


Please cite the Published Version

Maxwell-Keys, Craig, Wood, Andrew and Turner, Martin  (2021) Developing Decision Making in Rugby Union Match Officials Using Rational Emotive Behavior Therapy (REBT). *Psychology of Sport and Exercise*, 58. ISSN 1469-0292

DOI: <https://doi.org/10.1016/j.psychsport.2021.102098>

Publisher: Elsevier

Version: Accepted Version

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2 **Developing Decision Making in Rugby Union Match Officials Using Rational Emotive**
3 **Behavior Therapy (REBT)**

4
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7 Submitted 30th of March 2021.

8 Resubmitted 20th September 2021.

9 2nd Resubmission 26th October 2021.

10 Accepted into *Psychology of Sport and Exercise* 4th November 2021.

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19
20 The authors have complied with APA ethical standards in the treatment of the sample.

21 The authors have no conflicts of interest.
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Abstract

There is a dearth of applied research to inform psychological provision for match-officials. The application of Rational Emotive Behavior Therapy (REBT; Ellis, 1957) is becoming established as an effective psychological intervention with elite performers. This paper examined the effects of four one-to-one REBT sessions on irrational beliefs, anxiety, decision rumination and reinvestment, and match officiating performance with two elite rugby match officials. Using an idiographic single-case, staggered multiple-baseline across participants research design, visual and statistical analyses showed that the intervention brought about significant, immediate and maintained (12 week follow-up) reductions in irrational beliefs. Furthermore, participants also reported reductions in anxiety, and decision making reinvestment, alongside increased match official performance for one participant. The current study lends some initial support for the application of REBT with match officials, and develops understanding into potential links between irrational beliefs and decision making performance. The results are discussed in terms of theory, applied implications, limitations and future research.

Keywords: Applied sports psychology; rugby union; match-officials; intervention; CBT

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52 **Developing Decision Making in Rugby Union Match Officials Using Rational Emotive**

53 **Behavior Therapy (REBT)**

54 **Introduction**

55 Adversity (e.g., failure, rejection, or ill-treatment) is ubiquitous in elite sport, and thus
56 psychological approaches that can help those engaged in elite sport respond adaptively are of
57 particular importance. One psychological approach that has garnered interest in sport (Turner,
58 2016) is rational emotive behavior therapy (REBT; Ellis, 1957). REBT is based on the central
59 proposition that, on approach and in response to adversity, we have some responsibility for our
60 emotional and behavioral responses, and we can exercise this responsibility through cognitive
61 change (Turner, 2019). In REBT, the extent to which people exhibit functional or dysfunctional
62 emotions and behaviors depends upon the extent to which they hold rational and irrational
63 beliefs. Rational beliefs are flexible, logical, and non-extreme, and are conducive to long-term
64 mental health and goal attainment. In contrast, irrational beliefs are rigid, illogical, extreme,
65 and hinder long-term mental health and goal attainment (Dryden & Branch, 2008).

66 The theory and practice of REBT is best articulated through its GABCDE framework,
67 where G stands for goals, A stands for adversity (which are counter to G), B is for beliefs (about
68 A), C is for consequences (emotional, behavioural, cognitive), D stands for disputation
69 (rigorously challenging irrational beliefs), and E is for effective new beliefs (developing and
70 strengthening rational beliefs). Athletes are helped to recognize that when faced with an
71 adversity (A) that is counter to their goals (G), it is their beliefs (B) about the adversity (A),
72 rather than the adversity per se, that governs the functionality of their emotional, cognitive, and
73 behavioral consequences (C; Chadha et al., 2019). If A is met with *irrational beliefs*,
74 dysfunctional C's prevail, whilst in contrast, if A is met with *rational beliefs*, functional C's
75 prevail. The irrational beliefs are then disputed (D) following which new effective rational

76 beliefs (E) are instantiated and reinforced. Though originally conceived as a psychotherapeutic
77 model (Ellis, 1957), the introduction of REBT within sport and exercise is often referred to as
78 REB Coaching (REBC; Turner, 2019) and includes informed professional guidance on its
79 application for use with sport and exercise participants (see Turner & Bennett, 2018).

