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Psychological Demands Experienced by Recreational Endurance Athletes

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Psychological Demands Experienced by Recreational Endurance Athletes

This study aimed to identify psychological demands that are commonly experienced by endurance athletes so that these demands could inform the design of performance-enhancement psychological interventions for endurance athletes. Focus group interviews were conducted with 30 recreational endurance athletes of various sports (running, cycling, and triathlon), distances, and competitive levels to explore the psychological demands of training, competition preparation, and competition participation. An inductive thematic analysis was used to identify psychological demands that were experienced across sports, distances, and competitive levels. Seven themes captured demands that were commonly experienced away from the competitive environment (time investment and lifestyle sacrifices, commitment to training sessions, concerns about optimising training, and exercise sensations during training), preceding an endurance event (pre-event stressors), or during an event (exercise sensations, optimising pacing, and remaining focused despite adversity). Interventions that could be delivered to recreational athletes, who do not typically have access to a sport psychologist, are suggested. Experimental research examining the efficacy of interventions that help endurance athletes to cope with the reported psychological demands is encouraged.

Keywords: cycling, focus groups, qualitative research, running, stressors, triathlon

1 Through this research, we aim to contribute to the design of performance-enhancement
2 psychological interventions for endurance athletes by increasing the understanding of the
3 psychological demands commonly encountered by endurance athletes. Sport psychology
4 professional practice guidelines (Birrer & Morgan, 2010; Simons, 2012; Taylor, 1995)
5 encourage practitioners who are designing a psychological performance-enhancement
6 intervention to target the psychological demands of the sport, in order to optimise the efficacy
7 of the intervention. Although the prominent psychological demands experienced in specific
8 endurance events vary (e.g., Dosil, 2006), there may be demands that are commonly
9 experienced across various endurance sports, competitive distances, and competitive levels.
10 Research examining the efficacy of interventions at improving endurance performance could
11 target these common demands, which would provide an evidence base for practitioners
12 working with endurance athletes who compete in various endurance events. In other words,
13 efficacious interventions that target common psychological demands could have a wide
14 application.

15 Psychological demands relate to stressors in transactional theories of stress (e.g.,
16 Fletcher, Hanton, & Mellalieu, 2006; Lazarus, 1999). Contemporary transactional theories in
17 sport psychology propose that stress is “an ongoing process that involves individuals
18 transacting with their environment, making appraisals of the situations they find themselves in,
19 and endeavouring to cope with any issues that might arise” (Fletcher et al., 2006, p.329). From
20 a transactional perspective, stressors refer to encountered environmental demands (events,
21 situations, and conditions), and strain refers to negative psychological, physical, and
22 behavioural responses to stressors (Fletcher et al., 2006). Fletcher and colleagues’ (2006) meta-
23 model of stress, emotions, and performance provides a useful framework for explaining the
24 effects that stressors can have on an athlete’s performance. According to this meta-model,
25 athletes appraise the significance of their relationship with an encountered stressor to their

1 personal wellbeing. This process of appraisal involves an evaluation of whether the encounter
2 is relevant to their goals, values, beliefs, and situational intentions (primary appraisal) and an
3 evaluation of their coping options (secondary appraisal). The athlete's appraisals determine the
4 emotions, and associated somatic and cognitive symptoms, that the athlete experiences in
5 response to the stressor (Martinent & Ferrand, 2015; Uphill & Jones, 2007). Following the
6 emotional response, it is proposed that the athlete evaluates whether the emotion is relevant to
7 their performance (tertiary appraisal) and their options for coping with the emotion (quaternary
8 appraisal). The athlete's perceived ability to control and cope with their emotional response is
9 proposed to determine whether the athlete perceives it as facilitative or debilitating to their
10 performance. For example, negatively-toned emotions such as anxiety can be appraised as
11 being detrimental or facilitative to performance through their effects on psychological factors
12 such as concentration and effort (Neil, Hanton, Mellalieu, & Fletcher, 2011). Finally, an
13 athlete's actual ability to cope with the stressors and their responses to them is proposed to
14 determine the outcomes of the stress process, with sub-optimal wellbeing and performance
15 suggested to reflect an inability to cope. Indeed, research examining the stress process has
16 shown that an athlete's appraisals of encountered stressors influence their emotional responses
17 and that, depending on the athlete's coping, these emotional responses influence performance-
18 related behaviours (Miles, Neil, & Barker, 2016; Neil, Bowles, Fleming, & Hanton, 2016). The
19 stressors encountered by endurance athletes could therefore influence their performance,
20 depending on how the athlete appraises the stressors and elicited emotions and depending on
21 the effectiveness of their coping strategies.

22 Research has demonstrated that athletes encounter a wide range of stressors (for a
23 review, see Sarkar & Fletcher, 2014). These stressors can be broadly categorised as being
24 associated with competitive performance (referred to as "competitive stressors"), the sport
25 organisation that athletes operate within (referred to as "organisational stressors"), and personal

1 life events outside of sport (referred to as “personal stressors”). Competitive stressors include
2 preparation, injuries, pressure to perform well, underperformance in competition, performance
3 expectations, self-presentation, and rivalry. Organisational stressors include leadership and
4 personnel issues, cultural and team issues, logistical and environmental issues, and
5 performance and personal issues. Personal stressors include the work–life interface, family
6 issues, and the death of a significant other (Arnold & Fletcher, 2012; Sarkar & Fletcher, 2014).
7 Some stressors, such as pressure to perform well, are experienced by many samples of athletes
8 (McKay, Niven, Lavallee, & White, 2008; Noblet & Gifford, 2002; Thelwell, Weston, &
9 Greenlees, 2007). Other stressors, however, are more prominent in certain samples of athletes,
10 such as certain types of sport (McKay et al., 2008), competitive levels (Fletcher, Hanton,
11 Mellalieu, & Neil, 2012), and playing positions (Thelwell et al., 2007).

