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This study evaluates ultra-marathon runners' use of goal-setting, self-talk, and imagery as strategies to help them through the challenge of long-distance running. In stage one, thirty-one self-professed non-runners were recruited and received motivational interviewing (MI) in a group setting, examining their motivation to get healthy. In stage two, five months later, participants were asked if they would consider running an ultra-marathon, and fifteen (M_{age}=39.47, SD=5.84) agreed. At this point participants were randomly split into an MI or Functional Imagery Training (FIT) group. FIT teaches participants how to master goal centred imagery by controlling attention and elaboration. Groups received similar contact hours and completed 4 measures that assess grit, resilience, self-efficacy, and imagery ability at baseline and after the race. We found no significant differences between measures for finishers and non-finishers or between groups or over time. However, the likelihood of completing the ultra-marathon was five times as likely in the FIT group, than in MI (RR=5.25). Grit and resilience scores were strongly correlated. By receiving FIT, there was a significant association (p=.04) to complete the ultra-marathon. FIT is a relatively cost-effective method to increase exercise adherence through multi-sensory elaboration of goal setting and overcoming barriers or challenges.

Keywords: endurance, adherence, resilience, imagery training, Motivational Interviewing

We all know that exercise improves our physical and mental health but many of us do not exercise because of our current lifestyle priorities and barriers. Barriers to exercise that are identified in college students, such as a lack of motivation or time constraints (e.g., Egli, Bland, Melton, & Czech, 2011), may not improve later in life (Lees, Clark, Nigg, & Newman, 2005). Even those who do some exercise often want to exercise more (76% according to Ebben & Brudzynski, 2008). In this paper we report a motivation intervention that enables non-exercisers to take part in a highly arduous and challenging form of exercise, ultra-marathon running.

Barriers to exercise are more perceived than real. Jogging and running are popular forms of exercise which overcome many perceived barriers by being low cost, needing no specialised facilities or membership fees, and minimal equipment. Parkrun, which went global in 2008, now has more than six million members, operates in over two thousand running locations, increasing activity levels across every age group with programmes developed to get people from ‘couch to 5K’ by walking, jogging, running or in wheelchairs. The crucial barrier that needs to be overcome is simply a lack of motivation. Once motivated to engage, those who take part in Parkrun events report a positive impact on physical health, being connected with community and an increase in personal well-being (Grunseit, Richards & Merom, 2018). More challenging mass participation running events show similarly high engagement, once the motivation to start has been achieved. In 2019, the first marathon for over half of those entered from the UK, and for those 50,000 selected through the ballot, 42,906 started the race (85.8% of total entries) and 42,549 finished (99.2%).

Motivation has been particularly difficult to define (Beckmann & Heckhausen, 2018), but what is known is that it fluctuates dependent on internal (e.g., mood),

external (e.g., the task), or a combination of the two. Some of the key aspects of motivation to complete physically challenging tasks, such as running a marathon, include personal goal achievement and psychological strategies that enhance effort (Zach et al., 2017). Commitment on the other hand is an intrinsic obligation that is grounded upon core values. When challenging times occur, it seems that those committed have already accepted the hard-work and have planned ahead to enhance performance (Reilly et al., 2019). If running a marathon seems to be a colossal task that only 1% of the population achieve, then running an ultra-marathon (>42.2 km) is beyond imagination.

Not surprisingly, ultra-distance runners are more committed and more goal orientated than other athletes (Acevedo, Dzewaltowski, Gill & Noble, 1992). These runners reported using cognitive strategies of imagery, setting goals, self-talk and thought control; all techniques designed to cope more effectively with tolerating the discomfort of running for long durations. Therefore, ultra-marathon runners seem to start motivated (Roebuck et al., 2018), become committed, then adapt and refine methods to improve their performance.

