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ORCID: <https://orcid.org/0000-0001-5697-2974> (2023)  
Effectiveness of an online Acceptance and Commitment Therapy  
programme for perfectionism in soccer players. *Sport, Exercise,  
and Performance Psychology*. (In Press)

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Watson, D. R., Hill, A. P., Madigan, D. J., & Donachie, T. C. (in press). Effectiveness of an online Acceptance and Commitment Therapy programme for perfectionism in soccer players: A randomized control trial. *Sport, Exercise, and Performance Psychology*. Accepted 26-09-2023 [Author Accepted Version].

Effectiveness of an Online Acceptance and Commitment Therapy Programme for  
Perfectionism in Soccer Players: A Randomized Control Trial

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### Abstract

There is currently limited understanding of how to reduce perfectionism in sport. With research outside of sport as impetus, in the current study we evaluated the effectiveness of an online ACT-based intervention for reducing perfectionism and improving pre-competition emotions in soccer players. Following a pre-registered protocol, eighty-one female soccer players ( $M$  age = 24.28 years,  $SD = 6.77$ ) were randomly allocated to either an intervention group ( $n = 41$ ) or a waitlist control group ( $n = 40$ ). The intervention group had access to a set of online ACT-based modules for 8-weeks. Athletes completed measures of trait perfectionism, perfectionism cognitions, and pre-competition emotions pre-intervention and post-intervention. A 2 (group) x 2 (time) ANOVA revealed significant interaction effects for trait perfectionism, perfectionism cognitions, and pre-competition emotions. Following the intervention, the two groups displayed significant mean differences for trait perfectionism, perfectionism cognitions, and almost all pre-competition emotions. However, due to lower reliability of some instruments, findings regarding post-competition emotions were discounted. The findings suggest that online ACT-based interventions may be a viable and effective way to reduce perfectionism in soccer players (but not necessarily improving pre-competition emotions).

*Keywords:* practice, applied, health

50        **Effectiveness of an Online Acceptance and Commitment Therapy Programme for**  
51                    **Perfectionism in Soccer Players: A Randomized Control Trial**

52            Research suggests that athletes who are perfectionistic are more vulnerable to a range  
53 of difficulties. In soccer academy players, for example, perfectionism has been implicated in  
54 more negative pre-competition emotions and both higher burnout symptoms and higher  
55 depressive symptoms (Donachie et al., 2019; Smith et al., 2018). However, we know very  
56 little about effective interventions to reduce perfectionism in sport. The current study builds  
57 on a small but growing body of work that has assessed the effectiveness of different types of  
58 interventions to reduce perfectionism in athletes. We do so by evaluating the effectiveness of  
59 a novel online Acceptance and Commitment Therapy (ACT)-based intervention in soccer  
60 players. Our hope is to increase the evidence-base for researchers and practitioners working  
61 with perfectionistic athletes and provide a better basis for working with perfectionistic  
62 athletes in an applied setting.

63        **Trait perfectionism and perfectionism cognitions**

64            Perfectionism is a personality characteristic that includes traits, cognitions, and  
65 presentational components. Athletes display different patterns of these components to create  
66 complex profiles that exert an influence over their experiences in sport. The current study is  
67 concerned with trait perfectionism and perfectionism cognitions. Trait perfectionism is  
68 defined as a combination of unrealistically high standards and overly self-critical evaluations  
69 (Frost et al., 1990). The two broad dimensions are normally labelled perfectionistic strivings  
70 (PS) and perfectionistic concerns (PC) and are measured using different indicators or sub-  
71 dimensions from different models (see Stoeber & Otto, 2006). Some of the typical indicators  
72 are concerns over mistakes, doubts about performances, and negative reaction to  
73 imperfections, as well as the very high, exceptionally high, and unrealistically high standards  
74 for themselves and from others that people report they have when they are perfectionistic. To

75 understand the implications of being more perfectionistic in sport, researchers typically study  
76 these sub-dimensions of perfectionism separately or in different combinations with one  
77 another (see Hill & Madigan, 2017).

78         In addition to displaying general perfectionistic qualities, athletes who are  
79 perfectionistic will also experience specific types of thoughts. These are called perfectionism  
80 cognitions and are ruminative automatic thoughts and images that related to the need to be  
81 perfect (Flett et al., 2018). According to Perfectionism Cognitions Theory (PCT; Flett et al.,  
82 2018), perfectionism cognitions are the result of the way in which self-relevant information is  
83 processed. In particular, how deep lying schemas pertaining to the “ideal self” create  
84 sensitivity to notions of imperfection, dysfunctional attitudes, and irrational beliefs that make  
85 people vulnerable to overthinking (e.g., worry) and cognitive interference (e.g., mind  
86 wandering). Unlike trait perfectionism, perfectionism cognitions tend to be more state-like,  
87 variable, and amenable to change (see Donachie & Hill, 2020). In studying perfectionism  
88 cognitions, researchers record the frequency with which athletes report these types of  
89 thoughts, often alongside any trait perfectionism they exhibit.

90         Most research in sport has focused on trait perfectionism and has done so by  
91 comparing the correlates of PS and PC. In a meta-analysis of research in sport, PS was shown  
92 to be complex and ambiguous, and related to a mix of outcomes (Hill et al., 2018). For  
93 example, higher PS was related to higher positive affect and self-esteem, but also to higher  
94 anxiety and fear of failure. There was also evidence that higher PS is related to better athlete  
95 performance but this relationship, too, appears complex (e.g., Curran & Hill, 2018). In  
96 contrast to PS, PC was shown to be consistently problematic for motivation and wellbeing.  
97 For example, higher PC was related to higher external regulation, self-criticism, and  
98 depressive symptoms. It was also unrelated to athlete performance (but in other work it seems  
99 to have the potential to be related to lower performance via an interaction with PS; Lizmore

100 et al., 2019). As such, while the effects of PS are more contentious, there is consensus among  
101 researchers that PC is problematic and therefore a valuable focus for intervention in sport.

102           Research examining perfectionism cognitions in sport is more limited, but findings  
103 are indicative of some of the issues athletes can face as perfectionism cognitions become  
104 more frequent. In one study, for example, more frequent perfectionism cognitions were  
105 related to higher burnout symptoms and predicted burnout symptoms after taking into  
106 account trait perfectionism in youth rugby players (Hill & Appleton, 2011). In two other  
107 studies that are especially relevant here, perfectionism cognitions were found to predict more  
108 negative pre-competition emotions in youth soccer players and mediate the relationship  
109 between trait perfectionism and pre-competition emotions over time (Donachie et al, 2018;  
110 Donachie et al., 2019). Evidence suggests, therefore, that efforts to support perfectionistic  
111 athletes will need to include a focus on reducing perfectionism cognitions, as well as their  
112 trait perfectionism.

### 113 **Reducing perfectionism inside and outside of sport**

114           To date, five studies have evaluated the effectiveness of interventions aimed at  
115 reducing perfectionism in sport in athletes. Interventions have been delivered in different  
116 sports (running, archery, golf, and soccer), using different types of interventions  
117 (mindfulness-based, compassion-based, cognitive behavioral therapy [CBT]-based, and  
118 psychological skills training [PST]), and using different designs (pretest-posttest, randomized  
119 control trials [RCT], and single-subject multiple baseline). Generally, this research has  
120 provided evidence that, to varying degrees, perfectionism in athletes can be reduced using  
121 these interventions. For example, in one of the two studies using an RCT design, following a  
122 one-week self-compassion-based intervention varsity athletes reported significantly lower  
123 concerns over mistakes (Mosewich et al., 2013). In the only other study that used an RCT  
124 design, too, following a seven-week CBT-based self-help intervention, soccer players

125 reported significantly lower self-oriented perfectionism (expecting yourself to be perfect),  
126 socially-prescribed perfectionism (believing others expect you to be perfect), and  
127 perfectionism cognitions (Donachie & Hill, 2020).