12 Research has illuminated psychological demands experienced during training and
13 events within specific endurance sports (Buman, Omli, Giacobbi, & Brewer, 2008; Hollander
14 & Acevedo, 2000; Holt, Lee, Kim, & Klein, 2014; Kress & Statler, 2007; Nicholls, Levy,
15 Grice, & Polman, 2009; Samson, Simpson, Kamphoff, & Langlier, 2015; Schumacher, Becker,
16 & Wiersma, 2016). For example, channel swimmers have reported many demands including
17 wildlife encounters, weather and tidal conditions, swimming into the dark, loneliness,
18 uncertainty about the duration of the swim and finishing, and a range of uncomfortable
19 experiences (cold, cramping, pain, aching, hunger, fatigue, mouth swelling, and vomiting)
20 (Hollander & Acevedo, 2000; Schumacher et al., 2016). In addition, ultramarathon runners
21 reported that muscle cramping and injuries, gastrointestinal problems, and thoughts about
22 quitting were key stressors during a 125-kilometre ultramarathon (Holt et al., 2014).
23 Furthermore, elite-level cyclists reported that exertion pain is the greatest psychological
24 demand (Kress & Statler, 2007), and many recreational marathon runners report “hitting the
25 wall” (Buman et al., 2008). Anecdotally, endurance athletes in various sports and distances

1 also experience some common psychological demands (e.g., Taylor, 1995; Tuffey, 2000). For
2 example, Tuffey (2000) argued that endurance athletes experience three broad psychological
3 demands: 1) long and repetitive training sessions that can undermine motivation; 2) pain,
4 discomfort, and fatigue experienced in training and competition; and 3) preparation for
5 competition, including planning for pain and discomfort and developing and committing to a
6 race plan. There is a lack of research, however, that has included athletes of different endurance
7 sports, distances, or competitive levels and examined demands that are commonly encountered
8 by these athletes.

9 Identifying psychological demands encountered by endurance athletes who compete
10 recreationally, rather than professionally, could inform educational content and psychological
11 support provided to athletes who do not typically have access to a sport psychologist. These
12 athletes may learn about sport psychology through online media or group workshops where the
13 delivered content is unlikely to be personalised. Understanding the demands commonly
14 encountered by recreational endurance athletes could therefore help to maximise the relevance
15 of delivered content within the constraints of group-based delivery. In particular, identified
16 demands could inform the psychological support provided by “psyching teams” before, during,
17 and after endurance events such as marathons. Psyching teams provide support using online
18 media such as webpages and webinars, workshops, written handouts, dinner speeches, and brief
19 conversations with athletes before, during, and after the endurance event (Meijen, Day, &
20 Hays, 2016).

21 Research to date has illuminated demands experienced by athletes competing in a wide
22 range of sports, including specific endurance events. Some demands are commonly
23 encountered across sports, playing positions, and competitive levels, but others are particularly
24 prominent in certain samples of athletes. To date, no studies have included athletes of different
25 endurance sports, distances, or competitive levels and examined whether any psychological

1 demands commonly affect endurance athletes. The aim of the present study was to increase
2 understanding of the psychological demands commonly encountered by endurance athletes, in
3 order to inform the design of performance-enhancement psychological interventions for
4 endurance athletes. Research demonstrating the efficacy of psychological interventions that
5 target common demands would provide an evidence base that practitioners working with
6 endurance athletes could consider. This study also aimed to draw attention to common
7 psychological demands that relate to wellbeing instead of performance, such as sport
8 enjoyment, to support holistic psychology practice.

9 **Methods**

10 **Research Philosophy**

11 The primary researcher held a pragmatic research philosophy and attempted to provide useful
12 data for researchers and practitioners interested in performance enhancement in endurance
13 sports (Giacobbi, Poczwadowski, & Hager, 2005). Throughout the study, data collection and
14 analysis strategies were chosen based on their suitability for identifying psychological demands
15 that are commonly experienced across various endurance sports, distances, and competitive
16 levels.

17 **Research Design**

18 Focus group interviews were used to collect data. Focus groups offer a tool to identify areas of
19 consensus and disagreement between participants' experiences, and they can generate rich data
20 by capitalising on group interaction such as discussion, debate, exchange of anecdotes, and use
21 of humour (Kitzinger, 2006; Patton, 2002).

22 **Participants**

23 Maximum variation sampling (Patton, 2002) was chosen, and participants of different sports,
24 distances, competitive levels, ages, and genders were included. The researchers assumed that
25 they would identify unique themes in each focus group that would shed light on demands

1 experienced by specific groups. Nevertheless, the researchers were primarily interested in
2 common psychological demands identified in spite of this variation that could represent central,
3 shared experiences that characterise participation in endurance sports (Patton, 2002).

4 Participants were 30 British, recreational endurance athletes. Interviews were
5 conducted with the following groups: runners (n = 10) who competed at distances ranging from
6 800 metres to half marathons, including cross country; cyclists (n = 6) who competed in time
7 trials, road races, or both; triathletes who competed at distances ranging from sprint to long
8 distance (n = 10); and triathletes who predominantly competed in long-distance events (n = 4).
9 Focus group composition and participant characteristics are summarised in Table 1.
10 Participants also estimated, using a fixed range of values, the number of events they had
11 participated in during the previous year (median = 6-10) and in total (median = 21-50).

