**‘Short and Sweet’: A Randomized Controlled Initial Investigation of Brief Online Psychological Interventions with Endurance Athletes**

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## Abstract

There is potential in delivering brief, educational interventions online, particularly for recreational athletes. This initial investigation examined how two online interventions were perceived by endurance participants and how they affected outcomes of interest. After measuring self-efficacy, 142 people were randomised to one of three groups (self-talk, implementation intentions, control) before an endurance event. Ninety-four completed post-event measures, which were self-efficacy, goal attainment, performance satisfaction, coping, stress appraisals, and social validity.The interventions involved approximately ten minutes of initial engagement with online material. Perceptions of stress controllability were significantly higher in the implementation-intention group compared to the control. There were no other statistically-significant effects. Nevertheless, both intervention groups were satisfied with their interventions, found them useful, and were planning to continue using them. The findings demonstrate the feasibility and value of using brief, online psychological interventions, which may be timely in our changing profession, as COVID-19 has moved many interventions online.

Keywords: Brief contact interventions, endurance performance, psychological skills training

## ‘Short and Sweet’: A Randomized Controlled Initial Investigation of Brief Online Psychological Interventions with Endurance Athletes

Psychological research in the sport and exercise domains has the potential to benefit a wide variety of individuals (Brown & Fletcher, 2017; Gill et al., 2017). In the sport psychology literature, these benefits have arguably focused substantially on enhancing performance, including improving competition outcomes like finishing times and positions. Nevertheless, there have been calls for researchers to consider ways of enhancing the experience of those taking part in sport (Gill et al., 2017). This enhancement of experience can relate to emotional experience, such as through enhancing positive emotions such as joy and happiness, it can relate to cognitions such as through addressing irrational performance beliefs and concepts of self-worth, and it can relate to helping athletes cope with various demands and stressors that may impede their enjoyment and performance (Gill et al., 2017). One population who could benefit from this psychological research are people who participate and compete in endurance sports and events. A promising way of sharing research with endurance athletes are online interventions (McCormick et al., 2020).

A large and increasing number of people participate and compete in endurance sports and events (e.g., Scheerder et al., 2015), which include middle and long-distance running, swimming, cycling, triathlon, and rowing (McCormick et al., 2019). Some participate in these sports and events for competitive reasons, and others participate for reasons such as personal challenge (such as finishing a ‘first marathon’ or improving on their personal best time), health, fitness, and socialising (McCormick et al., 2020). Across these differing sports and motives, there are similar demands that endurance athletes are likely to face, including exercise-induced sensations (e.g., exercise-induced pain, exertion), pacing decisions, and a range of organisational and performance stressors (McCormick et al., 2018b). These demands can represent a significant barrier to performance and enjoyable experiences in endurance athletes. The removal of demands is not often feasible (see Meijen et al., 2020), and so it is important to consider ways that may allow endurance athletes to continue in the face of these demands. Psychological strategies can be used for this, and psychological interventions can be used to develop psychological strategies. Recreational endurance athletes may, however, not have access to interventions that are delivered by a qualified sport psychologist (Meijen, 2019), and it can therefore be helpful to consider additional ways of providing sport psychology support to endurance athletes. One way of doing this is to deliver brief interventions online. Educational interventions have been delivered online in sporting contexts (Thrower et al., 2019), and, arising as a need from the Covid-19 pandemic (Hurley, 2021), opportunities for delivering sport psychology online have become more prevalent (Price et al., 2020). Research on *brief* interventions that have been delivered online derives, however, predominantly from other domains such as health, clinical, and educational psychology (e.g., Cavanagh et al., 2013), and there is little mention of delivering *brief* online interventions to athletes in the sport psychology literature. Endurance participants and athletes are interested in engaging with sport psychology using online resources (McCormick et al., 2020). It is therefore timely to explore the use of brief interventions with endurance athletes delivered online, which could provide an additional approach to delivering sport psychology.

Brief interventions, in the context of the present study, involve provision of educational material about psychological strategies that can be easily understood and implemented. When developing brief interventions, consideration should be given to changing or adapting thoughts and feelings experienced during activities that someone is familiar with (e.g., training sessions) (Walton, 2014). A major benefit of using brief (online) interventions is that they can be implemented in real-life settings, outside of laboratory-based settings. This is relevant because a recent critical review highlighted that research conducted on psychological interventions and endurance performance has predominately used artificial laboratory-based settings (McCormick et al., 2019). Whereas such settings provide experimental control, endurance athletes do not perform in controlled environments, and the generalisation of results to real-life competition is questionable. To address this, McCormick et al. (2019) called for more studies to investigate psychological interventions at real-life endurance events (i.e., naturalistic settings). Examining the effects of an intervention in a naturalistic endurance setting has two key advantages. First, performance motivation of participants is likely to be more self-determined, and participants will likely have self-set goals. This self-determined motivation and the possession of self-set goals could encourage greater effort in each of the experimental conditions (McCormick et al., 2018a). Second, in a naturalistic setting, endurance athletes are likely to encounter a variety of demands and stressors which are not prevalent in laboratory settings (e.g., other competitors, weather, and logistical issues) (McCormick et al., 2018a).

Whereas it is important to examine interventions in real-life contexts, it is equally important to consider how the intervention is delivered. A key aspect of psychological interventions is successful engagement with the target audience, and this chance of engagement is greatly increased when interventions are delivered in a preferable format (e.g., Greenspan & Feltz, 1989). McCormick and colleagues (2020) identified that one of the most preferred ways of endurance athletes to receive psychological guidance was via websites. The internet has been demonstrated to be a successful delivery method for a variety of psychological interventions relating to behaviour change, mental health, and educational attainment (e.g., Gottlieb et al., 2017; Raghavendra et al., 2013), and could therefore be feasible for the current study. The use of the internet in delivering the intervention could also help facilitate the inclusion of endurance athletes competing in real-life events, as a much larger pool of participants could be recruited who are participating in a variety of events.