128         These studies are encouraging in regards to the potential to intervene and reduce  
129 perfectionism in athletes. However, overall, research in sport lags behind other settings. We  
130 continue to know very little about the effectiveness of different types and modalities of  
131 intervention for perfectionism in sport; ultimately, what works (and to what degree) and what  
132 does not work. In this regard, a recent study using a single-subject multiple baseline design is  
133 illustrative of some of the issues sports psychologists might face when working with  
134 perfectionism and how typical practice may not be effective. Specifically, Watson et al.  
135 (2022) found that while PST appeared to help reduce some of the adverse effects of  
136 perfectionism international basketballers reported (negative pre-competition emotions), there  
137 was little evidence PST reduced their perfectionism cognitions. In addition, in research so far  
138 on perfectionism, there has been a general reliance on traditional CBT-based interventions  
139 with far fewer studies exploring other types of intervention (see Galloway et al., 2022). This  
140 study addresses this limitation by examining, for the first time, the effectiveness of an online  
141 ACT-based intervention to reduce perfectionism.

#### 142 **Acceptance and Commitment Therapy and perfectionism**

143         ACT is a third wave form of Cognitive Behavioural Therapy with a distinctive  
144 philosophical (Functional Contextualism) and theoretical (Relational Frame Theory) basis  
145 (Hayes, 2004). One of its key features is that rather than seeking to change thoughts and  
146 feelings (something you would expect to see from traditional CBT), ACT seeks to help  
147 individuals change their relationship with these thoughts and feelings (Hayes, 2004). The  
148 main aim of ACT is to increase psychological flexibility – the ability to be in the moment,  
149 aware, and able to act on personal values (Doorley et al., 2020). Psychological flexibility is

150 made up of a mix of multiple, interlinked facets (“being present”, “opening-up”, and “doing  
151 what matters”), and arises through core processes of change that are the typical focus of  
152 applied interventions (Hayes et al., 2006; described in methods section). In support of its  
153 general use, ACT has been found to be an effective approach in a range of settings and for  
154 different outcomes including promoting mental health (e.g., wellbeing; Howell & Passmore,  
155 2019).

156         ACT may also be especially useful when addressing perfectionism. In describing why  
157 this is the case and the distinctive way in which ACT operates, Ong et al. (2019) note that  
158 from an ACT perspective perfectionism is an avoidant response to unwanted inner  
159 experiences and overregulation of rules. Moreover, within ACT, the unwanted inner  
160 experiences and overregulation of rules are not considered to govern behaviours in and of  
161 themselves. As such, both can be treated as separate and disarmed without need to change  
162 their content. This is a notable difference from other CBT approaches that necessitate change  
163 to underlying processes and may prove more difficult for perfectionism as irrationality  
164 attitudes, beliefs and thoughts are so deeply ingrained (Hewitt et al., 2017). Perhaps, then, the  
165 approach and practices of ACT may be a more realistic way of working with perfectionism  
166 for athletes and offer achievable respite and relief from many of its unhelpful internal  
167 experiences (e.g., self-criticism and images of failure).

168         Research using ACT-based interventions to reduce perfectionism outside of sport is  
169 beginning to emerge. One study of especial note is provided by Ong et al. (2019). Using an  
170 RCT design, they examined the effectiveness of a 10-week ACT-based intervention for  
171 perfectionism. They found that, following the intervention, the ACT group reported lower  
172 concerns over mistakes, and increased self-compassion and quality of life, in comparison to a  
173 control group. Other more recent ACT-based interventions for perfectionism have also found  
174 support for its use in reducing perfectionism and, at the same time, increasing resilience in



175 different clinical groups (Esmaeili et al., 2021). Overall, then, early indications are that ACT-  
176 based interventions are promising for perfectionism. However, the utility of ACT-based  
177 interventions has yet to test whether they are effective at reducing perfectionism inside of  
178 sport.

179         In regards to the current study, there are two previous interventions inside of sport  
180 that are noteworthy and included elements of ACT. Both studies used a 4-week long  
181 mindfulness intervention – which is an aspect of ACT – to reduce athlete perfectionism. The  
182 first of these studies found that parental expectations (something linked to the development of  
183 perfectionism and sometimes used as an indicator of PC) and somatic anxiety (a negative  
184 consequence of perfectionism) significantly reduced following the intervention (Kaufman et  
185 al., 2009). In the second study, De Petrillo et al. (2009) found that personal standards,  
186 parental criticism (again, something also linked to the development of perfectionism and  
187 sometimes used as an indicator of PC), and worry (a negative consequence of perfectionism)  
188 all significantly reduced following the intervention. These findings are tempered somewhat  
189 by the lack of rigour in the designs of the two studies, with both using pretest-posttest  
190 designs. However, alongside the research outside of sport, the findings are indicative of the  
191 possible benefits of ACT-based interventions for athletes.

## 192 **The present study**

193         The present study aimed to assess the effectiveness of an online ACT-based  
194 intervention for reducing perfectionism in soccer players. Based on previous research, we  
195 hypothesized that the intervention group will report (H1) significantly lower trait  
196 perfectionism (all indicators of PS and PC), (H2) significantly lower perfectionism  
197 cognitions, and (H3) significantly lower negative pre-competition emotions (anxiety,  
198 dejection, anger) and significantly higher positive pre-competition emotions (excitement,  
199 happiness), than the control group following the online ACT-based intervention.

## 200 **Method**

### 201 **Participants**

202 Eighty-one female soccer players were recruited from multiple soccer clubs ( $M$  age =  
203 24.28 years,  $SD = 6.77$ , range 18-44 years). They reported that they trained on average for  
204 6.46 hours a week ( $SD = 2.67$ ) and were from a range of backgrounds including White ( $n =$   
205 76), Black, African, Caribbean or Black British ( $n = 3$ ), and mixed or multiple ethnic groups  
206 ( $n = 2$ ). Athletes ranged from recreational ( $n = 15$ ), regional ( $n = 35$ ), national ( $n = 29$ ), and  
207 international ( $n = 2$ ) level. Recruitment took place during the season and all athletes were  
208 training and playing competitively at the time of the study. Of the 81 athletes, 41 were  
209 randomly allocated to the intervention group ( $M$  age = 26.00 years,  $SD = 7.88$ ), and 40 were  
210 allocated to the control group ( $M$  age = 22.53 years,  $SD = 4.90$ ). For a description of the flow  
211 of athletes from each stage of the study see Figure 1. We adhered to the CONSORT checklist  
212 for reporting the randomized control trial (Shultz et al., 2010; supplementary materials, S1).

### 213 **Power Calculation**

214 Our minimum target sample size is based on an a priori power analysis. G.Power  
215 (Faul et al., 2009) for sample size estimation for a two-tailed test, alpha ( $p$ ) = .05, power =  
216 .80, and an anticipated effect size of Cohen's  $d = 0.75$ , provided a target sample size of 58.  
217 The anticipated effect size is based on Donachie and Hill (2020) who, following a  
218 perfectionism intervention, found a difference between intervention and control groups  
219 immediately following their intervention (time 2) of Cohen's  $d = 0.75$  for PCI (the largest  
220 effect observed at that time point). However, we aimed to recruit at least an additional 20% to  
221 account for possible dropout (dropout was 13% in Donachie and Hill, 2020). Therefore, our  
222 final target sample size was 70 athletes ( $58 * 1.2$ ): intervention group  $n = 35$  and control group  
223  $n = 35$ .

### 224 **Design and Procedure**

225           Following ethical approval from the research committee, athletes were recruited from  
226 female soccer teams across the UK. We recruited females only because one of the authors  
227 had connections and links in female sport. Recruitment was done by communicating with  
228 gatekeepers and talking to coaches and players. The gatekeeper letter and participant  
229 information sheet stated our desire to recruit female soccer players (aged 18+ years) who self-  
230 identified as perfectionists and wanted to learn ways to manage their perfectionism  
231 (Donachie & Hill, 2020). If athletes were interested in taking part, they accessed an online  
232 survey that included information on the study, a consent form, and a questionnaire. Once  
233 athletes had signed and agreed to take part in the study and had completed their initial  
234 questionnaire, they were randomly assigned to either the intervention group or to a waitlist  
235 control group using block randomization.