12 [Table 1 here]

13 **Procedure**

14 Following ethical approval from the department ethics committee, gatekeepers (e.g., coaches,
15 committee contacts) at endurance sport clubs in South East England were contacted by email.
16 Three gatekeepers hosted a focus group with members of their club, and a fourth focus group
17 (three of four participants were from the same club) was held at the researchers' university.
18 Using pre-existing groups had the advantages that participants were comfortable talking to one
19 another, they related to each other's contributions, and they offered different perspectives on
20 specific examples (Kitzinger, 1994). Each focus group involved athletes from one sport so that
21 shared familiarity of the sport would facilitate in-depth discussion. Before the first focus group,
22 the facilitator conducted a pilot focus group with recreational runners to practise using the
23 interview guide and to test the relevance of questions. The questions were well received and
24 judged by the researchers to be appropriate for further use. Before each focus group, the
25 facilitator (who had not competed in an endurance sport) reflected in writing on topics of

1 discussion that were expected based on familiarity with sport psychology literature and
2 personal assumptions, themes they hoped would emerge (e.g., pain and discomfort are demands
3 in competition, boredom is a demand in training) and would not emerge (notably, anxiety plays
4 a key role in performance), and questions they perceived to be more important or more
5 interesting (e.g., “I am more interested in the demands faced during competition. I therefore
6 risk rushing through the questions about the demands experienced before competition”). The
7 main purpose of this activity was to raise awareness of assumptions and expectations about the
8 demands experienced by particular groups of endurance athletes and the researcher’s own
9 biases so that, during the focus group, the facilitator could self-question choices that could
10 influence the results (e.g., choice of probing questions, decision to move on to a new question).

11 Main Focus Groups

12 A semi-structured interview guide was prepared following the guidance of Patton (2002). The
13 facilitator began each focus group by describing what a focus group involves. The facilitator
14 then set ground rules (e.g., no interrupting) and introduced the topic. Specifically, the
15 researcher explained that he was interested in learning about the mental demands that
16 endurance athletes experience before and during competition. A demand was defined as a
17 typical aspect of the sport that makes the sport difficult. The researcher also specified that he
18 wished to talk about the thoughts and feelings that the participants experienced when training,
19 preparing for competition, and competing. Participants were encouraged to think about
20 specific, relevant experiences that they could remember well before answering each question.
21 Four main questions addressed psychological demands of training (“What do you feel are the
22 mental demands that you face, if there are any, when you are training for your sport?”),
23 psychological demands experienced during the build-up to a competition, psychological
24 demands experienced during a competition, and mental characteristics needed to excel. The
25 facilitator also asked whether pre-competition demands change as a competition draws closer

1 and whether demands vary during different stages of a race. Participants were encouraged to
2 talk about experiences that endurance athletes might take for granted. The facilitator used
3 detail, clarification, and elaboration probes, compared and contrasted responses, summarised
4 content, and asked for examples throughout (Patton, 2002). The facilitator also invited less-
5 vocal participants to contribute, and he moved on from each question when probing no longer
6 led to the discussion of new material. Before concluding, participants were given an
7 opportunity to discuss experiences that were not covered. Focus groups lasted between 85 and
8 115 minutes, and they were audio recorded.

9 **Data Analysis**

10 The interviews were transcribed verbatim by the primary researcher, producing 213 pages of
11 double-spaced text. Features that could influence data interpretation, such as laughter and
12 pauses in speech, were included. The transcripts were analysed in NVivo using a thematic
13 analysis that involved six phases: familiarisation with data (reading and re-reading the data,
14 noting down initial ideas); generating initial codes (systematically coding interesting features
15 of data, collating data relevant to each code); searching for themes (collating codes into
16 potential themes, gathering all data relevant to each potential theme); reviewing themes
17 (checking if the themes work in relation to coded extracts and the entire data set); defining and
18 naming themes (refining specifics of each theme and the overall story the analysis tells,
19 generating clear definitions and names for each theme); and producing the report (selecting
20 vivid, compelling extract examples, relating the analysis to the research question and literature)
21 (Braun & Clarke, 2006). Each theme was judged to capture “something important about the
22 data in relation to the research question, and represents some level of patterned [original
23 emphasis] response or meaning within the data set” (Braun & Clarke, 2006, p.82). An inductive
24 (i.e., data-driven) thematic analysis was chosen, and themes were identified in the explicit or
25 surface meanings of the data, so that the themes reflected participants’ accounts of experienced

1 demands. As this study is interested in psychological demands that are experienced across
2 endurance sports, themes were identified across (rather than within) focus groups, and the
3 themes provide an overall description of the demands faced by the endurance athletes (rather
4 than focusing on a small number of themes). The second author, who studied all transcriptions,
5 acted as a “Devil’s advocate”, critically challenging the primary researcher’s interpretation of
6 the data (Krane, Andersen, & Streaun, 1997). Critical discussion led to the addition of one theme
7 (concerns about optimising training) and refinement of the other six themes.

8 **Results**

9 Seven themes captured psychological demands that were commonly experienced across
10 endurance sports, distances, and competitive levels. These demands were commonly
11 experienced away from the competitive environment (time investment and lifestyle sacrifices,
12 commitment to training sessions, concerns about optimising training, and exercise sensations
13 during training), preceding an endurance event (pre-event stressors), or during an event
14 (exercise sensations, optimising pacing, and remaining focused despite adversity). Table 2
15 summarises each theme. To help the reader judge the relative prominence of each theme across
16 and within focus groups, Table 2 also states the number of participants in each focus group
17 whose verbal contributions were coded within each theme (note, however, that non-verbal
18 behaviours could not be coded, and “uh huhs” could not be attributed to specific participants).
19 The themes are presented in the order that they might be experienced during the build-up to
20 and during an event; training-related themes are presented first, followed by preparation and
21 competition themes, respectively.