There are a variety of possible interventions to help enhance the experience of endurance activities, including self-talk and implementation intentions (if-then planning), which both can be considered outcome-focused interventions (Lane, Totterdell, et al., 2016). Self-talk refers to what people say to themselves silently in their head or aloud (Latinjak et al., 2019). A substantial volume of research has demonstrated that strategically using planned self-talk statements that are motivational in nature can help people perform better during a range of endurance tasks (e.g., Blanchfield et al., 2014; for a review, see McCormick & Anstiss, 2020). Motivational self-talk interventions are well-suited to brief intervention delivery, as they can be efficacious whilst requiring little time or cost. The research evidence supports the efficacy of interventions delivered using workbooks, which can be completed in a relatively short amount of time (approximately 30-60 minutes) and require little interaction between the participant and the researcher.

Another brief intervention that has been shown to be efficacious in academic, health, and educational contexts is implementation intentions (i.e., ‘if-then planning’) (e.g., Achtziger, et al., 2008). Implementation intentions are a form of goal-related action planning, which are formulated through individuals identifying a potential challenge or difficulty they may face in pursuit of their goal (the ‘if’), and then a response for when this occurs (the ‘then’). They are hypothesised to work by encouraging individuals to use a formulated action plan, where there is a strong link between the ‘if’ and ‘then’ that supports the fast use of an effective, adaptive plan that can be likened to a strong habit (Adriaanse et al., 2011; Gollwitzer, 1999).

In an endurance context, Lane et al. (2016) demonstrated that use of implementation intentions led to superior emotional control and increased levels of performance satisfaction in distance runners, although it did not improve performance. Lane and colleagues suggested that the beneficial effects of the implementation intentions could have resulted from superior emotional regulation and more effective responses to stressful events faced when performing. In muscular endurance tasks there also does not appear to be an improvement in performance after using if-then plans (Bieleke & Wolff, 2017; Hirsch et al., 2020; Wolff et al., 2018). These findings underline the notion that the focus should not just be on performance, but also about the experience of endurance athletes. In addition to performance satisfaction and stress appraisals (Lane et al., 2016), the experience of endurance athletes can also be influenced by self-efficacy (Anstiss et al., 2018) and coping behaviours (Schumacher et al., 2016; Zepp, 2016).

In summary, there is considerable potential in delivering brief, educational interventions online for people who participate and compete in endurance events. Brief, online interventions could allow more people to access and benefit from the established evidence base for psychological interventions, particularly as many recreational participants do not have access to a sport psychology practitioner. Such interventions could be low cost, delivered in a preferable format, and benefit quality of experience and performance. This seems particularly timely in 2021, as COVID-19 has led to sport psychology interventions (e.g., CPD events, educational workshops) being delivered online. Considering the potential of delivering brief interventions online, as an initial investigation, the current study examined how brief psychological interventions (self-talk and implementation intentions) delivered online may affect and be perceived by endurance athletes competing in naturalistic settings. To help enhance experience and performance, the research therefore aimed to examine if receiving a brief intervention influenced self-referenced goal attainment, subjective performance satisfaction, self-efficacy, coping behaviours, and stress appraisals. In addition, and in line with the desire to provide endurance athletes with feasible and useful interventions, the research aimed to examine the perceived usefulness of the interventions and endurance athletes’ satisfaction with them.

## Methods

### Design

A randomised, controlled experimental design was used to assess the effects of the brief psychological interventions in a naturalistic setting (i.e., real-world endurance events).

### Participants

An apriori statistical power analysis calculated that 162 participants would be necessary to detect a small effect size (Cohen’s *f* = 0.10) with an α error probability of .05 and 80% power which was deemed achievable within the resource constraints, specifically the researcher time available for data collection (Lakens, 2013). A small effect was chosen for the power analysis to reflect the likely effect of a brief intervention in a naturalist setting.

Two hundred and thirty-five people originally registered their interest in the study, with 94 participants (52 males, 42 females) completing the study (see Figure 1 for full details on participant completion and attrition). The current study was therefore underpowered for detecting small effects, because of a higher than expected attrition rate and the inability to extend the researcher time available for data collection. The mean age of these 94 participants was 40.1 years (*SD* = 10.6), and they had been participating or competing in their endurance sport for an average of 7.62 years (*SD* = 5.43). Of the 94 participants, 67 reported that their primary sport was running, 13 were rowers, eight were triathletes, four were cyclists, and two were swimmers. In relation to previous psychological support for performance, most participants had not previously sought prior psychological help and support (*n* = 58). Twenty-five participants had sought psychological help and support in relation to books or online resources, and 11 had sought help from professional individuals (e.g., sport psychologists).

[Insert Figure 1]

**Procedure**

Ethical approval was granted by the department ethics committee, and informed consent was obtained from all participants prior to data collection. Data were collected at three time points (baseline, intervention, follow up) using three online surveys hosted on the Qualtrics online survey platform. At baseline, participants registered their interest in participating by completing an online survey (Survey 1), which was distributed via emails to endurance sport clubs and posts on social media. Survey 1 provided participants with eligibility criteria and demographic questions. It also asked them to indicate an event they were planning on entering, the date of this event, and a goal they had this for the event. Participants were free to set this goal, and were not restricted to a time-based or finishing result goal. Consistent with similar, brief intervention studies (e.g., Blanchfield et al., 2014; McCormick et al., 2019)**, t**he intervention time point was three weeks before the participants’ reported event date, at which stage they were emailed a link to Survey 2. In Survey 2, participants answered questions relating to their self-efficacy. After completing questions relating to self-efficacy, participants were randomly assigned to one of three groups (self-talk, implementation intentions, control) with an equal allocation ratio (1:1:1) using the in-built Qualtrics randomisation function. While the research team were blind to the initial randomisation of each participant, participant monitoring throughout the study (i.e., completion checks to inform reminders/follow-up emails) meant that it was not possible to be blinded to participants’ groups after the completion of Survey 2. If the survey was not completed, participants were sent a reminder email after five days, and again after ten days. The follow-up time point was two days after the participants’ reported event date (a compromise between supporting recall and not burdening participants immediately after the event), and they were emailed a link to Survey 3. Survey 3 consisted of further questions relating to self-efficacy, as well as the other outcome variables (see Measures). If the survey was not completed, participants were sent a reminder email after five days, and again after ten days.

