Exploring bodily sensations experienced during flow states in professional national hunt jockeys: A connecting analysis

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Abstract

Previous research has suggested that distinct bodily sensations are experienced by athletes during flow states, and could represent a sport-specific characteristic of this phenomenon. This study aimed to enrich understanding about bodily sensations and flow states in sport by exploring this experience in national hunt jockeys. The interspecies nature of horse-rider partnerships accentuates the importance of bodily awareness in equestrian sports. Therefore, horse racing provided a fertile context in which to investigate bodily sensations experienced during flow states in sport. In-depth, semi-structured interviews exploring the experience of flow in horse racing were undertaken with 10 professional national hunt jockeys (*M* age = 28.1 years). Data were interpreted iteratively using inductive categorising/thematic and connecting analyses. Present findings suggested that flow states in jockeys produce an idiosyncratic and multifaceted sensory experience, and indicated that altered physical perceptions during flow were not restricted to kinaesthetic properties. Jockeys explained that distinct bodily sensations were experienced during flow states, and described alterations in their perceptions of kinaesthesia, balance, arousal, and strength of touch. Each of these bodily sensations was discussed in relation to sensory information received from the horse, and a connecting analysis enlightened the factors underlying the realisation of these unique bodily sensations that accompanied flow states. Findings are discussed with respect to the existing literature on flow in sport and recommendations for future research are outlined. Further, possible considerations regarding the inclusion of bodily sensations as a characteristic of the flow experience in sport are outlined.

Keywords: optimal experience; senses; kinaesthetic; qualitative; horse; equestrian.

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Introduction

Flow is an intrinsically rewarding subjective experience that occurs when individuals are challenged to their limits, but perceive their skills to be adequate to meet the demands of the task, leading to feelings of control, complete absorption in the task, and the perception that actions occur in a spontaneous and automatic manner (Csikszentmihalyi 2002). The most common understanding of flow centres on Csikszentmihalyi's (1990) conceptualisation of the phenomenon as nine dimensions, comprising: (i) challenge-skills balance; (ii) action-awareness merging; (iii) clear goals; (iv) unambiguous feedback; (v) concentration on the task at hand; (vi) sense of control; (vii) loss of self-consciousness; (viii) transformation of time; and (ix) autotelic experience. Although this conceptualisation has been the primary framework adopted by flow researchers in sport (see Swann *et al*. 2012 for a review), questions have been raised about the capacity of Csikszentmihalyi's (1990) nine dimensions to fully capture the flow experience in sport, particularly with respect to bodily sensations (Swann 2016). The aim of this study was to explore bodily sensations and flow in sport by investigating this phenomenon in horse racing, a sport in which bodily sensations are fundamental to athletic performance.

The experience of flow in sport

Numerous studies have adopted qualitative methods (e.g. semi-structured interviews) to understand how flow is experienced by athletes across a range of sports (e.g. Bernier *et al.* 2009, Chavez 2008, Jackson 1996, Sugiyama and Inomata 2005, Swann *et al*. 2015a, Young 2000). Overall, the descriptions of flow emanating from these studies have largely reconciled with Csikszentmihalyi's (1990) nine dimensions framework. However, the majority of these studies, with the exception of Chavez (2008) and Swann *et al*. (2015a), employed deductive

thematic analysis, thereby matching codes generated from the data with the dimensions of flow proposed by Csikszentmihalyi (1990). Issues surrounding this analytical approach have been outlined by Swann *et al.* (2015a), who suggested that coding data into a pre-existing theoretical framework could have constrained the potential emergence of a more refined, sport-specific conceptualisation of flow.

One particular issue with using a deductive style of analysis is that sport performance involves the execution of complex motor skills, and the level of physical exertion required for task execution is axiomatically greater than, for example, more cognitively-oriented tasks (e.g. computer gaming, writing). During sporting tasks, athletes constantly monitor their bodily movements (Jackson and Csikszentmihalyi 1999). Indeed, Jackson (1992, p. 177) stated that 'an acute awareness of body' can occur during flow states, and it has been proposed that this awareness of bodily movements could produce a distinct sensory experience during flow (Toner *et al.* 2016). Kinaesthetic perceptions and bodily sensations appear to be particularly relevant in qualitative studies that have investigated flow in sport (Swann *et al.* 2012), although these elements do not easily align with the nine dimensions framework (Csikszentmihalyi 1990). Chavez (2008) reported that collegiate athletes described bodily sensations as part of their flow experiences, which included enhanced body sensitivity and attunement. Similarly, swimmers described an intensification of their bodily sensations, and specifically referred to a feeling of heat in their extremities and body, a stronger heartbeat, and 'tingling' sensations in their muscles (Bernier *et al.* 2009). Furthermore, altered cognitive and kinaesthetic perceptions were reported as characteristics of flow states by elite golfers, who elucidated changes in their visual sensitivity (e.g. visual narrowing, visualising well) and physical sensations (e.g. sense of lightness, feel enhanced physically) during flow (Swann *et al.* 2015a).