236           We used block randomization because it balances the allocation of athletes into the  
237 intervention and control groups (Efird, 2011). Block randomization is useful when the entire  
238 sample of the study is not yet recruited as it can help maintain equal allocation of participants  
239 into the intervention and control groups (Matts & Lachin, 1988). In the present study, we had  
240 three rounds of recruitment, each lasting for roughly two-weeks, and three blocks. Block  
241 randomisation allowed us to ensure an approximately equal number of participants in the  
242 intervention and control group though the recruitment period. During this process, block sizes  
243 were determined by recruitment each round and researchers were not blind to group  
244 allocation (rather than random block sizes or blinded allocation).

245           In designing the intervention, different options for delivery were considered. An  
246 online approach was selected as a pragmatic and scalable means of delivering an intervention  
247 over a short period of time, in multiple locations, to a large number of athletes. We were also  
248 aware that there is evidence that online delivery can be just as effective as face-to-face  
249 delivery for perfectionism interventions (see Suh et al., 2019). The intervention group had

250 immediate access to eight online ACT-based modules. The athletes accessed the modules via  
251 an online platform. They were told to start with module one (an introduction to sport  
252 psychology and ACT) but thereafter could complete the modules in any order and at their  
253 own speed. Apart from module one, the modules were designed around the Hexaflex model  
254 (Hayes et al., 2006). The modules included sessions on being present with a focus on how  
255 each participant reacts to mistakes. There were also modules on opening-up which included  
256 accepting thoughts and allowing thoughts to pass. Finally, there were modules on doing what  
257 matters which included living towards one's values. The aims and content of each session for  
258 the schedule of work is provided in the supplementary materials (supplementary materials,  
259 S2).

260 Each module was developed, pre-recorded, and narrated by the lead author, who is a  
261 HCPC registered practitioner psychologist and ACT practitioner. Each module included  
262 worksheets and metaphors (athletes were asked to stop and start the pre-recorded video to  
263 access these). With the exception of module one, each module started by asking the  
264 participant to think about what they had learnt from the homework of the previous module.  
265 Thereafter, each module explained the topic, outlined several key skills to support with a  
266 particular aspect or dimension of perfectionism, and provided homework that the participant  
267 was expected to complete between modules. Homework was then reviewed at the start of the  
268 next module. Athletes in the intervention group were emailed at week four and six to check in  
269 and find out if they had any questions or concerns.

270 After the control group completed the first questionnaire, they were emailed and told  
271 that they would receive a further email when they can access the online modules. The waitlist  
272 control group did not have access to the intervention during the 8-week block. Once the 8-  
273 weeks had passed, both the intervention group and the control group completed the online  
274 questionnaire for a second and final time. The control group was then given access to the

275 modules to complete at their leisure. There were no known or reported adverse effects from  
276 the intervention.

### 277 **Intervention**

278 **Module 1 – Introduction to Sport Psychology and ACT.** All the athletes were  
279 instructed to start with module 1 first. The module focussed on stigma, specifically helping  
280 athletes overcome any stigma they may have had towards sport psychology. It is worth  
281 mentioning that the athletes self-identified and self-enrolled for the intervention, so they may  
282 not have typically high levels of stigma associated with perfectionism (Watson et al., 2021).  
283 The module contained a large educational component, to help the athlete better understand  
284 sport psychology and how ACT will help with their perfectionism. Athletes were then set  
285 homework which was to set goals for what they wanted to achieve from the intervention.

286 **Module 2 – Contacting the Present Moment.** In this module, athletes focussed on  
287 staying present, with a particular focus on being present in training and games. This module  
288 linked with concerns over mistakes, which described how being overly concerned with  
289 making mistakes leads to a loss in concentration. Athletes were educated on what being  
290 present looks and feels like. This included several practical elements (e.g., ‘dropping the  
291 anchor’). The homework from this session was a mindfulness tracker, which the athletes used  
292 as a practice tool for being present.

293 **Module 3 – Mindfulness.** In this module, the athletes were tasked with controlling  
294 their body and mind through breathing. This module provided support for the athletes in  
295 overcoming a fear of failure, and reducing the stress and anxiety associated with this. Again,  
296 athletes were educated on what mindfulness is, before being taken through practical  
297 techniques (e.g., ‘spotting the pink elephant’). There were also several metaphors used  
298 throughout the module (e.g., ‘leaves on a Stream’). The homework was a diary to log mindful  
299 breathing and to notice difficult thoughts that they were experiencing.

300           **Module 4 – Acceptance.** In this module, the athletes were educated on how to accept  
301 mistakes, as well as themselves. This module also focussed on how self-critical the athletes  
302 were to themselves and others, providing support in reducing this self-criticism. The basis of  
303 the module taught the athletes how to accept, which included the idea of struggling (i.e., not  
304 accepting and continuing to wrestle with their thoughts) vs opening-up (i.e., accepting and  
305 allowing thoughts to come and go). The homework for the module was to log the frequency  
306 of negative experiences, and to assess whether the athletes were able to open-up and accept  
307 them or not.

308           **Module 5 – Defusion.** The aim of the module was to help the athlete ‘unhook’ from  
309 their thoughts. This included several practical techniques (e.g., ‘hands Infront of the face’).  
310 This module also supported the athletes with dealing with doubt about themselves and their  
311 abilities. To do so, they used metaphors (e.g., the sushi train) and desensitising techniques  
312 (e.g., saying thoughts in different voices). The homework for this module was a getting  
313 hooked diary. The athletes practiced desensitising certain thoughts they were having.

314           **Module 6 – Values.** The aim of this module was to help the athletes lead a values-led  
315 life. This means focussing on who they are rather than who they think they need to be. To  
316 further support this, the module linked together with reducing and managing personal  
317 expectations. It was important to educate the athletes on the differences between values and  
318 goals (a common mistake for many athletes). The athletes then explored their own values  
319 using a life compass. In addition, the athletes explored how they might overcome  
320 expectations, using values to do this. The homework for the module was for the athlete to  
321 continue to explore how expectations from coaches and parents’ effect how they train and  
322 compete. They were asked to assign their values to help reduce these expectations.

323           **Module 7 – Self.** In this module, the athletes were educated on their observer self.  
324 That is the self that can observe, be aware, and be innately calm and tranquil. In comparison

325 to the thinking self, which is constantly problem solving, evaluating, and pre-occupied with  
326 past or future events. This module was linked to overcoming negative reactions to  
327 imperfections. To help the athletes with this module, several metaphors were used including  
328 the chess board metaphor. Finally, the athletes wrote an obituary about themselves providing  
329 a sense of how they want to be viewed by others. The homework for this session was a  
330 reflection on the meaning of a picture. The picture was a person laid on the ground and  
331 looking up at the clouds, which had emotions written on each one.

332         **Module 8 – Committed Action.** In this module, the athletes were supported in  
333 maintaining any positive changes they may experience due to the intervention. This included  
334 educational components of goal setting. The aim here was to set healthy and realistic goals.  
335 Something that most athletes with higher levels of perfectionism struggle to do. Rather than  
336 striving for perfection, the athletes were encouraged to seek healthy striving. The session also  
337 included some what if planning, in preparation for any relapse. The homework for this  
338 session was to create an action plan, to describe why the goals are meaningful to the athlete,  
339 and what challenges they may be faced with over time.

#### 340 **Transparency and Openness Statement**

341         We have cited any data, code, and methods, provided by others in this study. Data and  
342 code used in the study are publicly available for institutional repository, as are all materials  
343 (Watson et al., 2023). Further intervention materials can be accessed by contacting the  
344 corresponding author. The design, hypotheses, and analysis plan for this study were pre-  
345 registered and is publicly available (Watson et al., 2021). In regards to deviations from the  
346 pre-registered study, we (1) added consideration of partial eta  $\eta^2$  to interpret the size of the  
347 interactions, (2) adhered to CONSORT guidelines (not originally stated in the pre-registration  
348 document), and (3) provide ancillary analyses (as requested by reviewers).