Measures

Self-efficacy. Self-efficacy was measured with the ‘Endurance Sport Self-Efficacy Scale’ (ESSES; Anstiss et al., 2018). The ESSES is an 11-item unidimensional scale that consists of items relating to pacing, controlling thoughts and emotions, and managing exercise-induced sensations. Each item was rated on an eleven-point scale which ranged from 0 (No confidence at all) to 100 (Completely confident). The ESSES and its subscales have been demonstrated to possesses satisfactory scale score reliability (α = .88), and this was replicated in the current study (α = .85).

#### Coping. Coping strategies were assessed using the Coping Inventory for Competitive Sport (CICS; Gaudreau & Blondin, 2002) in Survey 3. The CICS contains 10 subscales categorised into three second-order dimensions: task-oriented coping (mental imagery, thought control, effort expenditure, seeking support, logical analysis, and relaxation), distraction-oriented coping (mental distraction and distancing), and disengagement-oriented coping (venting of unpleasant emotions and resignation). The CICS has been previously used to assess coping strategies in a sample of marathon runners (Gaudreau et al., 2005), where it was identified that ten items were not applicable to endurance athletes. To promote higher levels of content validity in the current study, we opted to remove the problematic items identified by Gaudreau et al. (2005). Participants therefore completed a 28-item scale. Each item was rated on a 5-point Likert scale ranging from 1 (Does not correspond at all) to 5 (Corresponds very strongly). The CICS has previously reported acceptable scale score reliability (α = .58 — .94), and this was replicated in the current study (α = .61 — .92).

Goal attainment and subjective performance satisfaction**.** Each participant’s goal attainment was assessed via the question “Did you achieve your goal for this event?” and was responded to as either yes or no. To assess performance satisfaction, participants responded to the statement “How satisfied were you with your performance in this event/race/completion?” on a 7-point bipolar Likert scale ranging from -3 (Extremely dissatisfied) to +3 (Extremely satisfied). We used subjective performance satisfaction (rather than a performance measure) because of the heterogeneity in the current sample (e.g., sport, event type, age, gender, experience). The use of subjective performance satisfaction could also allow participants to judge performance against their own standard and help control for factors relating to course conditions, weather, and injury/illness which may impact upon performance (Lane et al., 2016).

#### Stress appraisal. Two items were adapted from Nicholls et al. (2009), which represented perceived intensity and controllability of the stress encountered during the event. For perceived intensity, participants were asked “How intense would you rate the stress that you encountered during your recent event?” and responded on a 7-point Likert scale from 1 (Not intense at all) to 7 (Extremely intense). For controllability, participants were asked “How much control did you perceive yourself to have over your stress during your recent event?” and responded on a 7-point Likert scale from 1 (No control at all) to 7 (Complete control).

#### Intervention checks. Length of time spent on the intervention section was recorded using the Qualtrics time monitoring function, to allow comparison between the two interventions and to explore the possible effects of time spent on intervention on further intervention checks. To assess the use of the interventions during the event, participants in the intervention groups responded to three questions. The first question was “Generally speaking, to what extent did you remember the intervention?” and was responded to on a 11-point Likert scale from 0 (Not at all) to 10 (Completely). The second question was “Generally speaking, to what extent did you use the intervention?” and was responded to on a 11-point Likert scale from 0 (Not at all) to 10 (All the time). The third question was “Generally speaking, to what extent were you comfortable using the intervention?” and was responded to on a 11-point Likert scale from 0 (Not at all comfortable) to 10 (Completely comfortable).

#### Social validity. Social validation is used to determine satisfaction with an intervention (Page & Thelwell, 2013). Participants responded to three items. The first item was “How satisfied were you with the intervention you received?” and was responded to a 7-point bipolar Likert scale from -3 (Extremely dissatisfied) to +3 (Extremely satisfied). The second item was “How useful did you find the intervention?” and was responded to on a 7-point bipolar Likert scale from -3 (Extremely useless) to +3 (Extremely useful). The last item was “Do you plan to keep using the intervention you received in the future), and was responded to on a 5-point bipolar Likert scale from -2 (Definitely not) to +2 (Definitely yes). Participants were also asked “Overall, are there any comments that you would like to make about the intervention you received?” and were provided with a textbox for qualitative responses.

### Interventions

Both interventions were delivered as part of Survey 2. The interventions were designed to be brief, and to be completed within approximately 15 minutes. Participants were instructed to complete the intervention in one continuous sitting in a quiet place. Wording for each intervention was kept similar, to minimise the potential for expectancy effects (full details of the interventions are available on request).

#### Self-talk. The self-talk intervention was adapted from previous research that used self-talk workbooks in an endurance context (Blanchfield et al., 2014; McCormick et al., 2019). The first stage of the intervention introduced what self-talk is and asked participants to recall self-talk statements that they remembered using in prior training or competition (Blanchfield et al., 2014). After listing these statements, participants were instructed to separate these self-talk statements into three categories: ‘Had a positive effect, ‘Had a negative effect’, and ‘Had no effect’, using the click and drag function on Qualtrics. After identifying and categorising their own self-talk statements, participants were presented with a list of example motivational and instructional self-talk statements from literature (Blanchfield et al., 2014; McCormick et al., 2018a). With both this example list and their own prior self-talk statements, participants were asked to identify four possible self-talk statements that would be useful in their upcoming event. After identifying these four statements, participants were encouraged to practice and refine these self-talk statements in their training before their event. After the completion of Survey 2, participants were also emailed their self-talk statements.

Implementation intentions. The implementation intention was adapted from prior research in both behaviour-change and performance-related interventions (Lane et al., 2016; Verhoeven et al., 2013). Similar to the self-talk intervention, participants were presented with information relating to what implementation intentions are, and how they may be used. They were given information on how implementation-intentions are formed (i.e., If X happens, then I will do Y), and informed that they acted as a form of action planning. To provide the participants with an example of implementation intentions and how they may be formulated, participants were presented with a click and drag task where they were asked to identify possible strategies for two common problems “If I get home from work/school and feel like I have no energy to train:” and “If during training I start feeling like I want to stop”. The possible solutions were presented with the prefix “Then I will…”. Both potential difficulties were deliberately chosen to be related to training, so as not to potentially influence participant’s decisions when formulating implementation intentions for their upcoming event.