80 The detrimental effects of irrational beliefs on mental health are widely known (Visla
81 et al., 2016) and have been demonstrated in athletic populations (e.g., Turner et al., 2019).
82 Though all humans have the propensity for holding rational and irrational beliefs (Ellis, 1987),
83 those operating in an elite athletic environment could be especially vulnerable to the
84 maladaptive effects of irrational beliefs (Turner & Barker, 2013). Elite sport is characterised
85 by a win at all costs mantra, the prevalence of irrational language (e.g., “must win”) by key
86 stakeholders (e.g., media, fans) and an inherent fixation on success, failure, and perceived self-
87 worth (Turner, 2016; Wood et al., 2018). The application of REBT is fast becoming recognised
88 as an effective approach to enhancing psychological outcomes associated with performance
89 (e.g., Turner & Bennett, 2018) such as: increased resilient qualities (Deen et al., 2017),
90 increased self-efficacy and perceived control (Wood et al., 2017a), increased self-determined
91 motivation (Chrysidis et al., 2020; Turner & Davis, 2018), reduced anxiety (e.g., Turner, Ewen,
92 & Barker, 2018), a more adaptive physiological state (i.e., reduce resting systolic blood
93 pressure; Wood et al., 2017b), and enhanced performance (Mesagno et al., 2020; Turner et al.,
94 2019; Wood et al., 2017b). In their systematic review of REBT in sport, Jordana et al. (2020)
95 indicated that REBT delivered via one to one counselling is especially effective in reducing
96 athlete anxiety.

97 Of the many individuals who operate in elite sport environments, one group that has
98 been under-researched are sport officials (Slack et al., 2014). In the current paper, instead of
99 ‘sport officials’ we use the term match officials (MOs) to fit with the rugby context. Despite
100 the occupational pressures that MOs are faced with (e.g., mass media coverage, abuse from

101 spectators as a consequence of decisions made; Webb et al., 2021) there remains limited
102 research into the effects of psychological strategies that can help MOs adapt to the ever-
103 changing performance environment. MOs have never been more in the public eye, and more
104 meticulously scrutinized than they are in the modern age (Dawson, 2012; O'Reilly, 2017);
105 perpetuated by live broadcasts, match commentary, and social media. MOs routinely
106 experience complex and ambiguous situations in which they are required to interpret, judge
107 and communicate effectively (Cunningham et al., 2014).

108 Particularly, rugby union has seen a rise in attention and scrutiny at the elite level which
109 has elevated the pressure on MOs, leading to moral panic (Garland, 2008). Indeed, MOs within
110 Rugby union receive abuse from players, coaching staff and fans alike, which has substantial
111 implications for psychological well-being, performance and retention (Ridinger et al., 2017).
112 The match official abuse reflects a wider trend mirrored in other sports such as cricket and
113 association football (Webb et al., 2019). Whilst stressors such as interpersonal conflict,
114 performance errors, and game importance are commonly reported by officials across sports
115 (Goldsmith & Williams, 1992) there appears to be stressors particularly pertinent to refereeing
116 at the elite level of Rugby union. In particular, self-presentational concerns, match importance,
117 and unfamiliarity (facing a game situation they had not faced before) were highlighted as
118 significant stresses for elite Rugby union referees (Hill et al., 2016). Uncertainty can be viewed
119 as highly threatening to referees and can lead to debilitating negative emotions and choking
120 (Hill et al., 2016). The management of self-presentational concerns and unfamiliarity is critical
121 to match officials in order to assuage choking under pressure in part due to distractions
122 (Mesagno et al., 2011).

123 Decision making skills are vital to the performance and function of an official (Larkin
124 et al., 2011) and it has been recognised that more evidence is needed for evidence-based and
125 efficacious decision-making training methods (e.g., MacMahon et al., 2007). Given the

126 demands on Rugby union MOs, their coping strategies have a large part to play in helping them
127 make accurate decisions during critical moments of a game (Hill et al., 2016). The complexity
128 of decision-making in officiating can differ between sports and have been separated into three
129 categories. These include monitors (e.g., gymnastics judges), reactors (e.g., tennis line judge),
130 and interactors (e.g., Rugby union referees; MacMahon et al., 2014). Rugby union MOs fall
131 under the ‘interactor’ type, having to contend with highly physical, perceptual, and in game
132 decision-making demands (Kittel et al., 2021). Considering the unique demands that rugby
133 union MOs are face with, it is important that they are able to deal with the demands to maintain
134 and uphold the integrity of the game they are officiating.

135 Indeed, decision-making is perhaps the most important skill for sports officials (Kittel
136 et al., 2019b; Morris & O’Connor, 2016), in part due to the expectations of players, coaches,
137 sporting organizations, and spectators, that the official can (or ‘should’) make accurate
138 decisions. Tasks to develop decision-making have previously included simulation related
139 scenarios, often under physical stress, and classroom or video-based approaches. These
140 approaches are used to replicate the ecological validity of real game situation in order to
141 contribute to deliberate practice and training opportunities for match officials (e.g., Kittel et
142 al., 2021). Nevertheless, within the decision-making literature there is little attention given to
143 the psychological preparation, and specifically the emotion regulation, required to make
144 important and accurate decisions when faced with an array of performance related stressors
145 (e.g., uncertainty, player interaction, mental fatigue).

