with her left hip but did not state if she suffered hip pain. These findings support Hobbs et al. [32], who reported that sitting pelvic asymmetry increased on the left with years of riding and increased pain in riders who compete at higher levels. Participant 4 said she 'started the second session of the intervention with soreness and tightness in her SI joint, but by the end of the session, she had no pain'. Participant 4 also had issues with her trunk, which she stated was 'off centre'. Trunk rotation is common (Alexander et al. 2014) and is consistent with Alexander et al. (2014), proposing that trunk asymmetry can transfer to the pelvis, which could be the rider compensating by reducing thoracic motion to avoid any pain [13].

Post-intervention, all participants reported improvements in

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rider position with statements including 'hip alignment improved' and 'freed up sacroiliac joint' (SI joint), and improved mobility stating, 'more movement through the pelvis' and 'more oscillation in the lower back'. Most horse and rider communication occur through the rider's seat, transferring the forces through the lower back. Having a supple back aids the rider in driving the horse forwards [29]. A tightened back or a rider suffering from back pain may present with muscular compensations [29]. Consequently, these postural asymmetries will cause the rider's weight to be unevenly distributed [34], and the horse will have to adjust their movement to accommodate the unbalanced rider (Williams & Gabor, 2017).

Equine welfare

An asymmetric rider can profoundly affect the riders ability to communicate through their aids to the horse [35]. A rider must be able to move each body segment independently, enabling them to efficiently apply the aids to the horse. For the rider to do this, the rider requires a sufficiently stable posture [37,38]. The ideal rider's posture is explained as building blocks stacked on top of each other [5,39,40], in an alignment where a vertical line can run down from the rider's ear and through the shoulder, hip and heel [5,40,41]. This ideal posture enables the rider to maintain balance and stability [12], which helps the rider to synchronise with the horse. In this study, participants stated that post-intervention, 'they felt more balanced', 'able to distribute weight', and 'more centred', suggesting that the rider was potentially not balanced in the saddle. Communication between horse and rider relies on the rider's seat, legs, and hands [9] to apply pressure when required. If the force applied by the rider is asymmetrical, the signals will become inaccurate and inconsistent [42]. In a study, Hobbs et al (2014) found that the riders grip strength was more significant in the right hand. Another study found that pressure applied to the mouth of the horse via the reins and bit was poor Clayton et al. [43] as contact is uneven Kuhnke et al. [44]. This may lead to confusion for the horse and result in conflict behaviours McGreevy & McLean [45], leading to welfare implications for the horse with stronger aids and equipment to get the horse to comply [5,42,45] which could be potentially dangerous for the horse and the rider.

Randle, Edwards & Button (2005) reported that 91% of ridden horses displayed behaviour problems under the saddle. There needs to be a more ethical approach toward the horse's welfare, and riders need to understand the impact their position can have on a horse. In this study, the participants were asked if they had noticed any differences in the horses way of going. Participant 4. Stated 'much better aligned with the horse under me' and 'her horse noticed the change too' and participant 1. Said 'improvements in her horse too'. The questionnaire did not include a question about conflict behaviour from the horse, and this wasn't mentioned, though some horses are colloquially termed as 'stoic' and do not display behaviours even when in pain or discomfort.

Imagery

Mental imagery is popular among professional sportspeople [47], with the most common mental imagery modes used being visual imagery and kinesthetic imagery [48]. Visual imagery is described as the self-visualisation of a movement, and kinesthetic imagery requires participants to mentally rehearse the motion [47]. However, it has been suggested that different sports skills prefer different modes of imagery. The type of sports skill can also influence the level of imagery a sportsperson uses. Evidence suggests that artistic sports which are classed as closed-skill sports such as trampolinists, gymnasts and dancers have more vivid visual imagery [49]. Whereas open-skilled sports, team sports including football and rugby displayed stronger movement imagery [49] though Wang et al. [50] found athletes from open-skill sports performed better in cognitive tasks than athletes of closed-skill sports, due to possibly having developed more flexibility in visual attention. Further, this could be due to closed-skill sports being predictable, and in a relatively static environment, the sports are more often self-paced Corrado, Guarnera & Quartiroli, 2014, whereas open skilled sports are unpredictable in an environment that continually changes. Equestrian sports are predominantly an individual sport, as with team sports though they are classed as closed and open skill sports [51] with eventing which is fast-paced and unpredictable and dressage which is predictable and is considered 'the most artistic of the equestrian sports' [52]. But there is the horse-rider relationship to consider, which adds more complexity to the sport. As previously stated, the rider must consider the balance and stability of their position for the overall performance of the horse-rider combination. Further, it is suggested that elite athletes demonstrate higher levels of mental imagery ability than novice athletes, which is suggested due to the repetition of their sport [53].