Next, participants were asked to consider four potential difficulties or challenges that they may encounter during their upcoming event. After identifying and entering them in the survey, participants were asked to think of potential strategies for dealing with them. Participants were asked to consider strategies they had used previously, or that they had seen other endurance athletes use. Additionally, example strategies were provided that included: focusing on your breathing, encouraging yourself to relax, and ensuring back up plans for nutrition/hydration. After formulating these implementation intentions, participants were encouraged to practice and refine these implementation-intentions in the build up to their event. After completion of the survey, participants were emailed their implementation-intentions.

#### Control. The control condition consisted of the following text: ‘You have been randomly allocated to the control condition. Control conditions are important as they allow us to work out the potential benefit of an intervention. We would like you to continue with your normal preparation and performance strategies. After you have completed the study, you will be provided with the other interventions we are trialling in this study.’

### Data analyses

Data were initially assessed for both univariate and multivariate normality. A group-by-time [3x2] mixed ANOVA was used to determine whether the intervention affected self-efficacy. A chi-square test was used to investigate differences between groups for goal attainment. A series of one-way ANOVAs were used to determine the effects of group on subjective performance satisfaction, coping, and stress appraisals. Independent samples *t*-tests were used to examine the effects of the interventions on intervention checks and social validity for each item. As an exploratory analysis, a correlational analysis was conducted between time spent on intervention during Survey 2, and scores on the intervention checks and social validity items. Partial eta squared (ηp²) effect sizes are presented for the ANOVAs (small, moderate, and large effect size anchors are 0.01, 0.06, and 0.14, respectively; Murphy & Myors, 2004), and Cohen’s *d* effect sizes are presented for the independent *t*-tests (small, moderate, and large effect size anchors are 0.2, 0.5, 0.8, respectively; Cohen, 1988). Brief qualitative data from Survey 3 relating to the intervention were inductively organised into domain summaries.

## Results

Normality checks on all variables showed that only intervention completion time violated assumptions of kurtosis and skewness (kurtosis = 8.43, skewness = 2.73). To address this violation, when conducting the correlational analysis with intervention completion time, Spearman’s rank correlation was used as it is suitable for non-parametric data (Kowalski, 1972). Means and standard deviations for each of the dependent variables are presented in Table 1.

[Insert Table 1]

### Goal Attainment and Performance Satisfaction

For the question where participants were asked to state their goals, participants reported a wide range of goals including those which were outcome-related (e.g., *Top three finish*), performance-related (e.g. *Sub 1hr 24 min*), and process-related (e.g., *Complete the event without any major injuries or issues)*. After the event, participants were asked to rate their goal attainment in relation to their stated goal. The results showed that goal attainment was similar across groups, with 56% of participants achieving their performance goal in the self-talk group, 57% in the implementation intentions group, and 54% in the control. A chi-square test revealed no significant effect of group on goal attainment, χ(1) = 2.00, *p* = .157. Across groups, participants were generally satisfied with their performance in their event (out of -3 to + 3, all medians = “2 – Moderately satisfied”, self-talk interquartile range[*IQR*] = -0.5 – 3, implementation intentions *IQR* = 1-3, control *IQR* = 1-3). There was no significant effect of group on performance satisfaction, *F* (2, 90) = .064, *p* = .938, ηp² = .00.

### Self-Efficacy and Coping

The effects of time, *F* (1, 91) = 0.46, *p* = .500, ηp²= .01, the effects of group, *F* (2, 91) = 0.87, *p* = .423, ηp²= .02, and the effects of the time by group interaction, *F* (2, 91) = 1.79, *p* = .173, ηp² = .04, on self-efficacy were not statistically significant. There was no significant effect of group on any of the CICS subscales (*p* values ranged from .880 to .110; see Table 1). This indicates that there was no effect of group on self-efficacy or use of coping strategies during the participants’ recent events.

### Stress Appraisals

There was no statistically significant effect of group for perceptions of stress intensity, *F* (2, 90) = 1.54, *p* = .219, ηp² = .03. There was a statistically significant effect of group for perceptions of stress controllability, *F* (2, 90) = 3.76, *p* = .027, ηp² = .08. Post-hoc analysis revealed that perceptions of stress controllability were lower in the control compared to the implementation intentions group (mean difference = -0.85, *p* = .008), but not in the self-talk group (mean difference = -0.52, *p* = .103). These results indicate that those in the implementation intentions group did not perceive the stress they encountered during their event as less intense, but as more controllable.

### Intervention Checks and Social Validity

There was no significant difference between groups for time spent completing the intervention, *t*(56) = 0.51, *p* = .609, *d* = 0.14, with both groups spending a similar amount of time on their respective intervention (self-talk *M* = 10m 26s, *SD* = 10m 08s, implementation intentions *M* = 11m 49s, *SD* = 10m, 15s). This supports the brief nature of the interventions.

In terms of the use of the intervention during their events, both groups reported similar levels of remembering to use the intervention (out of “1 – Not at all”, to “10 – Completely”, both medians = 8, self-talk *IQR* = 6-9.5, implementation intentions *IQR* = 6-9). The self-talk group reported slightly higher levels of using their intervention successfully during their event (out of “1 – Not at all”, to “10 – Completely”, self-talk median = 9, self-talk *IQR* = 6-10, implementation-intentions median = 7.5, implementation intentions *IQR* = 5-9), although this was not statistically significant, *t*(57) = 1.26, *p* = .212. Both groups reported similar levels of comfort using the intervention (out of “1 – Not at all comfortable”, to “10 – Completely comfortable”, self-talk median = 9.5, implementation intention median = 9, both *IQR*s = 8-10).