22 [Table 2 here]

23 **Time Investment and Lifestyle Sacrifices**

24 Training for endurance events required a substantial time investment from the endurance
25 athletes. As they also had family, employment, university, and social commitments, athletes in

1 each focus group struggled to find the time to train. Some athletes found this stressful, and they
2 described experiencing negatively-toned emotions such as frustration and anxiety.

3 Long-distance triathlete (LDT) 1: Especially if you've got, like you say, I've got no kids, but
4 I've got a wife and trying to keep her happy and not be training all the time, working, you know,
5 trying to juggle that, it can be mentally straining in itself. It's just trying to juggle everything
6 so you're doing enough training and then the frustration of, "I don't feel as if I've done enough
7 training" and then the worry, "I need to do more", but physically I can't do anymore because
8 I've not got any time.

9 Triathlete (T) 1: The half-Irons and the long, long distances that you have to spend hours and
10 hours and hours on a bike, you can't get away from spending a minimum of spending six hours
11 on a bike at a time just because your race will involve it, and then you have to do that probably
12 twice a week on each discipline that you're doing, so you've got six training sessions for every
13 little rest and that impacts. (His wife) T2's done practically no events this year because it was
14 kind of my turn to do a race, whereas next year, I don't know quite what we're going to do
15 because we're both racing. Anyone else want some children?

16 The athletes described the sacrifices that they made so that they could train and
17 compete, which included other sports, hobbies, employment opportunities, social
18 opportunities, and spending time with family. The athletes were also aware of the sacrifices
19 that their families made for them to train and compete, and they recognised that they needed
20 their family's support. Some athletes were willing to prioritise training and competing over
21 other opportunities and commitments, and they planned their days around training and
22 competing. Four athletes with families even stated that athletes need to be selfish to excel in
23 their sport. Nevertheless, the sacrifices made by family were sometimes a source of negatively-
24 toned emotions such as guilt.

25 Cyclist (C) 1: And I feel, to a point sometimes, a bit, a bit guilty, it's come up before about, sort
26 of the amount of time I'm away from my wife, she's very understanding, all the rest of it, but

1 there is that sort of that nagging “Maybe I shouldn’t be doing this, I should be at home doing
2 some painting or I should be going out with her”.

3 **Commitment to Training Sessions**

4 Athletes in each focus group reported a lack of motivation to start a training session and a
5 willingness to miss training sessions. This was particularly the case when they were training
6 alone and when the weather was cold or wet. Although numerous reasons were given for this
7 lack of motivation, such as not having an incentive like an upcoming event, a particularly
8 common reason was that the training was not enjoyable. Making arrangements to train with
9 others (e.g., squad training, organising to train with friends) helped the athletes commit to
10 attending training sessions and to work hard in those training sessions.

11 Runner (R) dialogue:

12 R1: Once you start, it’s ok. It’s actually getting up and out of the house.

13 R2: On my own, that’s definitely the case. If I’m going down to train with people, then
14 it’s not an issue, not at all.

15 R3: For example, like for the Tuesday and Thursday sessions, a lot of us obviously
16 enjoy them because we go down and there’s a big group there and we all do the session
17 together, but probably if all of us had to do the Tuesday and Thursday sessions on our
18 own, half of us probably wouldn’t do them.

19 T3: I have to focus on the thing that I’m weakest at (cycling) because... that’s the biggest chunk
20 in half-Ironman, that’s the most amount of time (pause) but, like T2, I couldn’t go out and do
21 it on my own, I’d need company (laughs)... It’s like when people say, “Oh, it’s fun”. It’s not
22 fun to me. I have to make myself.

23

24 **Concerns About Optimising Training**

25 Runners and triathletes described concerns about the quantity, appropriateness, or standard of
26 their training. This theme manifested differently across the focus groups. Dialogue between

1 three runners, who frequently trained together in a group, suggested that they were critical of
2 substandard performances in single training sessions and focused on these performances rather
3 than their longer-term progress, they compared their training performances to other runners
4 despite differences in training objectives, and they worried about taking rest days because they
5 did not want to lose fitness. The triathletes, on the other hand, described examples where they
6 lacked confidence that they were doing the right training or worried about getting the right
7 balance between the three disciplines.

8 Triathlete dialogue:

9 T4: You think, “Oh, am I concentrating on that sport too much?”

10 T5: Or am I getting enough miles on the bike or

11 T6: Well, it’s juggling, isn’t it. (T5: Yeah) You’re concentrating more on one, you’re
12 losing off the other, don’t you?

13 T5: Exactly.

14 **Exercise Sensations During Training**

15 The athletes described experiences of pain and exertion during training. These experiences
16 were particularly prominent among the runners and cyclists, who trained at high intensity. The
17 athletes recognised that they need to push through discomfort to achieve the physiological
18 adaptation necessary to improve their performance.

19 C1: It’s incredibly painful for me. When I go out with certain people (laughing) and we do a
20 hard session, I mean it’s maximal for me, when you’re riding with people who can stretch you,
21 it is absolutely flat out, I’m putting myself into pain zones that I’ve never been in to before and
22 would never do but, but for the fact that I’m trying to push the performance envelope.

23 T2: You know that you’ve got to push your body beyond what is comfortable in order for it to
24 adapt— it’s the principle of training. If you just sit there at a speed that’s comfortable in
25 whatever discipline, you’re not going to adapt, you’re not going to improve, so you know

1 you've got to get over that mental barrier, somehow going beyond what's physically
2 comfortable.