The participants of the intervention were intermediate to elite level dressage riders, all-female, aged from 26 to 57 years of age. Many of the participants had carried out mental imagery before, either through Neuro-linguistic programming training or by attending an Equipilates course, so they knew what it would entail, though Participant 1. Stated, 'she hadn't connected it to riding and hadn't thought about connecting it to riding before'. The participants preferred this intervention because they could select which imagery worked best for them and as Participant 2. States' make it our own'. The imagery exercises in the intervention were delivered using visual, verbal, and tactile approaches. In the visual, the participants were shown three-dimensional anatomical bones of the pelvis, pelvic half, femur, and spine, reflecting the anatomical part of the rider's body through visual demonstration Franklin [54]. The verbal imagery was guided imagery, either metaphorical or Neurocognitive Simulation of Movement (NSM). The metaphorical imagery used was floating balloons. This was used as an initial introduction to imagery for the riders. The riders were instructed to imagine their shoulders lifted by the balloons

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going up and down smoothly and evenly, and if they didn't like the image of the balloons, they could change the image to an image they preferred, which gave the same outcome. On the second day of the intervention, the participants were introduced to pictures of two floating buoys that represented the hip bones being level. In the tactile imagery (kinesthetic), the participants were guided through self-touch points of their pelvis, femur, and spine, going through guided anatomical and biomechanical imagery, looking at the relationship between the pelvis and the femur and where their hip joints were and their sacrum.

The feedback from the participants suggests that the anatomical imagery was the preferred method, with Participant 1. stating 'helped her pinpoint where the bones move' and 'the hip joint is a big one for me', and Participant 4. said 'always had an image of my hips being further apart [...] realizing how narrow my hip joints actually had helped me sort of feel for a different place in the saddle'. When riding, the pelvis tilts anteriorly and posteriorly, and the rider must move with the horse whilst maintaining a stable leg position [55]. For the rider to do this, the rider's hip joints need to flex and extend, and by doing so, they can absorb more movement from the horse [55]. As the riders stated they were not aware of their hip joint position, this could potentially change the dynamics of the movement and how the riders absorb the vertical forces from the horse and reduce the mobility of the hips resulting in poor postures [12]. Further to this, the Franklin Method Equestrian coach demonstrated the movement of the hemi-pelvis through guided exercises, imagining the range of motion it goes through. When riding in the walk, for example, the rider's hemi-pelvis goes through the action of forward-up-back-down [12] and being aware of this movement was something the participants found to be beneficial. Therefore, the DNI™ intervention brought more proprioceptive awareness around the hip joint, which could potentially benefit equestrians, given its suggested role in controlling pelvic alignment.

The findings of this study are consistent with Heiland & Rovetti (2012), who found that dancers preferred internal anatomical and kinesthetic imagery, the most common mode of imagery used in sport [48]. Further, studies have found that the inclusion of different image types can influence the sportsperson's performance for the better [47], which backs up Callow et al. (2016) study, looking at different imagery modalities on participants in a driving simulator. They found that the combination of visual and kinesthetic imagery produced better results, as they activated other areas of the brain, giving a more profound cognitive representation, and leading to enhanced performance.

Limitations of the study and future research. A criticism of the study was the sample size. It was not easy to recruit participants. I placed several adverts in local Facebook groups but had very little interaction from members of the groups. Once I had recruited participants, four dropped out, even though they had the opportunity to attend a free Franklin Method Equestrian Course.

The limitation of using a semi-structured interview technique is a low response rate [24]. Once the intervention was completed, not all participants completed the questionnaires, and this was also observed with the focus group interviews, with only seven participants responding. This affects the reliability of the study [24]. Future research is required, with a larger sample of riders of different levels and varying ages, giving the research validity. A further limitation of the study is the disparity between the rider's perception and objective measures [7], as this study was qualitative with no quantifiable outcome. Therefore, the results are based on what the riders perceived, which is subjective. But the results from this study indicate that a feasible design for a larger-scale study would be looking at both qualitative data and quantitative data.

Conclusion

The current study suggests that a three-day DNI intervention was perceived as effective for improving the position of elite dressage riders. The intervention also resulted in the riders developing more body awareness and feeling of their ridden position, which improves rider safety and the welfare of the horse. This provides evidence that DNI intervention was beneficial for the rider and warrants further investigation using objective measures in rider performance [56-65].

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