#### 349 **Measures**

350           **Trait Perfectionism.** To measure trait perfectionism, we used six subscales from  
351 three measures of perfectionism in sport: the Sport Multidimensional Perfectionism Scale-2  
352 (SMPS-2; Gotwals & Dunn, 2009), the Multidimensional Inventory of Perfectionism in Sport  
353 (MIPS; Stoeber et al., 2007) and the Performance Perfectionism Scale-Sport (PPS-S; Hill et  
354 al., 2016). Following the recommendations of Stoeber and Madigan (2016), to measure PS  
355 we used (a) the SMPS-2 subscale capturing Personal Standards (7 items; e.g., “I have  
356 extremely high goals for myself in my sport”), (b) the MIPS subscale capturing Striving for  
357 Perfection (5 items; e.g., “I strive to be as perfect as possible”) and (c) the PPS-S subscale  
358 capturing Self-Oriented Perfectionism (4 items; e.g., “I put pressure on myself to perform  
359 perfectly”). To measure PC, we used (a) the SMPS-2 subscale capturing Concerns Over  
360 Mistakes (8 items; e.g., “People will probably think less of me if I make mistakes in  
361 competition”), (b) the MIPS subscale capturing Negative Reactions to Imperfection (5 items;  
362 e.g., “I feel extremely stressed if everything does not go perfectly”) and (c) the PPS-S  
363 subscale capturing Socially-Prescribed Perfectionism (4 items; e.g., “People always expect  
364 more, no matter how well I perform”). The SMPS-2 and the MIPS had a response format of 1  
365 (*strongly disagree*) to 5 (*strongly agree*) and for the PPS-S had a response format of 1  
366 (*strongly disagree*) to 7 (*strongly agree*). All three instruments have previous evidence of  
367 reliability and validity (e.g., factor structure, internal consistencies; Hill et al., 2016;  
368 Madigan, 2016; Dunn et al., 2016). Finally, it has been previously reported that there is  
369 adequate intra-class correlation (ICC), which determines the amount of variance between  
370 variables, for PS (.81) and PC (.75) (Madigan et al., 2016).

371           **Perfectionism Cognitions.** To measure perfectionism cognitions, we used the  
372 Perfectionism Cognitions Inventory–10 (PCI-10; Hill & Donachie, 2020). Athletes indicated  
373 how frequently they experienced different perfectionistic thoughts on 10 items (e.g., ‘I should  
374 be perfect’). Athletes are asked to score each item on a 5-point scale (0 = ‘not at all’ and 4 =



375 'all of the time'). The PCI-10 was developed by Hill and Donachie (2020) using athletes. It  
376 has strong evidence to support its validity and reliability, including internal consistency and  
377 (unidimensional) factor structure. In addition, it has acceptable ICC (.74) and is strongly  
378 correlated with the longer version of the instrument ( $r = .94$ ; Hill & Donachie, 2020).

379 **Pre-Competition Emotions.** To measure pre-competition emotions, we used the  
380 Sport Emotion Questionnaire (SEQ; Jones et al., 2005). The SEQ measures five emotions  
381 that are grouped into two higher order dimensions: negative emotions (anxiety, 5 items,  
382 dejection, 5 items, and anger, 4 items) and positive emotions (happiness, 4 items and  
383 excitement, 4 items). The SEQ is made up of 22 items. Athletes are asked to indicate how  
384 they feel right now, at this moment to their upcoming sports competition on a 5-point scale (0  
385 = 'not at all' and 4 = 'extremely'). In support of the reliability and validity of the SEQ,  
386 evidence has been provided in regards to factor structure and internal consistency (e.g.,  
387 Arnold & Fletcher, 2015; Jones et al., 2005), as well acceptable ICC for anxiety (.72),  
388 dejection (.60), anger (.53), happiness (.73), and excitement (.77) (Donachie & Hill, 2020).

389 **Adherence.** As part of the T2 assessment, athletes in the intervention group were  
390 asked two additional questions: (1) How many hours did you spend on the modules  
391 altogether? and (2) How many modules did you complete? This type of assessment has been  
392 used previously (Pleva & Wade, 2007) and found to be a useful way of assessing intervention  
393 effectiveness by correlating adherence with residual change scores (Donachie & Hill, 2020).

### 394 **Statistical Analyses**

395 All statistical analyses were performed with SPSS version 23.0 (Statistical Package  
396 for Social Sciences; IBM, USA). As recommended by Galloway et al. (2022), we used  
397 intention-to-treat analysis (ITT) (i.e., participant scores are carried forward from baseline if  
398 they drop out), which meant that all 81 athletes were included in the statistical analyses. A 2  
399 (group) x 2 (time) analysis of variance (ANOVA) was used followed by independent samples

400 t-tests. Partial  $\eta^2$  statistics were used to determine the size of the interaction effects. A partial  
401  $\eta^2 = .01$  signifying a small effect, a partial  $\eta^2 = .06$  a medium effect and a partial  $\eta^2 = .15$  a  
402 large effect (Richardson, 2011). Cohen's  $d$  was used for between-group comparisons with  
403 0.30, 0.50, and 0.80 denoting a small, medium, and large effect (Cohen, 1992).

## 404 **Results**

### 405 **Reliability of scores from instruments and preliminary analyses**

406 Prior to the primary analyses, internal reliabilities ( $\Omega$ ) and test-retest reliability (intra-  
407 class correlations) were calculated for all instruments and both time points (see  
408 supplementary materials, S3). Internal reliabilities and test-retest reliabilities were adequate  
409 in most cases ( $\Omega > .70$  and ICC  $> .50$ ). However, there was also lower internal reliability for  
410 all pre-competition emotions at T2 for the intervention group ( $\Omega < .70$ ). We present findings  
411 in full here but note caution for effects pertaining to these variables and when discussing  
412 findings. It was also noteworthy that, based on the control group, ICCs indicated lower test-  
413 retest reliability in some dimensions of perfectionism (negative reactions to imperfection and  
414 perfectionism cognitions) and pre-competition emotions (happiness and excitement) (ICC  
415  $< .50$ ). Again, this is important information in considering the findings. Prior to conducting  
416 the primary analyses, we also inspected the distributions of the data via boxplots and z-  
417 skewness. These were considered acceptable with a small number of outlier scores evident  
418 for perfectionism cognitions and socially-prescribed perfectionism. Retaining these scores  
419 were considered preferable to other strategies in context of an intervention study (e.g.,  
420 removal or transformation).

### 421 **Assessment of intervention**

422 Main and interaction effects are presented in Table 1 and comparison of intervention  
423 group and control group at T1 and T2 are presented in Table 2.

### 424 **Trait Perfectionism and Perfectionism Cognitions**

425           In regards to the group, time, and interaction effects, there was a statistically  
426 significant group effect for athletes participating in the online ACT-based intervention group  
427 for all dimensions and elements of perfectionism, except self-oriented perfectionism. There  
428 was also a statistically significant time effect for self-oriented perfectionism, socially-  
429 prescribed perfectionism, and perfectionism cognitions for those athletes in the online ACT-  
430 based intervention group. Finally, there was an interaction effect (group x time) for all  
431 dimensions of perfectionism except socially-prescribed perfectionism for those athletes in the  
432 online ACT-based intervention group. In examining post-intervention differences, there was  
433 a statistically significant mean difference between the intervention group and the control  
434 group at T2 for all dimensions of perfectionism. In sum, athletes in the online ACT-based  
435 intervention group clearly had more benefit in receiving the online ACT-based modules for  
436 their perfectionism, than the athletes who did not receive anything. Effects typically exceeded  
437 criteria for being large (Cohen's  $d = 0.80$ ). This was not the case for self-oriented  
438 perfectionism (medium-to-large effect) and socially-prescribed perfectionism (marginally  
439 above a large effect) which were smaller.

#### 440 **Pre-Competition Emotions**

441           In regards to the group, time, and interaction effects, there was a statistically  
442 significant group effect for all pre-competition emotions for athletes participating in the  
443 online ACT-based intervention group. There was also a statistically significant time effect for  
444 anxiety, demonstrating the importance of the online ACT-based modules for athletes in the  
445 intervention group. Finally, there was an interaction effect (group x time) for all pre-  
446 competition emotions except excitement. Athletes who received the online ACT-based  
447 intervention had more benefit for their pre-competition emotions. In examining post-  
448 intervention differences, there was a statistically significant mean difference between the

449 athletes in the intervention group and the control group at T2 for all of the pre-competition  
450 emotions. All effects exceeded criteria for being large (Cohen's  $d = 0.80$ ).