While bodily sensations were not included as dimensions of the flow experience in studies in sport that analysed data deductively, several higher-order and raw data themes produced in these studies could be interpreted as indications of altered bodily perceptions during flow. For example, Jackson (1996) coded 'floating sensation' (e.g. being light, like floating across the ground) into action-awareness merging, and categorised 'body feels great' and 'feel strong' as higher-order themes within the autotelic experience dimension. Likewise, Sugiyama and Inomata (2005) categorised 'body feels great' into autotelic experience, and included 'very balanced' and 'body was light' in the unambiguous feedback dimension. Accordingly, these themes appear to closely resemble perceptions of bodily sensations reported in other studies in sport (Bernier *et al*. 2009, Chavez 2008, Swann *et al*. 2015a). Hence, it appears that deductively coding data *into* Csikszentmihalyi's flow framework led to the submersion of altered kinaesthetic sensations into other dimensions of the flow experience, and limited the capacity of researchers to explicate how alterations in perceptions of the body could constitute an idiosyncratic feature of flow in sport.

As Csikszentmihalyi's (1990) conceptualisation of flow emphasises cognitive aspects of this experience, some have argued that this perspective has limited the potential to understand this phenomenon as a corporeal experience (Dashper 2017, Humberstone 2011). Although perceptions of the body are not accounted for in the nine dimensions of flow, Csikszentmihalyi (1990) stated that 'the simple act of moving the body…provides optimal experience…each motor function can be harnessed to the production of flow' (p. 95). Interestingly, in the seminal work by Csikszentmihalyi (1975), climbers reported an intensification of kinaesthetic sensations during flow. Moreover, the Flow Questionnaire (Csikszentmihalyi and Larson 1984), which contains an amalgamation of direct quotes provided by participants in Csikszentmihalyi's (1975) early work, includes the phrase 'my body feels good' among the descriptions of flow. As such, it appears that altered bodily

perceptions could constitute a feature of the flow experience, but is not currently represented by the nine dimensions framework. Therefore, in light of the distinct relevance of bodily movements in sport, further investigation and refinement of the flow experience is warranted to account for the importance of kinaesthetic and bodily perceptions in this domain (Swann 2016).

Equestrian Sports

It has been suggested that the experience of flow could differ between sporting contexts (e.g. Chavez 2008, Kimiecik and Stein 1992) and that certain characteristics of the flow state might be more relevant in particular sports (e.g. Jackson 1992, 1996). One domain in which bodily sensations are of particular importance for sporting performance is equestrianism. Although the partnership involved comprised two humans, elite figure skaters reported that the unique dynamic of combining with another individual produced a distinct flow experience to that achieved when competing individually (Jackson 1992). While equestrian partnerships are comparable to sports involving human-human partnerships (e.g. pairs skating) in terms of the physical contact between both partners, equestrian sports have the additional feature of combining individuals from different species (Keaveney 2008). The interspecies nature of horse-human relationships denotes that the shared language between horse and rider is physical and embodied rather than verbal in nature (Evans and Franklin 2010). Horse riders and horses are highly attuned to their bodily sensations and utilise their bodies to transmit and receive information (Brandt 2004). This communication between horse and rider is an interactional process (Wipper 2000), whereby messages are conveyed through touch and proprioception (i.e. perception of the position of one's bodily movement - Hansen 2014). In acknowledging the relevance of the body in horse-rider relationships, Maurstad *et al.* (2013) stated that horse riding 'is about bodily sensations' (p. 326). Indeed, it has been suggested that flow states in horse riding could produce a unique kinaesthetic experience

(Thompson and Nesci 2016). Thus, equestrian sports could provide a fertile context to explore bodily sensations experienced during flow states in sport.

Horse riding produces a complex and embodied experience (Dashper 2017). Individuals who participate in equestrian sports aspire to achieve partnership (Wipper 2000) and 'oneness' (Birke and Brandt 2009, p. 196) with their horse. The synchronisation of horse and rider is commonly recognised by riders when they describe the joy associated with participating in equestrian sports (Thompson, 2011). In addition to intrinsic rewards, it is also acknowledged that good horse-rider partnerships are important for mitigating the substantial risks associated with riding horses (Thompson and Nesci 2016). A myriad of expressions have been advanced to capture this notion of unification of horse and rider, including embodying the centaur (Game 2001), 'centaurability' (Thompson 2011), co-being (Maurstad *et al*. 2013), and becoming Pegasus (Birke and Brandt 2009). This harmonisation of horse and rider produces "an unmistakable moment in the process of finding-creating the rhythm when 'it comes together'" (Game 2001, p. 8). These moments of rhythmic mutuality can generate a 'kinaesthetic act of transcendence' (Evans and Franklin 2010, p. 183), and horse riders often refer to a distinct 'feel' that embodies this sense of unity with their equine partner (Dashper 2017). Therefore, exploring the bodily sensations experienced during flow in equestrian sports could provide valuable insights into the sensorial qualities underlying the harmonisation of horse and rider.