Imagery, amongst other mental skills mentioned by ultra-marathon runners, is a method commonly used and applied by many athletes across various sports. Motivational benefits of imagery (Paivio, 1985; Gregg & Hall, 2018) have since been applied as a goal-centred approach to increase motivation and commitment. Motivational Imagery has been identified as being effective at increasing the levels of physical activity and exercise (Chan & Cameron, 2012; Giaccobbi, 2018; Kim, Newton, Sachs, Giacobbi, & Glutting, 2011) and helping individuals to reach the threshold of minimum exercise levels (Andersson & Moss, 2010). Guided imagery has been recently described as a motivational amplifier for engaging in physical

activities (Renner et al., 2019). However, what is needed is a compound mental skill that combines a series of strategies that enhances effort when unwanted thoughts arise, such as drop-out, which conflict with long-term goals.

Functional Imagery Training (FIT) is a novel motivational method (Andrade, Khalil, Dickson, May, & Kavanagh, 2016), based on the principles and spirit of Motivational Interviewing (MI; Miller & Rollnick, 2012), that integrates motivational imagery at key stages to magnify commitment to change. MI is a person-centred approach that engages the participant in the self-identification of goals, barriers, and plans of actions. Research (Anshel & Kang, 2008; Köse & Yıldız, 2021) has found that although MI does support exercise adherence and promotes healthy behaviours, when MI is paired with imagery training; becoming FIT, individuals have a significantly higher likelihood of not only changing behaviour, but with changes sticking (Solbrig et al., 2018). FIT has been demonstrated to be an effective method in increasing grit in soccer players (Rhodes, May, Andrade, & Kavanagh, 2018), weight loss (Solbrig et al., 2018), and increasing sporting performance (Rhodes, May, & Booth, 2020). Although based on visual cognitive representations, goal-focussed imagery is a compound mental skill that involves multi-sensory elaboration. For example, if the goal is to complete a marathon, the individual elaborates on crossing the finishing line; the feeling of tired legs, the taste of sweat, emotion and intrinsic meaning of completion. Elaboration, as the attention given to a stimulus or goal, goes beyond imagery as the individual engages in self-talk, triggers emotion, connects to core values and constantly appraises goals by contrasting between current performance and future success (Oettingen & Gollwitzer, 2018; Rhodes et al., 2020).

Ultra-marathon runners often first complete a marathon, then go on to focus on improving health (Krouse, Ransdell, Lucas, & Pritchard, 2011), which can

influence life meaning, self-esteem and the broader pursuit of goals (Waśkiewicz, Nikolaidis, Chalabaev, Rosemann, & Knechtle, 2019). Accepting that MI will likely enable individuals to start adhering to healthy goals (Anshel & Kang, 2008; Köse & Yıldız, 2021), the aim of this study was to ascertain the effectiveness of FIT in comparison to MI for running an ultra-marathon. We predicted that FIT, when compared to and MI performance group, would result in more runners starting and finishing the race. We measured imagery, resilience, grit and self-efficacy for the ultra-marathon runners, hypothesising a correlation between each of the three personality measures at baseline. Furthermore, we hypothesised that the FIT group would display higher self-report scores for all measures in comparison to the control group.

Method

Ethics and Design

The experimental protocol was approved by the authors' institutional ethics committee. All participants were informed at the start of the study that the project occurred in two phases and could withdraw at any stage. Stage one was a motivational interview lasting for roughly an hour and a half at baseline. Participants were then not contacted for 5 months. To enter stage two participants were asked if they would consider being part of the next project examining how performance approaches can support runners completing an ultra-marathon after additional training. At this point the remaining participants were randomly allocated to one of two discussion groups: the 'performance group' (PG) discussed running strategies that enhance performance, while the 'functional imagery group' received FIT. Consent was both verbal and written for each stage of the study.

Participants

An advert was posted on social media in March 2019 “seeking non-runners, who have no competitive experience” to partake in a project that aimed to “enhance motivation for exercise and health”. Thirty-one people (24 males, 7 females, M_{age}=36.92, SD=6.02) responded and then booked to attend an MI group session. The MI sessions, stage one, lasted for an average of 1 hour and 37 minutes, and 31 participants attended. After these sessions, no further contact was made until stage two, five months later, when participants were contacted via email or telephone, and asked: “would you consider running an ultra-marathon”. At this point fifteen participants agreed (M_{age}=39.47, SD=5.84) and were randomly (www.randomizer.org) allocated to either a discussion workshop (Male=6, Female=2) or the FIT (Male=6, Female=1) intervention.