3 **Pre-Event Stressors**

4 Cyclists and triathletes described substantial event preparation, which included packing their
5 bag and equipment, checking their bike, and learning the event route. They also described
6 difficult logistical aspects encountered on the day of an event, including waking up early,
7 driving to an event with closed roads and congestion, finding parking, registering at the event,
8 and setting their bike in the swim-cycle transition and memorising its location. As a
9 consequence, some of the athletes reported feeling stressed before the event, and they worried
10 that something might go wrong. The athletes also described unexpected disruptions to these
11 pre-event activities, which included arriving late to the event and forgetting a piece of
12 equipment. These disruptions led to the athlete feeling agitated, annoyed, or distracted.

13 C2: If I forget one thing, it might be something minor that doesn't make a lot of difference but
14 it ruins me mentally... It leaves me flustered, yeah. And I want to be on the start line with a
15 clear head, and it doesn't give me that. I'm fretting.

16 **Optimising Pacing During an Event**

17 The athletes wanted to pace themselves optimally to finish an event, to achieve a time, or to
18 place well in the standings. The athletes balanced pushing themselves to their limit with
19 avoiding premature exhaustion. Some of the athletes reported feeling uncertain about their pace
20 and questioned whether they were pushing hard enough. This demand appeared particularly
21 relevant to athletes who participated in longer events, especially triathlons.

22 T1: I always, yeah worry, "Am I going fast enough?" because it feels a bit too comfortable.

23 T7: I think that's the difficult part, saying "How fast can I really go and still just about make it
24 across the finishing line?"

25 LDT2: I find it mentally quite challenging balancing the three disciplines because, you know,
26 you turn up to the run, you've overcooked it on the bike, guess what, Armageddon. You

1 overcook it on the swim, Armageddon... There's this line, you know, if you push it by 2%,
2 you're going to get away with it... it's going to get you that PB (personal best), it's going to get
3 you in that top whatever number it is (in the standings) that you're looking to achieve. You
4 push it, you know, that 1% over, dog-doo, you're dead.

5 Competitive athletes who raced head-to-head described the tactical pacing decisions that they
6 made in relation to other competitors. They had to decide whether to adjust their pace to catch,
7 shake off, or fall behind a competitor, or whether to trust their own pace.

8 R4: So like if somebody comes past you in a race, it's having the confidence that you will still
9 beat them in the end, which happened to me in a couple of races where someone's come past
10 and I've managed to still get them at the end. You've got the choice of whether to believe when
11 they go past you, if you're going to let them go, stay with them, if you think that you are quicker
12 than them, still believe in yourself.

13 Tactical decisions were particularly important to road-race cyclists who raced for finishing
14 positions and not times. Indeed, Cyclist 3 described racing as a "moving game of chess"
15 because of the constantly-changing tactical elements of racing. The cyclists reported constantly
16 monitoring performance cues (e.g., positions of other cyclists, environmental and road
17 conditions), and they reacted to the behaviours of other cyclists.

18 **Exercise Sensations During an Event**

19 A demand consistently reported across focus groups was the exertion, pain, fatigue, and
20 discomfort experienced during events. Words such as "pain", "hurt", and "suffering" captured
21 a range of unpleasant exercise-induced sensations that typically became more prominent as the
22 event progressed and were greatest at the end. The athletes described a desire to stop or slow
23 down, and they described unhelpful self-talk that was persuading them to not continue.

24 Runner dialogue:

1 Facilitator: If you take out male and female, if you take out teenager versus someone
2 in their twenties, if you take out the distance, what do you think are the typical demands
3 of running that will always be there?

4 R5: Well, you're going through physical Hell and you've got to finish it as well as you
5 can...

6 R6: It's probably one of the only sports where, the goal of it is to push yourself through
7 as much physical pain as you can, and that's basically the goal... push yourself to your
8 maximum. That's it.

9 R7: Getting to the bell (in a 1,500-metre race) and then realising that you've still just got to do
10 this 400 metres to make it, I think, in my mind, everything's hurting, everything's in pain, but
11 somebody's saying "It's only 400 metres, it's only 400 metres", but somebody else is saying
12 "You're dead, you're not going to be able to make it"— you're always fighting against your
13 head in a race.

14 LDT3: If you're not thinking about anything (i.e., distracting yourself), all you're going to think
15 about is your feet hurt, your ankles hurt (LDT4: Yeah. My knee hurts), everything hurts, you
16 just think about all the bits that hurt, all the reasons why it's madness to keep on putting one
17 foot in front of the other, "You should just stop".

18 **Remaining Focused Despite Adversity During an Event**

19 The athletes reported a wide range of stressors that were encountered during endurance events.
20 These included unfavourable environmental conditions, being overtaken, substandard
21 performance, collisions, bike punctures, nutritional mistakes, and dropping food or a water
22 bottle. Athletes in each focus group reported occasions where these stressors had a detrimental
23 effect on their mental state. Specifically, the athletes often reported responding with
24 unconstructive self-talk statements and experiencing negatively-toned emotions such as
25 discouragement and frustration. Further, they described difficulty re-focusing on their
26 performance and remaining motivated.

27 Cyclist dialogue:

1 C3: Head winds can have an even worse effect because all of sudden you cannot go
2 faster, and you forget the fact that it's the same for everyone else as well, you know,
3 it's not just you...

4 C2: It still feels very personal at the time...

5 C3: Especially on the time trial, you're convincing yourself that you're the only one
6 feeling like that in these conditions, be it rainy and you're going slow, or your disk
7 wheel's getting hit by sidewind, you think that's not happening to anyone else and it's
8 just you, and you're looking down at your dock, "I'm 30 seconds off what I should be",
9 you know, "disaster".