Horse riders participate in a range of equestrian activities, including eventing, dressage, show jumping, endurance riding, polo, and horse racing. In a study exploring the factors influencing the occurrence of flow in horse racing[1] (Jackman *et al.* 2015), flat-race jockeys identified that *confidence and positive thinking, positive performance assessment, focus, preparation, optimal arousal, motivation to perform, optimal interaction with trainer,*

[1] In this article, horse racing refers to thoroughbred racing.

optimal physical state, *optimal environmental and situational conditions*, and *experience* facilitated flow. These factors were largely consistent with previous understanding of flow in sport (see Swann *et al.* 2012 for a review), but two novel themes also emerged, namely *positive horse demeanour and performance* and *optimal relationship between horse and jockey*. In turn, it was suggested that the flow experience in jockeys appeared to be affected by and permeated through the horse-rider dyad. More specifically, Jackman *et al.* (2015) reported that partnering a horse that was performing proficiently (e.g. rhythmic galloping[2] motion), displayed an appropriate racing temperament (e.g. remain calm and cope with demands), and achieved an optimal level of arousal (i.e. relaxed) prior to and during the race facilitated flow. In contrast, observable and felt signs of over-arousal (e.g. sweating, muscular tension) were adversative to flow. These findings suggest that bodily sensations are particularly relevant for the experience of flow in horse racing. Thus, further exploration of the phenomenon in this domain could offer a rich lens through which to advance understanding about bodily sensations associated with flow states in sport.

To date, most qualitative research on flow states in sport has employed thematic analysis (i.e. raw-data themes, higher-order themes, and general dimensions) to interpret the factors that facilitate, inhibit, and disrupt flow states (e.g. Jackman *et al.* 2015, Jackson 1992, 1995, Sugiyama and Inomata 2005), and describe the subjective experience of athletes during flow (e.g. Chavez 2008, Jackson 1996, Swann *et al.* 2015a). While previous studies have attempted to temporally distinguish the facilitative conditions from the flow characteristics, overlaps between these elements are apparent (Swann *et al.* 2012). Chavez (2008) outlined that there was ambiguity regarding whether or not bodily sensations were considered to be a facilitative condition for flow occurrence or a characteristic of the flow experience, as some

[2] Galloping consists of a high-speed, asymmetrical, four-time beat (i.e. non-lead hind, lead hind, non-lead fore, lead fore) in which the horse is airborne (i.e. not touching the ground) for one phase per stride (Pilliner et al. 2002).

participants outlined that internal sensations acted as precursors to flow, while others outlined that unique bodily sensations were experienced *during* flow.

Connecting analysis could be useful to address the issues outlined above as this approach enables the researcher to search for key relationships within the data and subsequently create links between categories (Maxwell 2013). This analytical approach can complement thematic/categorising analysis as synthesising categories generated from the data could provide a more composite understanding of the information (Maxwell and Chmiel 2014). Swann *et al*. (2015b) utilised connecting analysis to better understand the occurrence of flow in elite golf by searching for and identifying connections between factors that facilitated the occurrence of flow and those that characterised the experience. The results of this process yielded novel insights into the relationship between the antecedents and characteristics of flow in elite golf in that 24 connections were identified between the factors facilitating flow and the characteristics of flow. For example, elite golfers described a feeling of confidence during flow, and the connecting analysis revealed that this belief could stem from several factors, including a high-quality performance, effective practice and preparation, optimal environmental and situational conditions, the caddie, positive feedback, and commitment. As previous research reported that horses could facilitate the flow experience in horse racing (Jackman *et al.* 2015), connecting analysis could be a valuable analytical strategy to investigate how horses can facilitate corporeal aspects of the flow experience in jockeys.

Horse racing is segregated into two categories: flat-racing and national hunt racing. In flat-racing, races take place on flat tracks, and can range in distance from five furlongs[3] to two-and-a-half-miles. National hunt races are longer in distance than flat races, ranging in length from two to four-and-a-half miles, and involve the additional task of jumping fences or

[3] A furlong is the equivalent of 220 yards, or one-eighth of a mile.

hurdles during the performance. The added aspect of jumping fences in national hunt racing increases the demands placed on coordination between horse and jockey (cf. McBride and Mills 2012). This could produce more complex and varied experiences in the interactions between horse and jockey, meaning that national hunt jockeys could be a particularly valuable source of information regarding the bodily sensations experienced during flow states in horse racing. Moreover, it is suggested that top riders possess highly tuned equine antennae (Wipper 2000). As such, studying the experiences of elite, professional jockeys could provide richer understanding of the phenomenon in this domain.

Therefore, the primary objective of this study was to explore bodily sensations experienced during flow states in sport. Specifically, by conducting interviews with national hunt jockeys, this study aimed to build understanding about the bodily sensations experienced during flow states in sport by investigating this phenomenon from the perspective of information-rich cases. To move beyond the approaches of previous studies on the experience of flow, we sought to interpret data using thematic and connecting analysis to explore how perceptions of the horse-jockey dyad are linked to bodily sensations experienced by jockeys during flow. In turn, this study will begin to address calls for further investigation into bodily sensations and flow states in sport (Chavez 2008, Swann *et al.* 2012), and could contribute to any potential refinement of the flow framework in this domain (cf. Swann 2016).

Method

Participants

The participants were 10 Irish male professional national hunt jockeys who, hereafter, will be referred to by randomly chosen pseudonyms. All participants had ridden at Graded level[4]; five jockeys had ridden at Grade One level; seven jockeys had ridden at Grade Two level; and all jockeys had ridden at Grade Three level. The mean age of the sample was 28.1

[4] Graded races are the most prestigious races in national hunt racing.

years, ranging from 20 to 38 (*SD* ± 5.21). All participants held professional national hunt licences at the time of the study. The mean career length was 11.6 years (*SD* ± 5.06 years). Professional participants were selected on the basis that highly-skilled athletes are more likely to be familiar with the concept of flow and have a larger reference base of experience to draw from (Jackson 1996).