Measures

Three questionnaires were used to assess adversity and effort: grit, self-efficacy, and resilience, and one questionnaire assessed imagery ability. The four scales have a high reliability, unidimensional validity, can be completed relatively quickly due to minimal items that do not require detailed researcher explanations. Furthermore, performance was measured through completion of an ultra-marathon.

Grit.

The short Grit scale (Grit-S; Duckworth, Peterson, Matthews, & Kelly, 2007) consists of 8 items assessing the two facets of grit; perseverance of effort and consistency of interests (Duckworth & Quinn, 2009). Researchers (e.g., Ion, Mindu, & Gorbănescu, 2017) have debated the two facets of grit, finding that total grit score

is a better predictor of success and retention. Therefore, total grit score will be used to consider success.

Self-Efficacy

The General Self-Efficacy Scale (GSE; Schwarzer, & Jerusalem, 1995) comprises of 10 items assessing self-efficacy for personal goals, perseverance in the face of barriers, recovery from setbacks and investment of effort in goals. The items are generic which allow general use (Luszczynska, Scholz, & Schwarzer, 2005) and report a high one factor fit with moderate to high reliability (cf. Chen, Gully, & Eden, 2001) suitable for our sample.

Resilience

The Brief Resilience Scale (BRS) holds moderate to good reliability (Smith et al., 2008) assesses an individual's ability to adapt following adversity using 6 items. Although short, methodological reviews (e.g., Windle, Bennett, & Noyes, 2011) have found the BRS is one of the best methods to assess resilience through a unidimensional structure (McKay, Skues, & Williams, 2019).

Imagery Ability

The Plymouth Sensory Imagery Questionnaire (Psi-Q; Andrade, May, Deeprose, Baugh, & Ganis, 2014) reliably assesses vividness by examining vision, sound, smell, taste, touch, body, and emotion. Each of the 7 senses have 5 items and scores can be combined to give an overall score. The Psi-Q is used to assess imagery ability due to the general nature of the questions which has been used in a variety of samples (Renner et al., 2019).

Ultra-marathon

Participants were asked to enter an ultra-marathon that is 50 km or greater in distance. The events were all affiliated to UTMB® (Ultra-trail du Mont Blanc) and associated points given by the International Trail Running Association (ITRA) who evaluate races based on the quality and difficulty of the event. The participants entered one of three races, all of which occurred in the South West of England, UK in 2020.

Procedure

Participants attended an online MI workshop delivered by a trained and experienced MI practitioner who has a high fidelity of delivery for individuals and groups. Initially participants explored person-centred goals in small groups, with each individual given an opportunity to engage in conversation and focus on healthy habits. Participants appeared to have a high degree of motivation already and conversations were lively. Tasks (such as discussing the benefits of healthy behaviours after five months and discussing overcoming obstacles) were set in small groups with the aim to elicit change talk focusing on the desire to exercise and maintain changes (Miller & Rollnick, 2012). At the end of the session participants were asked to rate the importance (0=not at all, 10=extremely) of their healthy change, confidence going for runs, and readiness to start exercising today/tomorrow (see Miller & Rollnick, 2002). This data was not collected, but individuals were given an opportunity to receive additional motivational support at the end of the group session if scores were <5. Participants were informed that they would be contacted in five months to take part in stage two of the study if they wished.

After five months participants were emailed or received a phone call asking if they wished to take part in stage two of the research project which entailed running in

an officially organised ultra-marathon at their chosen distance beyond 50 km. At this point participants were reminded of their right to say no, anonymity and right for their data to be withdrawn. Of the 31 participants, 15 agreed to "give it a go" and were asked to complete the four measures and email it back to the researcher before the group intervention.