10 C4: When you're really going well, you look good, you know, and it's all coming together and
11 the adrenaline's flowing, you know, ppheeww, you're on fire. When things start to go wrong,
12 that's when it's a very difficult mental position to be in, I think, and that's the hardest thing to
13 try to learn, how to overcome that "Oh shit, what a terrible day this is".

14 LDT4: I had my PB up by probably half an hour on a good course and missing one bottle, just
15 literally, just flipped out my hand, scuppered the lot (laughing), took it out completely. And
16 that's it, you've then got to go for the rest of the race thinking, (numerous laughing) "I've
17 bugged up all that training", and now a year's worth of training, six months of dedicated
18 commitment, (laughing) and it's all gone to pot.

19 **Discussion**

20 This study aimed to increase understanding of the psychological demands commonly
21 encountered by endurance athletes, particularly to inform the design of performance-
22 enhancement psychological interventions for endurance athletes. Seven themes captured
23 demands that were experienced away from the competitive environment, preceding an event,
24 or during an event (Table 2). These demands were perceived to affect motivation and
25 concentration and therefore have implications for performance. The demands were also
26 perceived to affect outcomes related to wellbeing, such as the emotions experienced before,
27 during, and after events. Interventions that help endurance athletes to cope with these

1 psychological demands could therefore encourage desirable outcomes related to both
2 performance and wellbeing.

3 The results of this study draw attention to stressors that are commonly encountered by
4 recreational endurance athletes. The endurance athletes reported a range of competitive
5 stressors (e.g., being overtaken), as well as personal stressors related to time demands and
6 lifestyle sacrifices and organisational stressors related to pre-event logistics. These stressors
7 endangered goals such as finishing a long-distance triathlon, achieving a personal best time, or
8 placing well in the standings. Consistent with transactional theories of stress, these stressors
9 were often associated with negatively-toned emotions, such as guilt, frustration,
10 discouragement, and anxiety. Stressors and associated negatively-toned emotions were also
11 perceived as having detrimental effects on the athletes' motivation for training and competition,
12 as well as affecting their attention and concentration (Lazarus, 2000). Previous research has
13 demonstrated that some stressors are commonly experienced across many samples of athletes
14 (e.g., McKay et al., 2008), whereas others are particularly prominent in specific samples of
15 athletes, such as certain types of sport (McKay et al., 2008) and competitive levels (Fletcher et
16 al., 2012). Endurance athletes in the present study reported some demands that are commonly
17 experienced across sports, whereas other demands appear particularly prominent in endurance
18 sports. For example, the time investment and lifestyle sacrifices, the demand of optimising
19 pacing, and the experienced exercise sensations appear to characterise performing in endurance
20 sports at the recreational level. In contrast, some themes, such as pre-event stressors and
21 remaining focused despite adversity, reflect demands that are experienced in a range of sports
22 (e.g., Dugdale, Eklund, & Gordon, 2002; Mellalieu, Neil, Hanton, & Fletcher, 2009).
23 Independent of whether the themes highlight demands that are unique to endurance sports,
24 these demands are often experienced by endurance athletes and could therefore inform the
25 design of interventions for endurance athletes.

1 A demand that is prominent among recreational endurance athletes relates to time
2 demands and lifestyle sacrifices. Participants estimated that they trained for an average of 11
3 hours each week (Table 1). This is a substantial time investment for people who compete
4 recreationally, rather than professionally. A substantial training investment is necessary,
5 however, because participating and excelling in endurance sports requires a high level of
6 aerobic fitness. Other studies have similarly highlighted that ultramarathon runners (Simpson
7 et al., 2014) and masters cyclists (Appleby & Dieffenbach, 2016) dedicate a substantial amount
8 of time to training, which can come at the expense of other activities such as socialising with
9 friends. Although balancing competing time demands, making personal sacrifices, and
10 knowing that family have made sacrifices are recognised stressors for elite-level athletes in
11 other sports (e.g., McKay et al., 2008; Noblet & Gifford, 2002; Scanlan, Stein, & Ravizza,
12 1991), the substantial time investment and sacrifices associated with participation in endurance
13 sports are unusual for recreational-level sports.

14 A second demand particularly prominent in endurance sports relates to exercise
15 sensations (exertion, pain, fatigue, and discomfort) experienced during training sessions and
16 events. This broad demand manifests differently in different endurance events. For example,
17 injury-related pain, such as hurting feet and knees, is a prominent exercise sensation for athletes
18 competing over longer distances such as ultramarathons (Holt et al., 2014), and intense
19 exercise-induced muscle pain is a prominent exercise sensation for athletes who train and
20 compete at high intensity (Kress & Statler, 2007). Unpleasant sensations indicate that an athlete
21 is pushing their self, and participants recognised that they need to persevere to achieve
22 physiological adaptation from training or a desired outcome from an event. Psychological skills
23 training strategies that help athletes to persevere despite high levels of perceived effort
24 (Blanchfield, Hardy, de Morree, Staiano, & Marcora, 2014) and pain (Whitmarsh & Alderman,
25 1993) in training and in events could help endurance athletes to achieve these desired outcomes.

1 In the present study, athletes reported difficulties remaining committed to training sessions,
2 and the exercise sensations experienced during training could be a contributing factor. Research
3 demonstrates that exercise becomes less pleasurable when the intensity exceeds the lactate and
4 ventilatory thresholds, and exercise becomes unpleasant when the intensity reaches maximal
5 oxygen consumption (Ekkekakis, Parfitt, & Petruzzello, 2011). The lack of pleasure
6 experienced from exercising in an endurance activity, combined with cold and wet weather and
7 a lack of social interactions when training alone, may mean that some training sessions are less
8 enjoyable and, as a consequence, the athletes may be less committed to these training sessions
9 (Williams, 2013).