Procedure

Ethical approval for the study was granted by the departmental ethics committee at an Irish institution. The participants were contacted directly by the first author and asked if they would be interested in taking part in an interview regarding their experiences of flow in horse racing. Upon agreement, an interview was arranged for a location and time that was convenient for the participants. Prior to commencing the interview, participants were given the opportunity to ask further questions about the study and provided written consent prior to commencing the interview. As each interview transcript was sequentially analysed, the research team could perceive when theoretical saturation (e.g. Holt 2016) became apparent. After the seventh interview, the emergence of new information became substantially reduced. In accordance with good practice (Guetterman 2015), three further interviews were conducted. As no further themes or connections emerged during that process, theoretical saturation was deemed to have occurred. All interviews were conducted face-to-face and digitally recorded, with brief notes also taken throughout to aid the development of preliminary themes and connections. The interviews, which lasted on average 42 minutes (*SD* ± 6), were later transcribed verbatim in preparation for data analysis.

Interview guide

A semi-structured and open-ended approach was adopted by the researcher to enable participants to elaborate on areas that emerged during the interview and to permit the utilisation of probing questions to obtain further insight (cf. Sparkes and Smith 2014). Based

on the aims of the current study and details provided in previous research (e.g. Jackman *et al*. 2015, Jackson 1995, Swann *et al.* 2015a), a semi-structured interview guide was developed. Consistent with previous research (e.g. Swann *et al.* 2015b), participants were initially asked if they were familiar with the term flow. If not, a series of terms (e.g. 'in the groove' or 'auto-pilot') used interchangeably with flow in previous research (e.g. Jackson 1996, Young 2000) were employed in an attempt to familiarise participants with the concept. Subsequently, participants were asked to give an example of one memorable performance matching these terms and to describe their experience during that race. The interviewer judged whether or not these accounts were consistent with common conceptualisations of flow in sport (e.g. Jackson 1996, Swann *et al.* 2015a) prior to continuing the interview. All descriptions were deemed to be congruent with flow and participants were then posed a number of questions, including: (a) can you think of a personal experience in a race that was similar to this?; (b) can you describe that experience in as much detail as possible?; (c) what factors enable you to have these experiences?; and (d) what factors prevent you from having these experiences? In addition to these standard questions, probing questions (e.g. can you tell me more about that aspect of your experience?) were employed to obtain further information (cf. Sparkes and Smith 2014). The guide was pilot tested with two conditional jockeys[5]. The pilot study led to minor adjustments in the interview guide and the addition of more specific probing questions. Pilot data were not included in the final study as these jockeys did not hold professional licences.

Analysis

A research team, made up of the first three authors, was used to guide the analytical process. Initially, the first author (i.e. principal investigator) familiarised herself with the data

[5] Prior to obtaining a professional licence, jockeys receive a conditional licence until the occasion of their 60th win or passing their 25th birthday. Conditional jockeys are allowed to reduce the amount of weight allocated to their horse during the race. The amount of weight that conditional jockeys can claim is reduced in accordance with the number of winners accumulated (i.e. 0-20 wins - 7 lbs; 21-40 wins - 5lbs; 41-60 lbs - 3 lbs).

by undertaking multiple readings of each individual transcript in a process known as 'indwelling' (Maykut and Morehouse 2002). In line with recommendations (Maxwell and Chmiel 2014), data analysis involved a recursive process of alternating between inductive categorising/thematic analysis and connecting analysis. The inductive thematic analysis followed a similar procedure to that outlined by Braun and Clarke (2006). Initially, the first author searched for quotes that described the bodily sensations experienced during flow to produce initial *codes*. These codes were then inductively sorted and combined to form *higher-order themes*. Subsequently, an identical process of synthesizing similar *higher-order themes* was undertaken to generate more fundamental *categories*, which described the bodily sensations experienced by participants during flow. These same steps for thematic analysis were repeated to determine the factors pertaining to the horse that facilitated flow.

In accordance with recommended procedures (Maxwell 2013, Maxwell and Chmiel 2014), the connecting analysis involved searching for participant quotes that specifically linked factors relating to the horse to the bodily sensations reported by jockeys during flow. The clarity and richness of the described relationship between categories rather than the number of participants that discussed these links took precedence when exploring the connections between categories. This decision was taken based on the assertion that more represented quotations do not necessarily infer the importance of a link (Braun and Clarke 2006). Categorising/thematic and connecting analysis were viewed as being complementary rather than mutually exclusive (Maxwell and Chmiel 2014), and moving iteratively between both types of analysis enhanced the researchers understanding of the contextual features surrounding each category and connection. To aid this process, other members of the research team provided continual critical evaluations of the first author's interpretation of the data through the process of peer debriefing, as outlined below, until consensus was obtained.

Trustworthiness

Qualitative researchers use the term *trustworthiness* to describe methods employed to enhance the quality in their work (e.g. Sparkes and Smith 2014). The process of *peer debriefing* was undertaken throughout between the first, second, and third authors. In addition to providing continual guidance on the research process, the second and third authors critically evaluated the first author's assumptions and interpretation of the data (Creswell 2014). This process occurred through regular formal meetings of the research team and informal conversations between the first author and the second and third authors individually. While peer debriefing was conducted during the ongoing process of collecting and analysing data, 'critical friends' were asked to critique and provide feedback about findings generated by these processes (Smith and Caddick 2012, Smith *et al.* 2014). Accordingly, the fourth author was not involved in the analysis of data and thus offered an independent and more critical judgement of the findings. This author had extensive experience of research on flow states in sport and was therefore asked to critically evaluate the findings as a 'devil's advocate.' These discussions centred on providing feedback regarding the findings of the analytical process and challenging the researcher's assumptions about these findings. Subsequently, minor adjustments to the presentation of findings were undertaken.