Performance Group (PG)

The PG met online in three groups (sizes 3, 3 and 2) and discussed their current running programmes. No training advice was given by the researcher, but participants did discuss training programmes. Participants disclosed that they were running, a minimum of three times per week for training distances of between 10 km and 40 km. Periodically, participants reviewed their own strategies to (1) increase effort and training consistency, and (2) overcome 'the wall': the psychological barrier which may occur during a long run causing them to quit. This workshop lasted for between 47 minutes and 1 hour 12 minutes, ending with participants discussing what ultra-marathon event to enter between January and July 2020.

A booster session was offered two months before the prospective event lasting for 15 minutes. In this session strategies to increase effort and overcome 'the wall' were discussed, but no specific imagery trained. A final booster this time in the format of an email occurred the day before the event and participants were again reminded of their ethical rights.

FIT Group (FIT)

The FIT group met in three groups (sizes were 3 and 4), discussed training plans, running distance (between 5 and 40 kilometres) and frequency (minimum of 3 days per week), and reviewed coping strategies. Strategies were discussed using the

same initial review task as in the PG, but after 15 minutes participants were asked to imagine the training required to complete an ultra-marathon and imagine a specific point when 'the wall' or significant challenges occur, and a FIT session began. The sequence of the training was to: examine motivation specific achievement goals (Paivio, 1985), imagine obstacles and ways to overcome them (Oettingen, 2012), discuss individual strengths, and connect imagery with cues (Rhodes et al., 2018; Rhodes et al., 2020). During each sequence multisensory imagery was taught to the participants with the aim to add layers to the imagined future event (e.g., Williams, Cooley, & Cumming, 2013). Participants ended the session by talking though their imagery experience (Lang, 1979) when 'hitting the wall' and when 'mental mutiny' (destructive unwanted thoughts) occur, adding a daily behavioural and performance cue to third person self-talk. For example, when boiling the kettle and waiting, this was the cue to activate multisensory imagery for participant 4:

> I can imagine being totally tired, my legs struggling and I'm only 60k into the race. I will take a sip of water, slow down, reset. Then think of finishing and the conversation I will have on Monday morning. I'm in the staff room. It's warm and I've got a coffee in my hand. I'm telling them about being at 60k, tired, wet, but just persevering, moving forwards. The feeling I'm going to have when I finish, going from little exercise to ultra-athlete. I'll say to myself: 'come on (name), you've trained really hard, and you deserve to finish. Keep moving forwards mate, improve your arm swing'.

Race and Debrief

The three female participants entered two different 50 km races, and the twelve males entered one of three events between 100 mi (160.93 km) and 117 mi (188.29 km). After completion of the ultra-marathon, a mutual time for a debrief was organised on an individual basis. During this session participants completed the self-report scales again and descriptives collected including race data, such as running

time and step count. Finally, participants discussed their preparation for the ultra-marathon and their feedback on the PG and FIT group sessions.

Data Analysis

The complete dataset for self-report scale item responses and total score are openly available on Open Science Framework, including the corresponding analysis code, which was completed in R: https://osf.io/hq8eg/?view_only=0ccc0a60ca454c669da746da46e0e0bf. Significance was measured at the .05 level and Cohens d used for pairwise comparisons (Cohen, 1992; Lakens, 2013). Pearson's correlations including confidence intervals for the self-report scales were also conducted to assess relationships.

Results

Race Performance and Feedback

Of the eight participants in the performance group, four started the race (50%), and two finished. All seven of the FIT group started, and six finished. The Odds Ratio (OD) for group (PG vs FIT) and outcome (Success vs Failing to complete an ultra-marathon is 18 (CI 95%: 1.27 to 255.76, $p = 0.033$) and the Risk Ratio is 5.25. Even with the more conservative value of Risk Ratios, the participants in the FIT group are five times more likely to complete the ultra-marathon than those in the performance group.

Performance data and race drop-out information is available in Table 1. A Fisher Exact test showed a significant association between group and success on the race or failure (not starting and not completing), p=.0406.