10 An additional prominent demand related to pacing. Some athletes felt uncertain about
11 whether they should increase their pace, or they worried that they were not pushing hard
12 enough. These self-reports of pacing uncertainty may be attributed to the athletes' inability to
13 accurately predict how their perceived effort would increase during the rest of the event. The
14 endurance athletes might therefore have been cautious in how hard they pushed their selves so
15 that they avoided premature exhaustion (Marcora & Bosio, 2007; Marcora, 2010). Competitive
16 athletes who raced head-to-head also described pacing decisions that were influenced by the
17 behaviours of competitors. For example, they reported occasions where they had to decide
18 whether to trust their own pace or adopt the pace of a faster competitor, which involves the risk
19 of premature exhaustion. These head-to-head pacing decisions are difficult for endurance
20 athletes, because the performance environment is constantly changing, there are a lot of
21 relevant cues to consider, athletes do not know the current physiological capacity of their
22 competitors, and decisions often need to be made quickly and under pressure (Renfree, Martin,
23 Micklewright, & St Clair Gibson, 2014). Research that helps endurance athletes to use the most
24 relevant cues to make fast decisions that optimise their performance has been encouraged
25 (Renfree et al., 2014).

1 **Intervention Design and Applied Implications**

2 This study aimed to inform the design of performance-enhancement psychological
3 interventions for endurance athletes. A range of psychological interventions were recently
4 shown to improve endurance performance (McCormick, Meijen, & Marcora, 2015), but few of
5 these interventions appeared to target the demands of the particular endurance sport or the
6 demands of endurance events in general. The potential benefits of targeting the demands
7 reported in this study include performance enhancement, but they also extend to valuable
8 outcomes related to wellbeing, such as enjoyment and satisfaction. Many sport psychology
9 practitioners aspire to help athletes to achieve these wellbeing-related outcomes (e.g., Brady &
10 Maynard, 2010). Experimental research examining the effects of interventions that target some
11 of the highlighted psychological demands is encouraged.

12 Fletcher et al.'s (2006) meta-model of stress, emotions, and performance proposes that
13 efforts to manage the stress process in athletes can occur at three levels (primary, secondary,
14 tertiary). Primary interventions aim to eliminate or at least reduce the quantity, frequency, or
15 intensity of stressors, secondary interventions aim to modify sport performers' psychological
16 responses to stressors, and tertiary interventions aim to minimise the damaging consequences
17 of stressors by helping athletes to cope with reduced performance or wellbeing that result from
18 strain (Fletcher et al., 2006). Applied suggestions are offered for each level. Psychological
19 support that can be provided using online media such as webpages and webinars, workshops,
20 written handouts, dinner speeches, and brief conversations with endurance athletes at an event
21 (Meijen et al., 2016) could be particularly valuable for recreational athletes, because
22 recreational athletes do not typically have access to a sport psychologist.

23 For recreational endurance athletes, many competitions are mass-participation events,
24 and the findings of this study indicate that logistical and environmental organisational stressors
25 (Arnold & Fletcher, 2012) related to travel (e.g., congestion, closed roads), rules and

1 regulations (e.g., required arrival times), and distractions (e.g., locating toilets) are prominent.
2 As an example of a primary intervention, practitioners could provide guidance on preparing to
3 attend an upcoming endurance event through online media and pre-event workshops. For
4 example, endurance athletes could reduce pre-event stressors by creating a packing checklist,
5 researching anticipated road and car-park congestion, and preparing a timetable to arrive at the
6 event early. Indeed, there are computer and phone applications available that help with packing
7 for an endurance event (e.g., <http://triathlon.racechecklist.com>).

8 As an example of a secondary intervention, endurance athletes could use
9 implementation intentions, or “if-then plans”, to prepare for stressors that could occur before
10 or during an endurance event. Specifically, athletes could identify detrimental inner states (e.g.,
11 unconstructive thoughts or emotions) and obstacles that they might encounter (e.g., a tyre
12 puncture), and plan cognitive (e.g., motivational self-talk statements, adjustment of goals) or
13 behavioural (e.g., repairing a puncture, change of pace) responses (Achtziger, Gollwitzer, &
14 Sheeran, 2008). Endurance athletes could also visualise implementing these responses, or they
15 could actually practise them (e.g., taking goggles on and off during a swim). For experimental
16 research, problems encountered by endurance athletes, such as being overtaken by another
17 athlete or losing time to an uncontrollable factor (e.g., random puncture time penalties) could
18 be simulated in controlled laboratory conditions. In addition to implementation intentions,
19 sport psychologists could deliver cognitive-restructuring interventions based on cognitive-
20 behavioural therapy principles that help endurance athletes to perceive their emotions as
21 facilitative, rather than debilitating, to performance (Neil, Hanton, & Mellalieu, 2013).

22 Recreational endurance athletes may experience performance decrements and reduced
23 wellbeing because of stressors such as injury or having limited time to train due to family and
24 work commitments. Tertiary interventions can be used to help athletes to cope with these
25 performance decrements and reduced wellbeing. As an example, sport psychologists may be

1 present at an endurance event as part of a psyching team. As part of the structure of a psyching
2 team, sport psychologists may be present at the end of the event in locations such as the medical
3 tent, and can help athletes to manage thwarted performance expectations (Meijen et al., 2016).