Findings

The purpose of this study was to advance understanding of bodily sensations and flow states in sport by interviewing professional national hunt jockeys regarding their experiences of this phenomenon. The jockeys explained that flow constituted a distinct corporeal experience, and four categories represented the bodily sensations reported by these jockeys during flow, comprising: *kinaesthetic perceptions, lightness of touch, optimal arousal,* and *perceptions of balance.* Moreover, the connecting analysis revealed that each bodily sensation was facilitated by the horse (Figure 1). This section presents each category capturing the bodily sensations experienced by jockeys during flow in terms of higher-order

themes (italicised in text). In addition, connections between the factors pertaining to the horse that facilitated flow (emboldened in text) and the bodily sensations reported by jockeys during flow are outlined. Drawing directly on the experience of participants, verbatim quotes are included throughout to illustrate themes and connections.

[INSERT FIGURE 1 NEAR HERE]

Kinaesthetic perceptions

Distinct kinaesthetic perceptions in the horse-jockey dyad characterised the flow experience for national hunt jockeys. A signature feature of the flow experience for all jockeys was the distinct *kinaesthetic feel* that accompanied motion, as Nick outlined: 'the feel they give you, the way they move to the start, and the way they carry you is different.' The distinct kinaesthetic perceptions experienced during flow also included references to alterations in perceptions of speed. The jockeys outlined that a sense of control over the speed at which they were galloping accompanied the flow experience. Whereas the inhibition of flow was linked to insufficient or excessive speeds, flow states were characterised by the perception that the horse-jockey dyad was *moving at the right pace*: 'when you are on top of a horse and you are in the zone, you never feel like you are going too quick' (Chris). In explicating this embodied experience during flow, the sense that horse and jockey were *moving as one* was prominently discussed. The synchronised movements concomitant with flow states produced a distinct perception of connectedness and rhythmic mutuality between horse and jockey, which led to a switching of their attentional focus from the horse towards the broader performance context: 'you are in rhythm with him the whole way…You nearly see everything else going on because you are just not thinking about what you and your horse are doing…everything has just clicked' (Nick). The rhythmic and unified nature of motion was one of the most integral features of the flow experience for these jockeys.

In acknowledgement of the importance of jumping in national hunt racing, these distinctive kinaesthetic perceptions were proliferated when a horse was **jumping proficiently**. This higher-order theme captured the idiosyncratic feeling that surfaced when partnering horses that approached fences with the correct stride pattern and initiated their jump from the optimum take-off point: 'in jump racing, you definitely feel it…they jump brilliantly…they can pick a stride, and set themselves up very well' (Sam). A common view amongst jockeys was that horses with superior jumping ability were more likely to induce the kinaesthetic 'feel' associated with flow states: 'If you are on nicer horses, they give you that [feel]. They will end up jumping better so it gives you a much nicer feel' (Mark). The distinct kinaesthetic perceptions associated with flow states were heightened when jockeys judged that their horses were **in rhythm**. These jockeys were highly sensitive to detecting when their horse was moving in a rhythmic and fluent manner, and conveyed their ability to distinguish the kinematic ability of horses based on the bodily sensations experienced during motion: 'You know a [good] horse underneath you. They can gallop easier. They have more in their stride. They jump better. [On] inferior horses…(pause)…they're under pressure to gallop, and that puts even more pressure on [you] when you are jumping' (Michael). Positive feedback about the motion of the horse was integral to producing the kinaesthetic perceptions elicited during flow states. While the jockeys could identify that their horses were **galloping proficiently** at an early stage in the performance, this information could be acquired prior to the commencement of the race (e.g. cantering to the race starting point): "You can tell the type of horse you are sitting on by cantering down to the [starting] post. You sometimes canter down and think 'oh, this fella is quite nice'" (Mark). The capacity to obtain this positive feedback about the horse's motion prior to the performance enhanced the immediacy with which jockeys could experience altered kinaesthetic perceptions.

Lightness of touch

During flow states, the jockeys outlined that there was a distinct delicateness in the strength of their instructional cues. This *lightness of touch* was epitomised by the reduced level of tension exerted on the reins, which was an expression of the innate harmonisation between horse and jockey:

> There are some you feel you are interacting so well with them, and a little touch is all you need…they aren't pulling you and you don't have to be pulling them back in, and you have a nice contact on the reins. (Sam)

In contrasting the perceptions of touch experienced during flow to performances in which flow was inhibited, he continued by stating: 'on another one you might have to yank the reins going down to the jump and give it a big kick to get it to go.' Further, the lightness of cueing during flow was regarded as an observable indicator of the experience.