For social validity, both interventions were viewed favourably in terms of satisfaction (out of -3 to + 3, both medians = “2 – Moderately satisfied”, self-talk *IQR* = 0-2, implementation intentions *IQR* = 1-2) and as being useful for performance (out of -3 to +3, both medians = “2 – Moderately useful”, both *IQRs* = 1-2). Additionally, both groups reported they were likely to use their intervention in the future (out of -2 to +2, both medians = “1 – Probably yes”, self-talk *IQR* = 1-2, implementation *IQR* = 0-1). A Kendall’s tau-b correlation also revealed a small positive correlation between time spent completing the intervention and intervention satisfaction, which was statistically significant (τb = .23, *p* = .024).

### Qualitative Responses

The responses suggested that the simplicity and structure of the interventions was helpful and useful (eight responses of the total 42, e.g., “I liked that as a mental exercise, it was very simple to do. Didn't require a special environment, equipment, etc. so it was very accessible/practical”; “I have used this kind of positive thinking before but this research has made me much more organised about it”). Whereas the simplicity of the interventions was viewed as a strength by some, three participants responded less favourably (“Feels a bit fake”; ”Didn’t strike me as anything ground-breaking?”; “Needed training on how to use, learn and remember. Simple thing but in the heat of it all so easy to forget”).

## Discussion

This initial investigation examined how two brief, online interventions (self-talk and implementation intentions) were perceived by endurance participants and how they affected outcomes of interest in a naturalistic setting. The interventions had no effect on goal attainment, subjective performance satisfaction, self-efficacy, use of coping strategies, or perceived stress intensity. Participants in the implementation intentions group, reported higher levels of perceived stress controllability, although it needs to be reiterated that the sample was underpowered. Participants in the intervention groups were satisfied with their respective interventions, found them useful, and were planning to use them in the future. There were no differences between the two interventions regarding completion time and their usability during events, suggesting that the interventions are likely to be feasible and viable to implement with endurance athletes.

Goal attainment and performance satisfaction were similar across all three groups (the self-talk group, the implementation intentions group, and the control group), with most participants achieving their goal and being satisfied with their performance. Although attempts were made to address the issue of confounding variables when examining performance in naturalistic setting through use of a subjective performance satisfaction measure, no effects of the interventions were detected. In addition to the initial investigation being underpowered, other reasons to consider for this lack of an effect are that many participants had a goal of finishing an event, which most would achieve. Alternatively, participants were largely experienced in their sport, and so they would likely have developed their abilities and skills to perform at their own self-referenced level. This level of experience may have led to there being limited room for (performance) improvement. Nevertheless, sport is more than just performance outcomes such as time or finishing position. Both McCormick et al. (2018a) and Lane et al. (2016), although not demonstrating performance enhancement, found that their interventions benefited their participants’ experiences (e.g., enhanced emotional control, increased levels of satisfaction). Enhancing the experience of sport performers could have important implications for continued participation in sport, particularly in recreational, sub-elite athletes. In a pandemic like COVID-19, where face-to-face contact might be limited, this study shows the potential value of using interventions delivered online that have the potential to benefit athletes’ quality of experiences.

The only psychological variable that an intervention influenced was perceived stress controllability. Follow-up analyses revealed that this perception was only higher in the implementation intention group compared to the control group. As implementation intentions involve the identification of potential stressors and the formulation of strategies to deal with them, this appears a likely outcome of their use. Enhancing perceived stress controllability has been demonstrated to be a desirable psychological outcome relating to endurance sport performance (Nicholls et al., 2009), and the current study provides some initial support for the use of online implementation intentions to achieve this aim.

Although the interventions generally did not affect the main measured outcomes, participants were satisfied with their intervention and found it useful. Without overstating the findings and knowing whether the intervention satisfaction was influenced by factors such as enjoying being part of a study, it is worth noting that the participants reported that they were generally favourable to using the interventions in the future and liked the practicality of them. As the delivery of this intervention was similar to how a ‘real-life’ online intervention would be delivered, we can be optimistic that such online interventions would be well-received. An additional finding from the current study was the positive correlation between time spent completing the interventions, and the level of satisfaction with the interventions. Participants who spent longer completing the interventions initially may have learnt the intervention better, and in turn may have gained more from it during their event. Time spent engaging with self-directed interventions has been demonstrated to have positive impacts on subsequent intervention use and satisfaction (Geraghty et al., 2010), and the current research provides further support for this. We cannot determine an optimal duration of engagement with a brief intervention in a sporting context, based on the findings of this study and the lack of research on brief interventions delivered online in a sport setting. Nevertheless, as the self-talk and if-then planning interventions took on average 10:26 and 11:49 minutes, respectively, this can be considered a very small time investment for a potentially meaningful return.

In relation to social validity, the findings mirror the results of McCormick et al. (2018a) where participants found the intervention useful, despite there being no effect on performance. These findings help raise questions relating to the delivery of psychological interventions in sport. A key aspect of the provision of sport psychology is that techniques and interventions should be ‘evidence based’ (Martens, 1987), but arguably no studies have provided strong evidence for the performance effects of any psychological intervention on the performance of endurance athletes in real-life events using strong experimental designs (for a broader critique of the sport psychology performance-enhancement evidence, see Andersen, 2009). If, however, participants found the interventions useful and were satisfied with them (as occurred in the current study), does this ‘override’ the lack of performance effects? The answer to this question will largely depend on an individual’s perspective regarding what the purposes of sport psychology interventions are (e.g., the enhancement of performance, the improvement of experience, or a combination of both). Furthermore, with rapid changes to professional sport psychology practice happening through psychologists working with clients online as a result of the pandemic, the current study provides some useful considerations to take forward. One of these is that people can like brief interventions that are delivered online, without face-to-face contact with a practitioner. In fact, brief online interventions may even be preferrable to some people, because there is no pressure to engage with other attendees or speak aloud (which may be barriers to engaging with the educational content). Nevertheless, one participant outlined that they felt they needed training on how to use and remember it, especially in the heat of the moment. Thus, despite the accessibility of a brief intervention delivered online, it is important to remember that this does not replace one-to-one contact with a sport psychologist. In fact, brief interventions delivered online may highlight the need for developing one’s skills further.