#### 451 **Ancillary analyses**

452         Unplanned ancillary analyses are provided in the supplementary materials  
453 (supplementary materials, S4). Specifically, we provide a series of analysis of covariance  
454 (ANCOVA) focusing on differences between intervention and control groups in each  
455 dependent variable at T2 adjusted for the dependent variable at baseline (T1). These analyses  
456 show statistically significant differences for all dependent variables. We note the possible  
457 benefits of providing this type of analysis alongside non-adjusted analyses (e.g., De Boer et  
458 al., 2015) but also that CONSORT guidelines stress the potential for this type of analysis to  
459 bias the estimate of the treatment effect (Schultz et al., 2010).

#### 460 **Adherence**

461         To further assess the link between the intervention and observed changes, we  
462 examined whether the adherence measures (the number of hours spent on the modules and  
463 the number of modules completed) were correlated to change in outcome variables (see Table  
464 3). To do so, we conducted a regression analysis in which T2 scores were regressed on T1  
465 scores and then correlated the resulting unstandardized residual scores with measures of  
466 adherence. To conduct these analyses, we used completers in the intervention group only.  
467 Results are reported in Table 3 and show that the number of hours athletes spent on the  
468 modules was significantly correlated with reductions in their self-oriented perfectionism,  
469 perfectionism cognitions, and anxiety over time. The number of modules the athletes  
470 completed was also significantly correlated with reductions in their striving for perfection,  
471 negative reactions to imperfection, perfectionism cognitions, anxiety, and anger over time.  
472 On average the athletes spent 7.51 ( $SD = 1.63$ ) hours on the modules and completed 6.00 ( $SD$   
473  $= 1.64$ ) modules in total.

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**Discussion**

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The present study aimed to assess the effectiveness of an online ACT-based intervention for reducing perfectionism and improving pre-competition emotions in soccer players. Based on previous research, we hypothesized that the intervention group will report (H1) significantly lower trait perfectionism (PS and PC), (H2) significantly lower perfectionism cognitions, and (H3) significantly lower negative pre-competition emotions (anxiety, dejection, anger) and significantly higher positive pre-competition emotions (excitement, happiness), than the control group following the online ACT-based intervention. Support was found for all hypotheses with the exception of one dimension of trait perfectionism (socially-prescribed perfectionism) and one pre-competition emotion (excitement).

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**Trait Perfectionism and Perfectionism Cognitions**

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Our findings suggest athletes can be supported in reducing their perfectionism using an online ACT-based intervention. This was the case when examining almost all indicators of PS and PC, barring socially-prescribed perfectionism. In terms of contextualising these findings, we note that other studies have found similar support for ACT outside of sport (Ong et al., 2019). Our findings suggest similar beneficial effects are evident for athletes. In addition, previous studies have also found support for the use of elements of ACT for reducing perfectionism in athletes; namely, mindfulness (Kaufman et al., 2009). Our findings are supportive in this regard, too, and suggest broader coverage of ACT techniques may also be effective. Finally, the two most rigorous intervention studies in sport so far found athletes reported lower perfectionism after CBT-based and self-compassion-based interventions (Donachie & Hill, 2020; Mosewich et al., 2013). Adopting a similar design, the current study extends these findings to an online ACT-based intervention.

498           In comparing the findings to the two previous studies in sport using rigorous designs,  
499 we note a number of similarities and differences. Donachie and Hill (2020) found a  
500 significant interaction effects (group by time) and improvements for socially-prescribed  
501 perfectionism and self-oriented perfectionism with medium sized differences post  
502 intervention (Cohen's  $d = 0.29$ ). We found a significant interaction effect for self-oriented  
503 perfectionism (but not socially-prescribed perfectionism) and larger effects for both (Cohen's  
504  $d = 0.46$  and  $0.87$ ). As such, ACT appears somewhat more effective than CBT in reducing.  
505 As such, the evidence suggests that both CBT- and ACT-based interventions appear to be  
506 effective methods for athletes to improve aspects of trait perfectionism. Differences are less  
507 clear in regards to socially-prescribed perfectionism. It may be that ACT is less effective in  
508 addressing socially-prescribed perfectionism. However, due to differences between the  
509 studies beyond the type of intervention, it is not possible to make such conclusions  
510 confidently. To do so, future studies are required to directly compare the effects of equivalent  
511 CBT-based and ACT-based interventions (and others) to better understand these differences.

512           Our findings are more consistent with those of Mosewich et al. (2013). They found a  
513 significant interaction effect (group by time) and improvements for concern over mistakes (a  
514 dimension of PC) and significant differences between groups immediately after the  
515 intervention (and at follow-up). The size of their effects exceeded the criteria for being  
516 considered large (Cohen's  $d = 0.63$  and  $0.78$ ). Similarly, we found a significant interaction  
517 effect for concern over mistakes and significant differences between groups immediately  
518 after the intervention. The effect we observed was larger still (Cohen's  $d = 1.06$ ). In this case,  
519 it appears that a self-compassion-based intervention and ACT-based interventions yield  
520 similar effects in regards to the dimensions of perfectionism they influence. Note, too, the  
521 ACT intervention outside of sport by Ong et al. (2019) had an effect on concern over  
522 mistakes as observed in the current study (Hedges'  $g = 1.03$ ). The larger effects observed in

523 the current study when compared to Mosewich et al's study may reflect a range of factors  
524 including differences between the two types of intervention (ACT versus self-compassion-  
525 based), but also factors such as the longer length of the ACT interventions. Again, research  
526 comparing the effectiveness of equivalent interventions is needed to explore these differences  
527 further.

528         The effect of the intervention was largest for helping athletes reduce perfectionism  
529 cognitions. This was also the case in Donachie and Hill (2020) who observed effects that  
530 were nearly twice the size of the effect for any other dimension of perfectionism (Cohen's  $d$   
531 = 0.75 and 1.15). As they argued, it may be that as perfectionism cognitions are more state-  
532 like, it is more amendable to change. In the current study, the effect for perfectionism  
533 cognitions was exceptionally large (Cohen's  $d = 2.17$ ). So it may be that ACT is also  
534 especially effective at addressing perfectionism cognitions. A distinctive aspect of the online  
535 ACT-based intervention was taking a step back from thoughts, allowing thoughts to pass by,  
536 and to not engage with each individual thought. In this sense, athlete's may have come to  
537 notice or acknowledge their perfectionistic thoughts less. Alternatively, by increasing  
538 psychological flexibility, athletes may have learned to spend more time, cognitively, in the  
539 present, rather than ruminating about the past – an important feature of perfectionism  
540 cognitions. We offer a note of caution, however, in regard to this particular finding as our  
541 assessment of the reliability of perfectionism cognitions scores over time suggests it  
542 generally fluctuates more so than other aspects of perfectionism. This feature might also  
543 explain the large effects.

544         In observing possible differences between ACT and other interventions for  
545 perfectionism, we are mindful of evidence of differences for other outcomes, too (e.g.,  
546 chronic pain; Ruiz, 2012). Whether our findings reflect general support for ACT or support  
547 the especial use of ACT for perfectionism is still unclear. However, the notion of promoting

548 psychological flexibility appears to align well with many of the problems associated with  
549 perfectionism which reflect a severe form of psychological rigidity (see Flett & Hewitt,  
550 2023). In this sense, the approach may lend itself to more effective work with perfectionism  
551 in athletes than others. However, direct evidence to support his possibility is needed.  
552 Evidence of the particular value of ACT for perfectionism cognitions for athletes, though,  
553 appears consistent with the underlying principles of the approach and is aligned with meta-  
554 analytical work that has shown mindfulness-based interventions reduce more general  
555 ruminative thoughts (e.g., Perestelo-Perez et al., 2017). In context of this other work, we  
556 believe there is sufficient evidence to consider the use of ACT when working with  
557 perfectionism in sport and appears to be an effective method by which athletes can reduce  
558 their trait perfectionism and perfectionism cognitions.