A **favourable response to command** from the horse enabled the initiation and continuation of these deft instructional cues during flow states. By generating the desired behavioural response from the horse through more delicate movements compared to normal performances, this created the sense that horse and jockey were in tune with one another:

> It's just so much easier to ride a good horse. You don't have to…(pause)…nothing is an effort. You don't have to try and do anything, everything you ask the horse to do, it will do it for you. You're so in rhythm with the horse that without even trying the horse is listening to you. You don't have to force anything or make any drastic moves. Nothing is difficult… it just happens. It just flows. (Nick)

The likelihood of being afforded the opportunity to deliver subtler and more refined instructional cues was greatest when jockeys partnered horses with superior ability:

> You feel as though you know everything that's going to happen before it happens. It's very rare that you'd be on a horse that nice…There is very little

> interaction with the horse…you only have to make very gentle touches and they'll automatically give you every reaction that you want. (Sam)

The capacity to experience this bodily sensation was considered to be highly contingent on the performance and response efficacy of the horse. In contrast a less desirable/prompt response to command led to more vigorous cueing commands, thus opposing the lightness of touch concomitant with flow states.

Optimal arousal

The jockeys in this study reported that optimal arousal was an essential feature of their flow states. A *relaxed* physical state was described during flow, and this sensation appeared to be a somatic indicator of the calm psychological state experienced during flow, as Ben outlined: 'you are a little bit more relaxed and mentally things are happening a little bit slower in your mind too.' In addition to this feeling of relaxation, these jockeys outlined that distinct perceptions of *positive energy* were concomitant with their flow states, as conveyed by statements including: 'you have a positive energy about you' (Adam); and 'it gives you this energy that you didn't know you have' (David). In acknowledgement of the physiological sensations emitted by optimal arousal and the physical connection between horse and rider, it was explained that these bodily sensations could be transmitted to the horse through the cutaneous interface between horse and rider:

> When you are more relaxed, your body is more relaxed, and when you are more relaxed, the horse is more relaxed and trusts in you more. When you are sitting on the horse [in flow], you give it a more positive vibe when you are riding. (Nick)

A positive perception of the horse's level of physiological activation was integral to achieving optimal arousal. The jockeys explained that a **relaxed** horse was important to experience the relaxation associated with flow states: 'At the time when it's going perfectly,

the horse will be calm, and will want to go the same pace as everyone else' (James). Positive sensations also stemmed from perceiving that a horse was **feeling good**. A noteworthy finding was the perception that symptoms of physiological arousal in the jockey could be interpreted by the horse and reciprocated across the horse-jockey dyad, as Nick outlined:

> You automatically gain confidence from sitting on a better horse. From him giving you more confidence, you'll give him confidence as well and it just makes everything easier…the horse has the same mentality [as you] really and they run better for it. Maybe that's in my head, but I think horses run better for me when I'm confident.

The jockeys explicated the ultrasensitive physiological antennae of horses ('they get a sense of what you are thinking') and their capacity to discriminate between bodily sensations emitted by jockeys (e.g. anxiety or relaxation).

Perceptions of balance

Information concerning perceptions of balance is sourced from the vestibular system, and a feeling of equilibrium was reported as a feature of the flow experience. In explicating the importance of balance for riding horses, these jockeys appeared to be highly sensitive to acquiring and interpreting information about their own balance as well as that of the horse. The distinct perception of *balance* experienced during flow was a highly desirable sensation: 'Everything is in a balanced situation. It's going to feel nicer, it feels better' (David). This bodily sensation was a hallmark of the heightened levels of kinematic effectiveness in the horse-jockey dyad experienced during flow states.

The achievement of this bodily sensation was highly dependent on the level of equilibrium achieved by the horse during performances. Jockeys emphasised the reciprocal nature of equilibrium within the horse-jockey dyad, with the degree of equilibrium in one partner affecting the equilibrium of the other. A **balanced** horse helped jockeys to achieve

this sense of equilibrium during the performance. It was broadly discussed that some horses are more proficient in maintaining their own equilibrium than others, and that this capacity enhances the likelihood of a jockey realising the sense of balance associated with flow. An additional finding was that the equilibrium of the horse could enhance perceptions of control and effortlessness during performances, as Sam explained:

> A horse running well is really the same as a nice runner. They are very controlled, their body is perfectly balanced and they are perfectly composed…If the horse is perfectly balanced, they are in control of everything in that moment, so you are sitting on it and having to do very little work really. If the horse is balanced in itself, it's very easy to look stylish and look neat and tidy on top of it.

In contrast, a horse that was unbalanced prevented the achievement of equilibrium associated with flow. Subsequently, these jockeys outlined that such negative bodily sensations forced them to adjust their riding position, which resulted in the inefficient use of energy resources: 'If a horse is unbalanced, it's going to be pulling and dragging out of you, which causes you then to have to try and counter-balance them, so there is a massive waste of energy in that system' (Mark). This example highlights that being balanced not only enhanced their subjective experience, but was also integral to optimising performance.

Discussion

This study was designed to better understand the bodily sensations experienced by athletes during flow by qualitatively exploring this phenomenon in national hunt jockeys. The primary contribution of this study was the identification of an amalgam of bodily sensations experienced by jockeys during flow. In turn, this study begins to answer calls for further understanding of bodily sensations and flow in sport (Chavez 2008, Swann 2016) by providing in-depth insights into how perceptions of the body can alter during flow from the

perspective of athletes who rely heavily on bodily sensations during their performances. The present research builds on previous work that identified altered bodily sensations as components of the flow state in sport (e.g. Bernier *et al.* 2009, Chavez 2008, Swann *et al.* 2015a). By doing so, the findings support the contention that Csikszentmihalyi's (1990) nine dimensions framework might not adequately account for the embodied sensory aspects of the phenomenon (cf. Dashper 2017, Humberstone 2011), and suggest that further refinement of the flow framework could be warranted to account for the complex and multisensorial nature of the flow experience in sport.