**Limitations and Future Research**

In relation to limitations, this online brief intervention was an initial investigation that was underpowered. Furthermore, although we measured participants’ intentions to use the interventions in the future, we did not measure the interventions longitudinally. This limits our understanding of the potential lasting effects of the interventions, and this has implications for our ability to recommend them for use. Future research could address this concern by examining the effects of such brief interventions longitudinally, for example through the use of brief questionnaires on a weekly basis or extending the length of time for follow up (e.g., examine use of the interventions across a number of events). This would help further demonstrate the benefits of such interventions, and would allow an understanding of the potential for ‘top-up’ interventions or suggest when to provide reminders regarding their use (e.g., through email or text messages) (Geraghty et al., 2010). In addition, most participants foremostly identified as runners. It could be that certain brief interventions are more suitable to different endurance sports, and future research could look to address this through targeting other endurance sports (e.g., triathlon and swimming).

The control condition used was a “waiting list” where the participants were offered the intervention after the study had taken place. This choice was made to avoid the deception associated with placebo psychological interventions whilst, at the same time, minimise demoralisation and contamination, two well-known threats to internal validity (Shadish et al., 2002). However, a waiting list condition does not control for the potential expectancy effect in terms of performance improvement, i.e. the placebo effect (Hurst et al., 2020). However, in the context of this pragmatic trial, these confounding variables are not a major issue because, in naturalistic conditions, the placebo effect and the effects caused by the interaction with the intervention provider (e.g., coaches, the sport psychologist, and other sport scientists) are important components of psychological interventions and other interventions aimed at improving athlete performance (Halson & Martin, 2013). The hypothesis that specific content of the brief online psychological intervention (self-talk vs. implementation intentions) has specific effects beyond placebo was investigated by comparing the two experimental groups which we can assume had the same placebo and experimenter effects because of random allocation to treatment, careful wording of the psychological interventions, and similar attention by the researchers.

The present study delivered brief educational interventions online, which could be a time-efficient and preferable way to deliver evidence-based interventions to large numbers of people. This could be valued by recreational endurance participants who do not have access to a sport psychology practitioner (McCormick et al., 2020) or who seek out additional ways of accessing sport psychology support. Further, such interventions could be preferable in our changing profession, because COVID-19 has led to sport psychology interventions (e.g., CPD events, educational workshops) being delivered online. Online delivery may be preferable for some, through saving time (e.g., travel to workshops) and reducing some of the social barriers experienced at in-person workshops (e.g., meeting unfamiliar people, pressure to speak publicly or participate with others). The present study showed that an intervention that involved a 10-minute time commitment on average led to desirable outcomes relating to stress controllability and intervention satisfaction. Further work on online interventions is encouraged that translate the findings of efficacy studies into interventions that endurance participants could access, use, and benefit from. This is particularly timely as the 2020-2021 COVID-19 social distancing guidelines have encouraged online sport psychology delivery, but there is little research on interventions delivered this way. Online videos, mobile phone applications, coach education, and magazine articles also offer intervention-delivery formats that are preferable to endurance athletes (McCormick et al., 2020).

## Conclusion

The current study is among the first to examine the effects of brief, online psychological interventions on endurance athletes participating in real-life events. The interventions involved approximately ten minutes of initial engagement with online material. Although the interventions had no effect on goal attainment, performance satisfaction or other psychological factors, implementation intentions led to an increase in perceived stress controllability. In addition, participants were satisfied with their respective interventions, found them useful, and were planning to use them in the future. The current study helps demonstrate the feasibility and viability of using brief, online psychological interventions with endurance athletes, and helps provide an initial starting point for further research to design and evaluate online interventions. This may be timely in our changing profession, after COVID-19 has moved many of our interventions online.

**References**

Achtziger, A., Gollwitzer, P. M., & Sheeran, P. (2008). Implementation intentions and shielding goal striving from unwanted thoughts and feelings. *Personality and Social Psychology Bulletin*, *34*, 381–393. https://doi.org/10.1177/0146167207311201

Adriaanse, M. A., Gollwitzer, P. M., De Ridder, D. T. D., de Wit, J. B. F., & Kroese, F. M. (2011). Breaking habits with implementation intentions: A test of underlying processes. *Personality and Social Psychology Bulletin*, *37*(4), 502–513. https://doi.org/10.1177/0146167211399102

Andersen, M. (2009, June). Performance enhancement as a bad start and a dead end: A parenthetical comment on Mellalieu and Lane. *The Sport and Exercise Scientist*, 12–14. http://www.bases.org.uk/the-sport-and-exercise-scientist

Anstiss, P. A., Meijen, C., Madigan, D. J., & Marcora, S. M. (2018). Development and initial validation of the Endurance Sport Self-Efficacy Scale (ESSES). *Psychology of Sport and Exercise*, *38*, 176–183. https://doi.org/10.1016/j.psychsport.2018.06.015

Bieleke, M., & Wolff, W. (2017). That escalated quickly-Planning to ignore RPE can backfire. *Frontiers in Physiology*, *8*, 736. https://doi.org/10.3389/fphys.2017.00736

Blanchfield, A. W., Hardy, J., de Morree, H. M., Staiano, W., & Marcora, S. M. (2014). Talking yourself out of exhaustion: The effects of self-talk on endurance performance. *Medicine & Science in Sports & Exercise*, *46*, 998–1007. https://doi.org/10.1249/MSS.0000000000000184

Brown, D. J., & Fletcher, D. (2017). Effects of psychological and psychosocial interventions on sport performance: A meta-analysis. *Sports Medicine*, *47*, 77–99. https://doi.org/10.1007/s40279-016-0552-7

Cavanagh, K., Strauss, C., Cicconi, F., Griffiths, N., Wyper, A., Jones, F., & Kabat-Zinn, J. (2013). A randomised controlled trial of a brief online mindfulness-based intervention. *Chiesa & Serretti*, *51*, 573–578. https://doi.org/10.1016/j.brat.2013.06.003

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Gaudreau, P, & Blondin, J.-P. (2002). Development of a questionnaire for the assessment of coping strategies employed by athletes in competitive sport settings. *Psychology of Sport and Exercise*, *3*(1), 1–34. https://doi.org/10.1016/S1469-0292(01)00017-6

Gaudreau, Patrick, El Ali, M., & Marivain, T. (2005). Factor structure of the Coping Inventory for Competitive Sport with a sample of participants at the 2001 New York marathon. *Psychology of Sport and Exercise*, *6*(3), 271–288. https://doi.org/10.1016/J.PSYCHSPORT.2004.01.002

Geraghty, A. W. A., Wood, A. M., & Hyland, M. E. (2010). Attrition from self-directed interventions: Investigating the relationship between psychological predictors, intervention content and dropout from a body dissatisfaction intervention. *Social Science & Medicine*, *71*(1), 30–37. https://doi.org/10.1016/J.SOCSCIMED.2010.03.007

Gill, D. L., Williams, L., & Reifsteck, E. J. (2017). *Psychological dynamics of sport and exercise* (4th ed.). Human Kinetics.