### 559 **Pre-Competition Emotions**

560 In further support of intervention, along with perfectionism athletes reported  
561 improvements in pre-competition emotions. However, internal reliability for measures of pre-  
562 competitive emotions were not adequate at T2 in the intervention group ( $\Omega < .70$ ). In some  
563 cases, due to the very low internal reliability (dejection, happiness, and excitement), we  
564 recommend discounting the findings. In the other cases, where internal reliability is  
565 approaching acceptable levels for smaller instruments (anxiety and anger), we recommend  
566 that these finding are interpreted with caution. It is unclear why internal reliabilities were  
567 acceptable at T1 and not T2 in the intervention group. In this regard, it is noteworthy that the  
568 scores remained reliable at T2 for the control group. As such it is possible that some items of  
569 the scales were affected by the intervention but not others, for example. Regardless, in the  
570 absence of this form of reliability, inferences regarding the effectiveness of the intervention  
571 for the athletes pre-competition emotions are not advised.



572           Notwithstanding this caution, results pertaining to the more reliable scores for anxiety  
573 and anger are consistent with the wider benefits of online ACT-based interventions. We note,  
574 for example, that ACT has previously been shown to be effective in improving emotion  
575 regulation of athletes (e.g., anger; Chang & Hwang, 2017). We also note that research  
576 examining perfectionism and pre-competitive emotions over time in soccer players has  
577 shown strong links between both trait aspects of perfectionism and perfectionism cognitions  
578 with negative emotional experiences, anxiety, and anger, in particular (Donachie et al., 2019).  
579 Therefore, our findings are also consistent with the notion that addressing perfectionism  
580 could have additional benefits for athletes. Whether these effects are a direct consequence of  
581 ACT or are an indirect consequence of reducing perfectionism would be an insightful avenue  
582 for future research. Of course, so is revisiting these observed effects to secure more reliable  
583 measurement.

#### 584 **Practical Implications**

585           The present study offers several important practical implications for sport  
586 psychologists, coaches, organisations, and athletes. The current study suggests that ACT may  
587 be beneficial for athletes and may help them reduce their perfectionism. We therefore  
588 recommend considering the merits of ACT as a type of intervention when working to reduce  
589 perfectionism in athletes. It appears at least as effective as other interventions tested in sport  
590 to date in regards to observed effects on perfectionism. ACT may also be useful more  
591 generally and offer opportunities for athletes to become more psychologically flexible and  
592 address some of the wider difficulties associated with perfectionism. This may or may not  
593 include pre-competition emotions, but based on other research, could possibly include stress,  
594 self-esteem, and depressive symptoms (Räsänen et al., 2016).

595           We also consider the findings to provide support for considering the use of online  
596 delivery of interventions. Online interventions for perfectionism have shown to be largely

597 successful in previous research (see Suh et al., 2019). As such, we cautiously advocate for  
598 practitioners to consider using online interventions as part of their work. Online interventions  
599 can allow athletes greater flexibility, opportunity, and accessibility in engaging with  
600 psychological support (Price et al., 2021). Online resources also provide a means of reaching  
601 a large audience, supporting more athletes, and can be cost-effective. Provision of this kind is  
602 likely achievable for most sports organisations, particularly if resources are shared or  
603 provided in partnership with others. However, practitioners should be reminded that we are  
604 waiting on more extensive evidence of the effectiveness of online interventions for  
605 perfectionism in sport.

606         Finally, practitioners should also consider using or complementing their applied  
607 practice with self-help style, or minimally guided, self-paced interventions to support  
608 perfectionistic athletes. Self-help guides have found themselves to be an important source of  
609 support for those high in perfectionism (Steele & Wade, 2008). This type of intervention may  
610 help overcome some of the stigma or reluctance to seek out support that is related to  
611 perfectionism (Watson et al., 2021). This type of work may therefore be especially beneficial  
612 for perfectionistic athletes and an initial way of engaging and supporting them prior to  
613 introducing more traditional ways of working. Some degree of monitoring and contact may be  
614 required, though, and will likely enhance adherence and quality of these types of intervention  
615 (Suh et al., 2019).

### 616 **Limitations and Future Directions**

617         The study provided novel and important findings. However, there are a number of  
618 limitations. Firstly, as noted throughout, some of the instruments in the intervention group  
619 showed less than adequate internal reliability. Therefore, findings relating to these variables  
620 should be discounted or considered with caution. Secondly, the lack of blinding in the study  
621 is a methodological weakness. While contact was minimal between experimenter and the

622 athletes, athletes knowing they were in an intervention study aimed at reducing perfectionism  
623 may have created expectancy or desirability effects that impacted the findings. It is also the  
624 case that we cannot guarantee that members of intervention group did not interact with  
625 members of the control group providing at least some cross-contamination of effects.  
626 Blinding is difficult in this context and a common limitation, but additional active control  
627 groups would make for a more stringent test of the intervention and are needed in future  
628 work. Thirdly, we did not include a follow-up phase beyond post-intervention. Therefore, the  
629 degree to which the effects of the intervention are maintained over time is unknown. Some  
630 effects may be lost or reduced (or even emerge) over time. Future research should consider  
631 utilising one or more follow-up measurements. Fourthly, we did not take process measures to  
632 identify mechanisms of change in the intervention. As such, while there is evidence that ACT  
633 may be effective in reducing perfectionism, we do not know why. We presume it is an  
634 increase in psychological flexibility. This will need to be measured in future studies, though,  
635 to examine if this is the case (as Ong et al., 2019, did). Finally, although our adherence  
636 measures provide some insight into engagement with the intervention, they are self-report  
637 measures so closer and more objective tracking of adherence would be useful in future  
638 research (e.g., system recorded hours), as would exploring participant experiences on the  
639 intervention (e.g., social validation).

#### 640 **Conclusion**

641       The present study was the first to examine the effectiveness of an online ACT-based  
642 intervention for reducing perfectionism in soccer players. Discounting effects that included  
643 measures with lower reliability, athletes reported significantly reduced trait perfectionism and  
644 perfectionism cognitions following the intervention. As such, online ACT-based  
645 interventions may therefore be an effective and viable option when seeking to support  
646 athletes reduce their perfectionism.

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**Table 1**  
*Main group, time, and interaction effects (group x time)*

Measure	Group effect	Partial $\eta^2$	Time effect	Partial $\eta^2$	Group*Time effect	Partial $\eta^2$
Perfectionistic Strivings						
PES	$F(1,79) = 15.89, p < .001$	.17	$F(1,79) = 0.45, p = .505$	.01	$F(1,79) = 12.37, p < .001$	.14
SOP	$F(1,79) = 1.46, p = .230$	.02	$F(1,79) = 33.82, p < .001$	.30	$F(1,79) = 34.54, p < .001$	.30
SP	$F(1,79) = 10.86, p < .001$	.12	$F(1,79) = 0.95, p = .333$	.01	$F(1,79) = 9.12, p = .003$	.10
Perfectionistic Concerns						
CM	$F(1,79) = 12.06, p < .001$	.13	$F(1,79) = 0.23, p = .633$	.00	$F(1,79) = 5.67, p = .020$	.07
SPP	$F(1,79) = 15.41, p < .001$	.16	$F(1,79) = 6.29, p = .014$	.07	$F(1,79) = 0.28, p = .602$	.00
NR	$F(1,79) = 15.81, p < .001$	.17	$F(1,79) = 0.02, p = .879$	.00	$F(1,79) = 10.42, p = .002$	.12
Perfectionism Cognitions						
PCI	$F(1,79) = 32.45, p < .001$	.29	$F(1,79) = 5.52, p = .021$	.07	$F(1,79) = 39.09, p < .001$	.33
Pre-Competition Emotions						
Anxiety	$F(1,79) = 33.45, p < .001$	.30	$F(1,79) = 47.86, p < .001$	.38	$F(1,79) = 56.30, p < .001$	.42
Dejection	$F(1,79) = 40.36, p < .001$	.39	$F(1,79) = 0.91, p = .342$	.01	$F(1,79) = 8.00, p = .006$	.09
Anger	$F(1,79) = 40.40, p < .001$	.34	$F(1,79) = 0.61, p = .438$	.01	$F(1,79) = 7.77, p = .007$	.09
Happiness	$F(1,79) = 51.82, p < .001$	.40	$F(1,79) = 0.00, p = .980$	.00	$F(1,79) = 4.17, p = .044$	.05
Excitement	$F(1,79) = 40.95, p < .001$	.34	$F(1,79) = 1.82, p = .181$	.02	$F(1,79) = 0.38, p = .541$	.01

Note. PES = personal standards, SOP = self-oriented perfectionism, SP = striving for perfection, CM = concerns over mistakes, SPP = socially-prescribed perfectionism, NR = negative reactions to imperfection, PCI = perfectionism cognitions.