Table 1. Performance data and race drop-out information.

	N	Did not start	Did not finish	Finish	Pre-race Drop-out	Race Drop-out
Control	8	4	2	2	1x Injury 2x Poor weather 2x No reason	Injury at mile 22 Injury at mile 41.
FIT	7	0	1	6	None	Injury at mile 37.

As the race distances varied by sex and location, completion times differed with the mean completion time = 23 hours and 43 minutes, with a total of 193,871 steps and burning 12,729 calories. The four performance group starters tallied 40.8 mi per week in the month prior to their ultra-marathon, while the FIT group trained for 44.2 mi per week. Anecdotally, the four performance group participants who did not race, stated that they rarely trained in cold weather conditions, whereas those who did start trained in all-weather conditions regardless of the heat, rain, or snow. Performance group participants reported that they used goal setting by focusing on running targets such as the brow of a hill or a distance. Once they hit that target, they would reset a new running target. This narrow goal focus enabled them to manage their attention when motivation was low. The FIT group reported that they used imagery regularly and found the obstacle task in the group intervention session important as it enabled them to remain consistent with their programme by planning effectively. The performance group struggled with negative self-talk when training and competing, while the FIT participants reported cognitive control of their "internal chatter by activating imagery at critical times" and that imagery "helped to focus on success when fatigue and unwanted thoughts tried to take over".

Self-report scales

Baseline and final total scores for the performance group and FIT group are shown in Figure 1. There were no significant differences between performance group and FIT at baseline in any of the measures (p>.05).

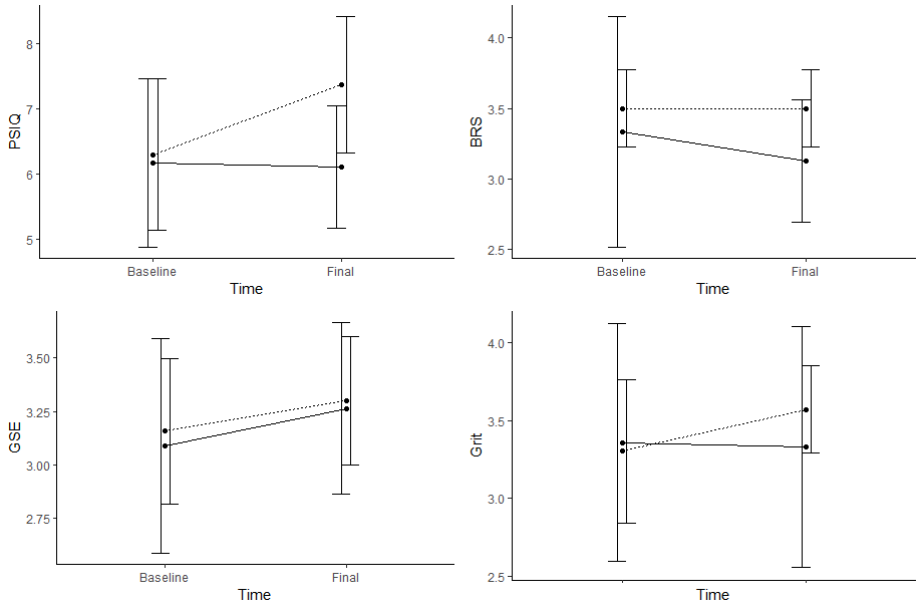

Figure 1. Mean baseline and final scores for each of the four measures (Performance Group = solid line, FIT = dotted line). Error bars show standard deviation.

At baseline only GSE and Grit correlated significantly (Table 2), although BRS showed a positive association with GSE and GRIT.

Table 2. Mean, standard deviation and correlations for all self-report measures.

Variable	*M*	*SD*	1	2	3
1. PSIQ	218.07	41.44			
2. BRS	3.41	0.61	-.18		
			[-.63, .37]		
3. GSE	3.12	0.42	-.07	.50	
			[-.56, .46]	[-.01, .81]	
4. Grit	3.33	0.62	.01	.50	.66**
			[-.51, .52]	[-.02, .80]	[.22, .88]

Note. M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$.