The reliance on bodily sensations for the transmission and interpretation of information between horse and jockey offered a rich context to explore perceptions of the body during flow in sport. In this study, altered perceptions of kinaesthesia, touch, arousal, and balance represented jockeys' descriptions of bodily sensations experienced during flow. While elements of each of these categories are apparent under various codes in previous studies (e.g. Bernier *et al*. 2009, Chavez 2008, Jackson 1996, Sugiyama and Inomata 2005, Swann *et al.* 2015a), the present study produced a clearer and more definitive presentation of some bodily sensations that can be experienced by athletes during flow. Notably, several bodily sensations identified in previous research were not reported in the present study, including *intensified body sensitivity* (Chavez 2008), *intensified perceptions of heat* (i.e. thermic perceptions - Bernier *et al.* 2009) and *absence of pain*[6] (i.e. nociceptive perceptions - Jackson 1996, Sugiyama and Inomata 2005). As such, it is possible that bodily sensations experienced during flow could differ between sporting contexts, and that the idiosyncratic physical demands and environments contained within certain sporting activities could produce unique corporeal experiences. Furthermore, previous research has indicated changes

[6] References to the absence of pain were coded as components of the autotelic experience by Jackson (1996) and Sugiyama and Inomata (2005).

in other senses, including *auditory perceptions* (e.g. Chavez 2008) and *visual perceptions* (e.g. Swann *et al.* 2015a). Therefore, any refinement to the flow framework should go beyond physical perceptions and account for the multitude of sensorial features that have been reported as part of the flow experience in the current study as well as previous research in the area.

An important feature of the flow experience reported in the current study was the locomotive synchrony between horse and rider. More specifically, these jockeys referred to the distinct kinaesthetic 'feel' that embodied their experience whilst jumping and galloping. The relevance and desirability of this 'feel' reinforces the contention that the unification of horse and rider can generate distinct kinaesthetic sensations during flow states (Thompson and Nesci 2016). This kinaesthetic 'feel' was epitomised by a sense of oneness and rhythmic mutuality in the horse-jockey dyad. The rhythmic harmony and corporeal synchrony described by jockeys during flow states appears to reflect the concept of entrainment, a term Game (2001) uses to explicate how horses and riders synchronise and attune with each other's rhythm. This locomotive synchrony between horse and jockey forged a distinct sense of connectedness and partnership during flow states. Previous work in sport has alluded to perceptual changes in athletes' connections with sporting objects and environmental features during flow. For example, Jackson (1996) included 'like boat becomes part of you', 'tuned into water', and 'feel as though body and bike one' as raw-data themes describing the flow experience, but coded these within the loss of self-consciousness dimension. Similarly, Chavez (2008) outlined that swimmers reported a connection with the water, and a golfer described their club as an extension of their hand during flow. Subsequently, this led the author to conclude that 'there is a heightened perception of the body in the environment in which the athlete is competing' (p. 88). While the sentient nature of horses undoubtedly differentiates the nature of this embodied experience in equestrian sports, the current findings

build on previous work by suggesting that the experience of flow is associated with altered perceptions of kinaesthesia and relations with elements that are external to the body (i.e. the horse).

Distinct perceptions of balance whilst riding were reported as characteristics of flow states. Jockeys are required to maintain balance whilst riding an animal travelling at close to 40-miles-per-hour across undulating terrain, and necessitate supreme levels of balance to continually adapt their bodily position to optimise the equilibrium of the dyad. Increases in movement velocity place greater demands on the horse's balance and dynamic equilibrium (Pilliner *et al.* 2002). In contrast to other equestrian riders who generally ride in a three-point position and maintain contact with the horse through their two legs and saddle (e.g. show jumping, dressage), jockeys typically ride in a two-point position (i.e. two legs in contact with horse) and rarely 'sit' in their saddle. While this riding position is considered to be more effective for racing performance (Pfau *et al*. 2009), it also accentuates the importance of balance for this sporting activity. Sugiyama and Inomata (2005) reported that athletes described perceptions of being *very balanced* during flow, although this was categorised deductively within the unambiguous feedback dimension. Arguably, this bodily sensation could be more relevant for sports that impose greater demands on the balance of athletes, including sports that involve undulating surfaces (e.g. snowboarding) and unstable objects (e.g. gymnastics rings), and those that contain movements involving rotation (e.g. hammer throw) and landing (e.g. figure skating).

Functioning horse-rider combinations should perform effortlessly, harmonically, and without signs of duress or force (Wolframm 2014). During flow states, jockeys described the softness of their hands when in contact with the reins, and outlined that lighter and more delicate movements elicited the desired behavioural response from the horse. Alterations in proprioceptive perceptions were linked to positive feedback regarding the horse's

progression, and horses that were meeting the demands of the task were less likely to require more pronounced cueing commands, thus enhancing perceptions of effortlessness during the performance. This bodily sensation reconciles with previous research in sport, as golfers reported a *sense of lightness* in their bodies and a *feeling of lightness* in their club (Swann *et al.* 2015a), while Sugiyama and Inomata (2005) and Jackson (1996) reported *body was light* and *feeling light* as features of the flow experience. Present findings suggest that perceptions of lightness described by jockeys referred more precisely to the strength of movements underlying their instructional cues rather than more broadly to their body as a whole. Previous studies in sport reported *feel strong* (Sugiyama and Inomata 2005) and *feeling stronger* (Swann *et al.* 2015a) as features of flow, but this characteristic was not apparent in the current study. Instead, jockeys outlined that exerting stronger force through the reins and legs was more likely to coincide with the absence of flow as this type of instruction was generally required when a horse was not performing capably or responding in the desired manner. Therefore, it is likely that perceptions of the strength of movement produced during flow states could be specific to the demands of a sport, degree of strength or precision required for executing specific skills, and parts of the body that are most involved in executing particular movements in different sports.