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, *54*(7), 493–503. https://doi.org/10.1037/0003-066X.54.7.493

Gottlieb, J. D., Gidugu, V., Maru, M., Tepper, M. C., Davis, M. J., Greenwold, J., Barron, R. A., Chiko, B. P., & Mueser, K. T. (2017). Randomized controlled trial of an internet cognitive behavioral skills-based program for auditory hallucinations in persons with psychosis. *Psychiatric Rehabilitation Journal*, *40*(3), 283–292. https://doi.org/10.1037/prj0000258

Greenspan, M. J., & Feltz, D. L. (1989). Psychological interventions with athletes in competitive situations: A review. *The Sport Psychologist*, *3*, 219–236. https://doi.org/10.1123/tsp.3.3.219

Halson, S. L., & Martin, D. T. (2013). Lying to win-Placebos and sport science. *International Journal of Sports Physiology and Performance*, *8*, 597–599. http://journals.humankinetics.com/ijspp

Hirsch, A., Bieleke, M., Schüler, J., & Wolff, W. (2020). Implicit theories about athletic ability modulate the effects of if-then planning on performance in a standardized endurance task. *International Journal of Environmental Research and Public Health*, *17*, 2576. https://doi.org/10.3390/ijerph17072576

Hurley, O. A. (2021). Sport cyberpsychology in action during the Covid-19 pandemic - Opportunities, challenges and future possibilities: A narrative review. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2021.621283

Hurst, P., Schiphof-Godart, L., Szabo, A., Raglin, J., Hettinga, F., Roelands, B., Lane, A., Foad, A., Coleman, D., & Beedie, C. (2020). The Placebo and Nocebo effect on sports performance: A systematic review. *European Journal of Sport Science*, *20*, 279–292. https://doi.org/10.1080/17461391.2019.1655098

Kowalski, C. J. (1972). On the effects of non‐normality on the distribution of the sample product‐moment correlation coefficient. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, *21*(1), 1–12. https://doi.org/10.2307/2346598

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, *4*, 863. https://doi.org/10.3389/fpsyg.2013.00863

Lane, A. M., Devonport, T. J., Stanley, D. M., & Beedie, C. J. (2016). The effects of brief online self-help intervention strategies on emotions and satisfaction with running performance. *Sensoria: A Journal of Mind, Brain & Culture*, 30–39.

Lane, A. M., Totterdell, P., MacDonald, I., Devonport, T. J., Friesen, A. P., Beedie, C. J., Stanley, D., & Nevill, A. (2016). Brief online training enhances competitive performance: Findings of the BBC Lab UK psychological skills intervention study. *Frontiers in Psychology*, *7*(MAR), 1–14. https://doi.org/10.3389/fpsyg.2016.00413

Latinjak, A. T., Hatzigeorgiadis, A., Comoutos, N., & Hardy, J. (2019). Speaking clearly . . . 10 years on: The case for an integrative perspective of self-talk in sport. *Sport, Exercise, and Performance Psychology*. https://doi.org/10.1037/spy0000160

Martens, R. (1987). Science, knowledge, and sport psychology. *The Sport Psychologist*, *1*, 29–55. https://doi.org/10.1123/tsp.1.1.29

McCormick, A., & Anstiss, P. (2020). Self-talk and endurance sports. In A T Latinjak & A. Hatzigeorgiadis (Eds.), *Self-talk in sport*. Routledge.

McCormick, A., Anstiss, P. A., & Lavallee, D. (2020). Endurance athletes’ current and preferred ways of getting psychological guidance. *International Journal of Sport and Exercise Psychology*, *18*, 187–200. https://doi.org/10.1080/1612197X.2018.1486874

McCormick, A., Meijen, C., Anstiss, P. A., & Jones, H. S. (2019). Self-regulation in endurance sports: theory, research, and practice. *International Review of Sport and Exercise Psychology*, *12*, 235–264. https://doi.org/10.1080/1750984X.2018.1469161

McCormick, A., Meijen, C., & Marcora, S. (2018a). Effects of a motivational self-talk intervention for endurance athletes completing an ultramarathon. *The Sport Psychologist*, *32*, 42–50. https://doi.org/10.1123/tsp.2017-0018

McCormick, A., Meijen, C., & Marcora, S. (2018b). Psychological demands experienced by recreational endurance athletes. *International Journal of Sport and Exercise Psychology*, *16*, 415–430. https://doi.org/10.1080/1612197X.2016.1256341

Meijen, C. (2019). Prelude: interventions for endurance performance. In *Endurance performance in sport: Psychological theory and interventions* (pp. 109–112). Routledge.

Meijen, C., Turner, M., Jones, M. V., Sheffield, D., & McCarthy, P. (2020). A Theory of Challenge and Threat States in Athletes: A revised conceptualization. *Frontiers in Psychology*, *11*, 126. https://doi.org/10.3389/fpsyg.2020.00126

Murphy, K. R., & Myors, B. (2004). *Statistical power analysis: A simple and general model for traditional and modern hypothesis tests* (2nd ed.). Lawrence Erlbaum.