A MANOVA for group and time was conducted. The results showed a main effect of time, $F(4,21)=3.31$, $p=.03$, $\eta p2=.045$, no effect of groups, $F(4,21)=.84$, $p=.51$, $\eta p2=.02$, and no significant time x group interaction, $F(4,21)=.63$, $p=.64$, $\eta p2=.02$. Post-hoc analysis of univariates also showed no significant differences (all $p>.05$).

Discussion

The aim of this study was to establish if a performance discussion group or FIT group could support individuals to start and finish an ultra-marathon. Far beyond our prediction, all the FIT group started the ultra-marathon, in comparison to half of the performance group participants, and all but one of the FIT group completed the ultra-marathon, while only two did from the performance group. While the performance group developed the motivational adherence to train for the ultra-marathon through the use of MI, the FIT group were committed, perhaps due to their multi-sensory elaboration which got all the participants to the start line.

The setting of goals, their discussion and importance, affects adherence. Guided multi-sensory elaboration which is then refined by the participant is fundamental to master imagery use (Lang, 1979), which gives participants the autonomy to practice the skill in a functional format. Using imagery during challenging events and/or when confronted with physiological discomfort (running an ultra-marathon) and mental mutiny (intrusive thoughts about quitting), is a way to realign attention. Using imagery at critical times, as FIT participants reported,

increases cognitive control that has the potential to manage intrusive negative thoughts, similar to FITs application in craving research (Andrade et al., 2016). FIT participants were ‘equipped’ with the compound mental skill (Rhodes et al., 2020) of multi-sensory imagery which activates self-talk and triggers emotional cues as a tool to deal with possible challenging moments to enhance resilience and promotes performance.

The self-report measures showed no significant difference by time or condition. Although a similar FIT methodology was delivered by Rhodes et al. (2018) with professional soccer players showing a significant improvement in grit, this study did not replicate this finding. We perceive that the training completed between stage one and two of this project and committing to the ultra-marathon possibly increased grit and the other measures at baseline. This is a limitation of the general design. Measuring each self-report factor would have been best conducted at the start of stage one in addition to the timepoints when data was collected.

We correlated imagery alongside three personality scales to ascertain if there were relationships. There was no significant correlation between scales with the exception of grit and self-efficacy. Research (Georgoulas-Sherry & Kelly, 2019) and conceptual arguments (Webster & Rivers, 2019) into grit, resilience and self-efficacy suggest each of the self-report measures positively correlate. Indeed, they may, but not for the small sample in this study. Predicting student performance, Alhadabi and Karpinski (2020) found high achievers also scored high on self-efficacy and grit scales. Therefore, the context such as within education, the military or sport, sample, and challenge maybe a vital factor in building the constructs of success when facing a substantial challenge (Cassidy, 2015).

FIT appears to be a relatively cost-effective method to increase adherence through multi-sensory elaboration of goal setting and overcoming barriers or challenges. FIT for sport can be used in endurance events that may at first seem out of reach for those initially motivated and then committed. This study supports previous research that FIT improves sporting performance (Rhodes et al., 2020) and health related goals (Solbrig et al., 2018).

This study produced mixed results due to the small sample size: the population of novice ultra-marathon runners is very limited. If it were possible to recruit a larger sample of novice ultra-marathon runners, more informative findings would result. As the intervention was conducted online, it could be delivered globally to an international audience to improve the size and diversity of the sample.

This is the first study to investigate psychological methods and their effectiveness in supporting self-certified non-runners to go from couch to ultra-marathon runner. In our collective research (*removed for blind peer review*), we have found that by first examining motivation in depth, then connecting individuals through focus groups to share goals and verbalise challenges, this process may evoke initial behaviour change. To maintain changes and push the boundaries of physical and mental performance, multi-sensory imagery is the key difference between those who reach the starting line and then go on to finish, and those who do not.

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