**Table 2***Analysis of simple effects on all measures between intervention and control group at each time point*

Measure	Time 1					Time 2				
	Intervention M (SD)	Control M (SD)	M difference	<i>P values</i>	<i>d</i>	Intervention M (SD)	Control M (SD)	M difference	<i>P values</i>	<i>d</i>
Perfectionistic Strivings										
PES	3.58 (0.85)	3.88 (0.78)	0.30	.103	0.37	3.23 (0.74)	4.12 (0.70)	0.89	<.001	1.24
SOP	5.51 (1.16)	5.58 (0.88)	0.07	.764	0.07	5.12 (1.12)	5.58 (0.85)	0.47	.037	0.46
SP	3.65 (0.92)	3.86 (0.76)	0.21	.263	0.25	3.28 (0.77)	4.05 (0.69)	0.77	<.001	1.05
Perfectionistic Concerns										
CM	3.50 (1.12)	3.83 (0.87)	0.33	.143	0.33	3.30 (0.82)	4.13 (0.75)	0.84	<.001	1.06
SPP	4.09 (1.59)	5.00 (1.45)	0.92	.009	0.60	4.43 (1.17)	5.53 (1.34)	1.10	<.001	0.87
NR	3.53 (0.95)	3.81 (0.85)	0.28	.168	0.31	3.19 (0.77)	4.13 (0.73)	0.94	<.001	1.25
Perfectionism Cognitions										
PCI	2.60 (0.98)	2.75 (0.86)	0.15	.480	0.16	1.66 (0.75)	3.17 (0.64)	1.51	<.001	2.17
Pre-Competition Emotions										
Anxiety	2.73 (0.90)	2.91 (0.88)	0.17	.384	0.20	1.25 (0.86)	2.97 (0.83)	1.71	<.001	2.04
Dejection	1.31 (1.24)	2.31 (1.17)	1.00	<.001	0.83	0.88 (0.59)	2.51 (1.11)	1.63	<.001	1.83
Anger	1.28 (1.29)	2.29 (1.19)	1.01	<.001	0.81	0.85 (0.64)	2.54 (1.17)	1.69	<.001	1.79
Happiness	2.46 (0.75)	1.74 (0.77)	0.72	<.001	0.95	2.65 (0.54)	1.54 (0.76)	1.10	<.001	1.68
Excitement	2.61 (0.76)	1.88 (0.76)	0.74	<.001	0.96	2.55 (0.49)	1.71 (0.61)	0.84	<.001	1.52

Note. PES = personal standards, SOP = self-oriented perfectionism, SP = striving for perfection, CM = concerns over mistakes, SPP = socially-prescribed perfectionism, NR = negative reactions to imperfection, PCI = perfectionism cognitions.

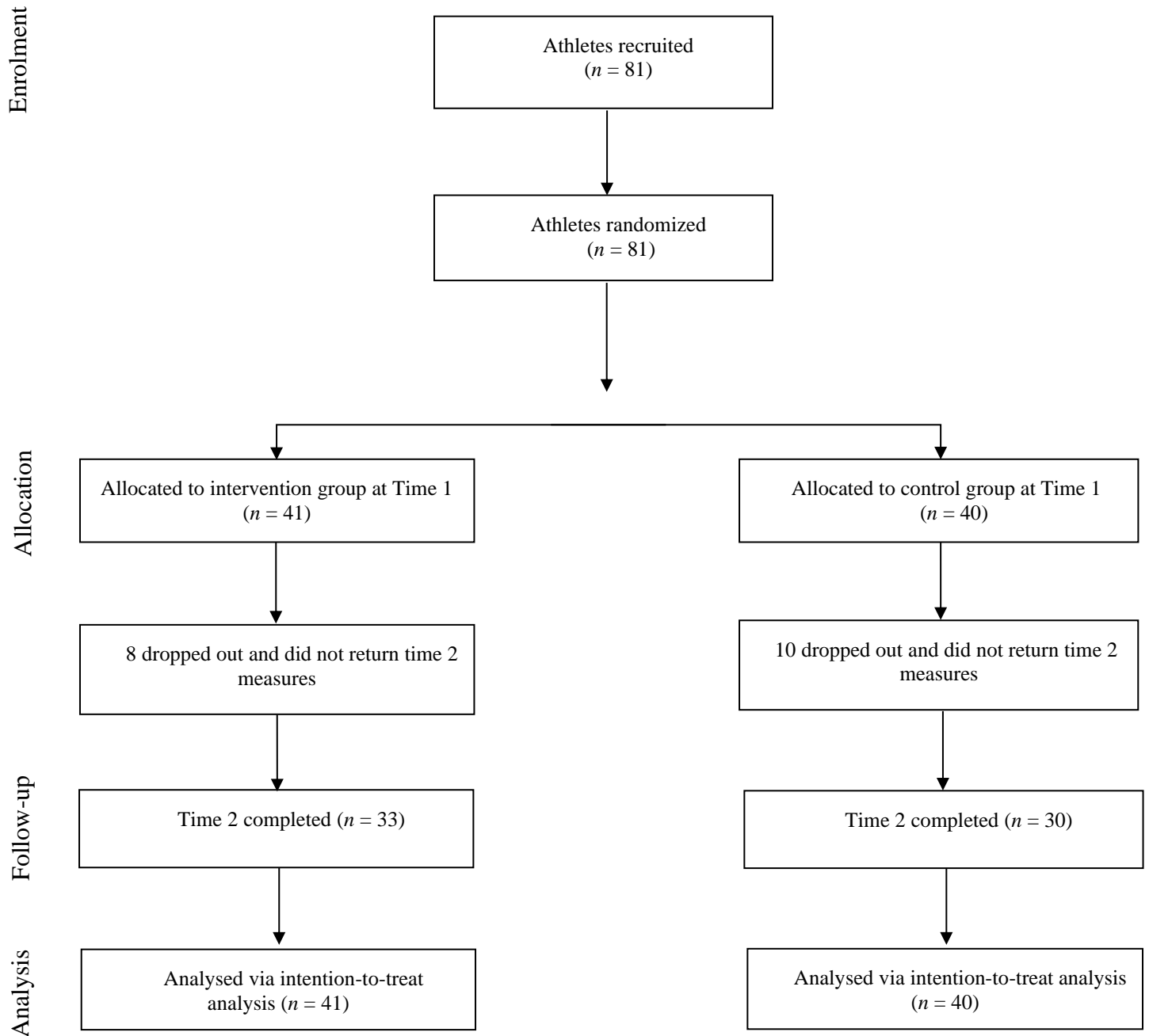
Intervention group (n = 41) and the control group (n = 40).

**Table 3**  
*Pearson's correlations of adherence with residual change*

	Hours Spent on the Modules		Number of Modules Completed	
	<i>r</i>	<i>P values</i>	<i>r</i>	<i>P values</i>
Perfectionistic Strivings				
PES	-.027	.882	-.238	.182
SOP	.405	.019	.192	.284
SP	-.196	.274	-.373	.032
Perfectionistic Concerns				
CM	-.174	.331	-.343	.051
SPP	-.133	.459	-.130	.472
NR	-.210	.241	-.349	.047
Perfectionism Cognitions				
PCI	-.599	<.001	-.617	<.001
Pre-Competition Emotions				
Anxiety	-.363	.038	-.641	<.001
Dejection	-.024	.896	-.016	.932
Anger	-.283	.111	-.359	.040
Happiness	.133	.459	.265	.136
Excitement	-.033	.853	.227	.203

Note. PES = personal standards, CM = concerns over mistakes SOP = self-oriented perfectionism, SPP = socially-prescribed perfectionism, SP = striving for perfection, NR = negative reactions to imperfection, PCI = perfectionism cognitions. Sample size (n = 33) includes all completers from the intervention group.