4 Finally, endurance athletes dedicate a substantial amount of time to training, even at
5 the recreational level. It can be difficult for endurance athletes to find time to train because of
6 family, work, and other commitments, and endurance athletes and their families make
7 sacrifices so that the athlete can train and compete. When designing an intervention,
8 practitioners and researchers should consider the restricted time that endurance athletes have
9 available. Practitioners should also be aware that demands outside of sport, such as time and
10 family stressors, can affect an endurance athlete's experiences during training and events.
11 Practitioners working with an endurance athlete are therefore encouraged to adopt a holistic
12 approach to service delivery and to consider the interplay between the athlete's different life
13 domains (e.g., Friesen & Orlick, 2010).

14 **Limitations**

15 This study aimed to identify psychological demands that are commonly experienced by
16 endurance athletes. Covering a broad range of demands related to training, competition
17 preparation, and competition participation was useful for informing psychological
18 interventions for endurance athletes, but it meant that individual demands were not explored in
19 depth. Future research could build on these findings by focusing on a narrow range of demands.
20 An additional limitation of this study is that it focused on the demands experienced by
21 endurance athletes, and it did not examine the full stress process including appraisals, emotions,
22 and coping (cf. Miles et al., 2016; Neil et al., 2016). Future research that is informed by a
23 transactional theory of stress could shed greater light on the complete stress process in
24 endurance athletes. The presented data indicates that research informed by transactional

1 theories could inform the application of psychology in endurance sports to support valuable
2 outcomes related to both performance and wellbeing.

3 **Conclusion**

4 This study aimed to increase understanding of the psychological demands commonly
5 encountered by endurance athletes, in order to inform the design of performance-enhancement
6 psychological interventions for endurance athletes. Identified themes shed light on
7 psychological demands that are commonly encountered away from the competitive
8 environment (time investment and lifestyle sacrifices, commitment to training sessions,
9 concerns about optimising training, and exercise sensations during training), preceding an
10 endurance event (pre-event stressors), and during an event (exercise sensations, optimising
11 pacing, and remaining focused despite adversity). Psychological interventions that help
12 endurance athletes to cope with these psychological demands could encourage desirable
13 outcomes related to both performance in endurance sports and wellbeing. Experimental
14 research examining the efficacy of such interventions is encouraged.

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1 **Tables**

Table 1
Overview of Participant Characteristics

Focus group	Gender	Age	Competitive level	Yearly training (weeks)	Weekly training (hours)	Years competing at the sport	Years competing at main distance
Runners	m = 7, f = 3	21 ± 3	n = 4, r = 4, u = 2	50 ± 4	9 ± 2	7 ± 4	4 ± 3
Triathletes	m = 7, f = 3	41 ± 11	a = 6, l = 4	48 ± 4	13 ± 6	10 ± 7	6 ± 3
Cyclists	m = 6	50 ± 17	a = 1, l = 5	48 ± 3	11 ± 2	10 ± 13	9 ± 13
LD triathletes	m = 4	45 ± 4	v = 4	47 ± 5	13 ± 7	5 ± 2	3 ± 2
Overall	m = 24, f = 6	37 ± 15		48 ± 4	11 ± 5	8 ± 8	5 ± 7

Note. a = age-group national or international; f = female; l = local; LD = long-distance; m = male; n = national; r = regional; u = university; v = pursuing personal bests in various countries; ± = mean ± standard deviation.

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Table 2
Overview of Themes and Sub-Themes

Theme	Sub-theme	Essence of the theme/sub-theme	Participants coded within the theme/sub-theme
Time investment and lifestyle sacrifices	Time investment to participate	The endurance athlete struggles to find time to train.	C = 3, R = 2, LDT = 3, T = 7 Subtheme total = 15
	Sacrifices made for the sport	The athlete and their family make sacrifices so that the athlete can participate in the sport.	C = 3, R = 6, LDT = 3, T = 4 Subtheme total = 16 Theme total = 21
Commitment to training sessions		Remaining committed to training is difficult, particularly when training alone in bad weather.	C = 5, R = 8, LDT = 2, T = 10 Theme total = 25
Concerns about optimising training		The athlete is concerned about doing insufficient, inappropriate, or substandard training.	C = 0, R = 3, LDT = 1, T = 5 Theme total = 9
Pre-event stressors	Logistical stressors and worries	Pre-event logistics are stressful, and the athlete worries that something might go wrong before the event start.	C = 0, R = 0, LDT = 3, T = 7 Subtheme total = 10
	Something goes wrong	Something goes wrong before the event start, and it has a negative effect on the athlete's mental state.	C = 4, R = 1, LDT = 1, T = 0 Subtheme total = 6 Theme total = 15
Exercise sensations	Exercise sensations during training	Training is hard work and painful.	C = 6, R = 5, LDT = 0, T = 2 Subtheme total = 13
	Exercise sensations during an event	The athlete experiences exertion, pain, fatigue, and discomfort during the event.	C = 3, R = 5, LDT = 4, T = 7 Subtheme total = 19 Theme total = 23
Optimising pacing during an event	Pushing yet pacing	The athlete finds it difficult to judge how hard they can push their self during an event.	C = 0, R = 2, LDT = 4, T = 8 Subtheme total = 14
	Effect of other competitors on pacing	The athlete has to make pacing decisions based on the behaviour of their competitors.	C = 4, R = 5, LDT = 0, T = 3 Subtheme total = 12 Theme total = 21
Remaining focused despite adversity during an event		The athlete finds it difficult to re-focus and remain motivated after encountering a stressor.	C = 5, R = 6, LDT = 4, T = 7 Theme total = 22

Note. C = Cyclists (out of 6); R = Runners (out of 10); LDT = Long-distance triathletes (out of 4); T = Triathletes (out of 10).