Similar to flat-race jockeys (Jackman *et al.* 2015), national hunt jockeys conveyed the importance of reaching an optimal level of arousal for achieving superior performance. Descriptions of distinct perceptions of physiological activation during flow states in previous research have varied, with some athletes alluding to *relaxed and calm aspects of the experience* (Chavez 2008), while elite golfers reported *feeling calm/relaxed* and *feeling the adrenalin* (Swann *et al.* 2015a). As such, it is possible that optimal levels of physiological activation could be influenced by the sport and individual preferences. A noteworthy finding was that jockeys' descriptions of optimal arousal during flow included references to their

own level of arousal as well as information relating to the arousal levels of the horse. Flow states were associated with perceptions of relaxation for both horse and rider, and jockeys explained that the bodily sensations associated with a relaxed physical state could be transmitted to and interpreted by the horse. This finding exemplifies the embodied nature of communication between horse and rider (Brandt 2004, Dashper 2017), and emphasises the exceptional somatic sensitivity of horses (Brandt, 2006). In a broader sporting context, the potential transmission of information regarding an individual's level of physiological activation could be important in sports that involve physical contact between human partners. For example, in paired figure skating and dancing, it is possible that the cutaneous interface between partners could provide a medium for the transmission of bodily sensations between partners.

Limitations and future recommendations

Although this study provides greater understanding of bodily sensations experienced during flow in sport, and specifically in the sport of horse racing, there are some limitations. The findings are unique to this sample of professional national hunt racing jockeys, and future research should seek to investigate bodily sensations and flow in other sports, as well as other equestrian disciplines. While career-based interviews can provide initial understanding, the retrospective nature of this approach has been criticised (e.g. Jackson and Kimiecik 2008, Swann *et al.* 2012). In an attempt refine this approach and collect experience-near data on the psychological states underlying excellent performance in sport, Swann *et al.* (2016) conducted 'event-focussed' interviews with athletes soon after recent and specific excellent performances. This approach has enriched understanding of flow in sport and future studies could attempt to acquire more recent and detailed descriptions of bodily sensations experienced during flow. In addition, this approach could also explore whether or not perceptions of bodily sensations differ between flow and other psychological states

underlying excellent performance (e.g. clutch states - Swann *et al*. 2016). Ethnographic approaches to the study of sensory experiences in sport have been advocated (e.g. Sparkes 2009), and as present findings suggest that flow states involve a distinct sensory experience, ethnographic research designs could offer a potential avenue for further research. Calls for physiological and psychophysiological approaches to the study of flow in sport have been forwarded (e.g. Jackson and Kimiecik 2008, Swann *et al.* 2012). The concept of challenge and threat states (Blascovich and Mendes 2000) has been recently proposed as a potential avenue for experimental flow research (Tozman and Peifer 2016), and the Theory of Challenge and Threat States in Athletes (Jones *et al.* 2009) could be a useful starting point for researchers to examine the physiology of flow states in sport. Finally, the subjective nature of data analysis and interpretation of findings derived in the present study could be different to the opinion of others, although we aimed to address this issue by utilising various trustworthiness strategies throughout the analytical process.

Conclusion

The current study provided detailed insights into bodily sensations experienced by national hunt jockeys during flow states. The importance of bodily sensations in equestrian sports provided a rich context in which to explore perceptual changes in the body of athletes during flow. Consistent with previous research (e.g. Bernier *et al*. 2009, Chavez 2008, Swann *et al*. 2015a), the findings indicate that perceived alterations in the body can be produced when athletes experience flow. In the current study, jockeys reported a lightness of touch, optimal arousal, and altered perceptions of balance and kinaesthesia during flow. Furthermore, in comparing the current findings to previous research, it appears that the corporeal aspect of the flow experience could differ between sporting contexts. The environment in which athletes perform (e.g., water), the objects they use (e.g., golf club), and the physical movements involved in specific activities can vary across sports, thus altering

the nature of the sensory information acquired by the body (Hockey and Allen Collinson 2007). In acknowledgement of the interspecies nature of the sporting partnership in equestrian sports, the jockeys elucidated that altered perceptions of the body during flow were facilitated by the horse. Although unique interactions with auxiliary objects (e.g. bikes) and environmental features (e.g. water) have been identified as components of flow in sport previously (e.g. Jackson 1996), the sentient nature of horses arguably leads to a more dynamic and complex embodied experience during flow compared to non-equestrian sports. In conclusion, while common understanding of flow centres on Csikszentmihalyi's (1990) nine dimensions framework, the current findings suggest that revision of the conceptualisation of flow in sport could be warranted to account for the complex and multisensorial nature of the experience in this domain.

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