**Figure 1** CONSORT diagram representing the flow of athletes for each stage of the intervention



**S1**

CONSORT Checklist of information to include when reporting a randomised trial

Section/Topic	Item No	Checklist item	Reported on page No
<b>Title and abstract</b>			
	1a	Identification as a randomized trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions	2
<b>Introduction</b>			
Background and objectives	2a	Scientific background and explanation of rationale	3
	2b	Specific objectives or hypotheses	8
<b>Methods</b>			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	8
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	8
Participants	4a	Eligibility criteria for participants	9
	4b	Settings and locations where the data were collected	10
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	10
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	11-12
	6b	Any changes to trial outcomes after the trial commenced, with reasons	NA
Sample size	7a	How sample size was determined	9
	7b	When applicable, explanation of any interim analyses and stopping guidelines	13
<b>Randomization:</b>			
Sequence generation	8a	Method used to generate the random allocation sequence	9
	8b	Type of randomization; details of any restriction (such as blocking and block size)	9
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	9
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	9



Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	NA
	11b	If relevant, description of the similarity of interventions	NA
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	13
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	13
<b>Results</b>			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analyzed for the primary outcome	33
	13b	For each group, losses and exclusions after randomization, together with reasons	33
Recruitment	14a	Dates defining the periods of recruitment and follow-up	NA
	14b	Why the trial ended or was stopped	NA
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	31
Numbers analyzed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	31
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	30-31
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	30-31
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	NA
Harms	19	All important harms or unintended effects in each group	10
<b>Discussion</b>			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	19-20
Generalizability	21	Generalizability (external validity, applicability) of the trial findings	13-14
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	15-18
<b>Other information</b>			
Registration	23	Registration number and name of trial registry	NA
Protocol	24	Where the full trial protocol can be accessed, if available	10
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	NA

**S2**

## Online ACT-based intervention plan and session overview

<b>Module</b>	<b>ACT</b>	<b>Perfectionism</b>	<b>Aim</b>	<b>Module Components</b>
<b>1</b>	Introduction to ACT	Stigma	Reduce stigma and provide overview of ACT	1.1 What is sport psychology? 1.2 Welcome to ACT 1.3 Goals of the programme
<b>2</b>	Contacting the present moment	Concerns Over Mistakes	Staying focused in competition/training	2.1 What is being present? 2.2 Contacting the present moment 2.3 Using senses (e.g., dropping anchor)
<b>3</b>	Mindfulness	Fear of Failure	To be able to control the body and mind	3.1 What is mindfulness? 3.2 Emptying the mind 3.3 Pink elephant
<b>4</b>	Acceptance	Self-Criticism	To be able to accept mistakes/the self	4.1 How do I accept? 4.2 Struggling vs opening up 4.3 Thoughts – emotions – actions
<b>5</b>	Defusion	Doubt About Actions	To disconnect thoughts	5.1 Removing doubt (e.g., hands Infront of face) 5.2 Being more compassionate to the self 5.3 Getting hooked
<b>6</b>	Values	Managing Expectations	Leading a values led life	6.1 Values vs goals 6.2 Exploring values 6.3 Overcoming expectations
<b>7</b>	Self	Negative Reactions to Imperfections	Increase awareness of the self	7.1 How do you want to be seen? 7.2 Overcoming imperfections 7.3 Obituary
<b>8</b>	Committed action	Healthy Striving	Setting realistic and healthy goals	8.1 Committing to the plan 8.2 What If planning 8.3 Overcoming FEAR

## S3

## Internal reliabilities and intra-class correlations

Measure	T1	T2	T1-T2	T1-T2		<i>F</i> ( <i>df</i> )
	$\omega$	$\omega$	<i>r</i>	ICC	CI	
<b>Control group</b>						
PES	.92	.88	.68*	.64	.40, .80	5.08 (39, 39)***
CM	.94	.89	.60***	.56	.29, .74	3.87 (39, 39)***
SOP	.82	.84	.96***	.96	.93, .98	51.17 (39, 39)***
SPP	.91	.95	.63***	.60	.33, .77	4.42 (39, 39)***
SP	.87	.84	.58*	.57	.32, .74	3.75 (39, 39)***
NR	.90	.86	.48**	.45	.17, .66	2.83 (39, 39)***
PCI	.93	.90	.35*	.30	.01, .55	2.02 (39, 39)**
Anxiety	.91	.85	.78***	.78	.62, .88	7.96 (39, 39)***
Dejection	.95	.92	.79***	.78	.62, .88	8.51 (39, 39)***
Anger	.94	.93	.80***	.79	.62, .88	8.89 (39, 39)***
Happiness	.88	.86	.38*	.37	.08, .61	2.22 (39, 39)**
Excitement	.84	.70	.42**	.40	.11, .63	2.37 (39, 39)**
<b>Intervention group</b>						
PES	.84	.87	.40*	.36	.08, .60	2.28 (40, 40)**
CM	.93	.90	.32*	.31	.01, .56	1.89 (40, 40)*
SOP	.86	.84	.95***	.90	.36, .97	39.29 (40, 40)***
SPP	.86	.90	.11	.10	-.21, .39	1.23 (40, 40)
SP	.88	.84	.35*	.32	.04, .56	2.05 (40, 40)**
NR	.85	.84	.31*	.29	.00, .54	1.88 (40, 40)*
PCI	.93	.81†	.24	.15	-.08, .40	1.61 (40, 40)
Anxiety	.87	.62	.12	.05	-.08, .22	1.27 (40, 40)
Dejection	.94	.58	.28	.20	-.08, .47	1.56 (40, 40)
Anger	.94	.69	.17	.12	-.16, .40	1.30 (40, 40)
Happiness	.79	.53	.19	.17	-.13, .45	1.43 (40, 40)
Excitement	.81	.24†	.37*	.34	.04, .59	2.03 (40, 40)*

Note.  $\omega$  = McDonald's Omega, ICC = intra-class correlation (two-way mixed effects, single measures, absolute definition), CI = confidence interval, PES = personal standards, CM = concerns over mistakes, SOP = self-oriented perfectionism, SPP = socially-prescribed perfectionism, SP = striving for perfection, NR = negative reactions to imperfection, PCI = perfectionism cognitions. † = Omega would not compute so Cronbach's alpha is provided.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ , two-tailed.

**S4**

Results of Analysis of Covariance (ANCOVA) for dependent variables

Measure	Intervention M	Control M	<i>F</i> ( <i>df</i> )	<i>P</i> values
Perfectionistic Strivings				
T2 PES	3.30	4.05	29.05 (1,78)	<.001
T2 SOP	5.15	5.55	38.14 (1,78)	<.001
T2 SP	3.32	4.01	21.72 (1,78)	<.001
Perfectionistic Concerns				
T2 CM	3.35	4.08	20.65 (1,78)	<.001
T2 SPP	4.43	5.53	12.45 (1,78)	.004
T2 NR	3.23	4.08	29.46 (1,78)	<.001
Perfectionism Cognitions				
T2 PCI	1.68	3.15	97.11 (1,78)	<.001
Pre-Competition Emotions				
T2 Anxiety	1.29	2.93	92.70 (1,78)	<.001
T2 Dejection	1.09	2.30	47.59 (1,78)	<.001
T2 Anger	1.05	2.33	44.28 (1,78)	<.001
T2 Happiness	2.56	1.64	35.27 (1,78)	<.001
T2 Excitement	2.44	1.82	24.03 (1,78)	<.001

Note. PES = personal standards, CM = concerns over mistakes SOP = self-oriented perfectionism, SPP = socially-prescribed perfectionism, SP = striving for perfection, NR = negative reactions to imperfection, PCI = perfectionism cognitions.

Intervention group (n = 41) and the control group (n = 40). Time 1 variable is included as covariate with corresponding adjusted means displayed.