Nicholls, A. R., Levy, A. R., Grice, A., & Polman, R. C. J. (2009). Stress appraisals, coping, and coping effectiveness among international cross-country runners during training and competition. *European Journal of Sport Science*, *9*, 285–293. https://doi.org/10.1080/17461390902836049

Page, J., & Thelwell, R. (2013). The value of social validation in single-case methods in sport and exercise psychology. *Journal of Applied Sport Psychology*, *25*, 61–71. https://doi.org/10.1080/10413200.2012.663859

Price, D., Wagstaff, C. R. D., & Thelwell, R. C. (2020). Opportunities and considerations of new media and technology in sport psychology service delivery. *Journal of Sport Psychology in Action*. https://doi.org/10.1080/21520704.2020.1846648

Raghavendra, P., Newman, L., Grace, E., & Wood, D. (2013). ‘ *I could never do that before* ’: effectiveness of a tailored Internet support intervention to increase the social participation of youth with disabilities. *Child: Care, Health and Development*, *39*(4), 552–561. https://doi.org/10.1111/cch.12048

Scheerder, J., Breedveld, K., & Borgers, J. (2015). Who is doing a run with the running boom? The growth and governance of one of Europe’s most popular sport activities. In J. Scheerder, K. Breedveld, & J. Borgers (Eds.), *In Running across Europe* (pp. 1–27). Palgrave Macmillan.

Schumacher, J. M., Becker, A. J., & Wiersma, L. D. (2016). Forging ahead: An examination of the experiences and coping mechanisms of channel swimmers. *The Sport Psychologist*, *30*, 327–338. https://doi.org/10.1123/tsp.2015-0137

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.

Thrower, S. N., Harwood, C. G., & Spray, C. M. (2019). Educating and supporting tennis parents using web-based delivery methods: A novel online education program. *Journal of Applied Sport Psychology*, *31*, 303–323. https://doi.org/10.1080/10413200.2018.1433250

Verhoeven, A. A. C., Adriaanse, M. A., de Ridder, D. T. D., de Vet, E., & Fennis, B. M. (2013). Less is more: The effect of multiple implementation intentions targeting unhealthy snacking habits. *European Journal of Social Psychology*, *43*(5), 344–354. https://doi.org/10.1002/ejsp.1963

Walton, G. M. (2014). The new science of wise psychological interventions. *Current Directions in Psychological Science*, *23*(1), 73–82. https://doi.org/10.1177/0963721413512856

Wolff, W., Bieleke, M., Hirsch, A., Wienbruch, C., Gollwitzer, P. M., & Schüler, J. (2018). Increase in prefrontal cortex oxygenation during static muscular endurance performance is modulated by self-regulation strategies. *Scientific Reports*, *8*, 15756. https://doi.org/10.1038/s41598-018-34009-2

Zepp, C. (2016). Coping with stress during a marathon. In C. Zinner & B. Sperlich (Eds.), *Marathon running: Physiology, psychology, nutrition and training aspects* (pp. 83–105). Springer. https://doi.org/10.1007/978-3-319-29728-6

Figure 1. Participant attrition and completion rate for the online interventions

Randomised (*n* = 142)

Allocated to self-talk intervention (*n* = 47)

Registered initial interest with participating in the study

(*n* = 235)

Allocated to implementation intention group (*n* = 50)

Allocated to control group (*n* = 45)

Completed follow-up measures (*n* = 31)

Lost to follow-up:

* injury (*n* = 3)
* event cancelled (*n* = 4),
* no reason given (*n* = 12)

Completed follow-up measures (*n* = 33)

Lost to follow-up:

* injury (*n* = 2)
* no reason given (*n* = 10)

Excluded (*n* = 93)

* Not meeting inclusion criteria (*n* = 10)
* No reason given by the participant (*n* = 83)

Completed follow-up measures (*n* = 30)

Lost to follow-up:

* injury (*n* = 2)
* event cancelled (*n* = 1)
* no reason given (*n* = 14)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 1 | | | | | | | | |
| *Mean and Standard Deviation Scores for the Dependent Variables, with p Values and Effect Sizes* | | | | | | | | |
| **Group** | | | | | | | | |
| **Measure** | **Self-Talk** | | **Implementation Intentions** | | **Control** | | ***p*** | **ηp²** |
|  | ***M*** | ***SD*** | ***M*** | ***SD*** | ***M*** | ***SD*** |  |  |
| Pre-Event Self-Efficacy | 68.9 | 10.5 | 72.2 | 10.7 | 71.4 | 10.2 | .618 | .01 |
| Post-Event Self-Efficacy | 72.7 | 13.7 | 74.6 | 9.19 | 69.4 | 12.9 | .228 | .03 |
| Subjective Performance Satisfaction | 1.40 | 1.73 | 1.55 | 1.57 | 1.49 | 1.58 | .938 | .00 |
| Perceived Stress Intensity | 5.60 | 1.59 | 4.96 | 1.54 | 5.03 | 1.51 | .219 | .03 |
| Perceived Stress Controllability | 5.33 | 1.06 | 5.66 | 1.02 | 4.82 | 1.53 | .027 | .08 |
| Coping – Thought Control | 3.62 | 0.75 | 3.54 | 0.79 | 3.53 | 0.83 | .880 | .00 |
| Coping – Imagery | 3.23 | 0.96 | 3.33 | 0.88 | 3.05 | 0.83 | .428 | .02 |
| Coping – Relaxation | 3.45 | 0.96 | 2.96 | 0.89 | 3.15 | 0.95 | .110 | .05 |
| Coping – Effort | 4.01 | 0.91 | 3.84 | 0.69 | 4.01 | 0.68 | .481 | .02 |
| Coping – Logical Analysis | 3.72 | 1.06 | 3.35 | 0.84 | 3.42 | 0.90 | .282 | .03 |
| Coping – Venting | 2.22 | 1.18 | 1.84 | 0.85 | 2.05 | 0.98 | .353 | .02 |
| Coping – Distraction | 2.47 | 0.83 | 2.21 | 0.81 | 2.56 | 0.90 | .260 | .03 |
| Coping – Disengagement | 2.11 | 1.13 | 2.00 | 1.06 | 2.42 | 1.27 | .354 | .02 |
| *Note*. *p* values and effect sizes (*ηp²)* based on ANOVAs between groups; self-efficacy scores can range 0-100; subjective performance satisfaction can range -3 to 3; stress intensity and controllability scores can range 1-7; coping scores can range 1-5. | | | | | | | | |