146 Researchers suggest that rugby union MOs who are able to maintain performance
147 standards during challenging moments of a game, do so by adopting problem and emotion-
148 focused coping strategies, whereas poor performance and choking are associated with
149 avoidance-coping strategies (Hill et al., 2016). To this end, REBT, with its emphasis on
150 emotion and behavior regulation via cognitive change, offers an efficacious and unexamined

151 way through which MOs could maintain their performance whilst officiating challenging
152 moments of a game. REBT can also be applied 'off-field', for which is there is a particular
153 need to develop decision-making development methods (Kittel et al., 2021).

154 The purpose of the current study is to examine the effects of REBT on the anxiety,
155 decision making, and officiating performance of Rugby Football Union MOs. Whilst past
156 research has demonstrated the effects of REBT on the anxiety (Turner et al., 2018) and
157 performance (Wood et al., 2017b) of athletes, REBT's effects on decision making is unknown.
158 Elite level MOs are reported to experience significantly higher levels of anxiety compared to
159 amateur MOs (Johansen & Haughen, 2013), and researchers have linked the debilitating effects
160 of anxiety to poorer decision making (e.g., Hill et al., 2016) and MO performance (Kamata et
161 al., 2002). A MO's decision making ability under pressure is valuable area of investigation,
162 because it captures one of the core aspects of their role. One framework that can be used to
163 examine decision making under pressure is the self-focus framework as assessed by decision
164 rumination and reinvestment (Kinrade et al., 2010). The Decision Specific Reinvestment Scale
165 (DSRS; Kinrade et al., 2010) measures one's propensity to reinvest explicit knowledge when
166 under pressure, via consciously monitoring decision making and ruminating on previous
167 decisions; both of which are predictive of a maladaptive cognitive consequence (e.g., greater
168 bias to home teams; Pool et al., 2011) and poorer decision making when under pressure
169 (Kinrade et al., 2015).

170 From an REBT viewpoint, it is possible that MOs holding greater irrational beliefs will
171 experience greater performance anxiety (e.g., Chadha et al., 2019), and more likely to reinvest
172 and ruminate (Artiran et al., 2019) over their decision making, resulting in poorer MO
173 performance (Maxwell et al., 2006). Therefore, applying REBT, MOs could develop rational
174 beliefs with a view to managing their anxiety, and consequent decision reinvestment to enable
175 more accurate decision making (performance) as part of an adaptive state of mind.

176 In order to investigate these evidence-based and theory-driven presuppositions, in the
177 current study we examine the effects of REBT on anxiety, decision making reinvestment, and
178 MO performance with two MOs, through a single-case experimental design (SCED; e.g., Davis
179 & Turner, 2019). SCEDs allow for the intensive and in-depth investigation of a psychological
180 intervention (Barker et al., 2020), which is often a complex and multi-faceted process that is
181 susceptible to contextual interference (Dryden, 2012). Also, SCEDs allow the detailed
182 investigation of individuals using a breadth of repeated measurements (e.g., self-reported,
183 objective, and social validation), to help form a more enhanced picture of the individual (i.e.,
184 changes in performance scores, psychological variables; Normand, 2016).

185 The present study adds to existing literature in two ways. First, this study will contribute
186 to the dearth of research documenting the application of interventions to support high-level
187 MOs who, much like elite athletes, are increasingly placed under pressure to perform. Second,
188 the present study elucidates the mechanisms by which REBT may lead to enhanced
189 performance, which is largely missing from the extant literature (Turner, 2019), namely
190 decision making reinvestment. Based upon previous research and REBT theory, it is
191 hypothesised that REBT will bring about immediate and maintained reductions in irrational
192 beliefs and anxiety, alongside enhanced decision making and officiating performance in MOs.

193 **Method**

194 **Participants**

195 The author's approach to participant recruitment was to meaningfully study few
196 participants in the interest of discovering the detailed responses of each participant in
197 particular, then determine what, if anything, these particulars have in common (Thorngate,
198 1986). Using this person-centred approach we were able to report participant-specific views
199 and circumstances that would not be typically seen in larger sample studies (Normand, 2016).
200 Indeed, working individually with fewer participants accurately reflects how one would

201 typically apply REBT in practice, and is in line with Barlow and Nock's (2009) assertion that,
202 "...it is the individual organism that is the principle unit of analysis in the science of
203 psychology" (p. 19). In approaching the study in this way, we are able to furnish practitioners
204 with details that would not be possible if we had more participants (e.g., Turner & Barker,
205 2013, recruit four participants and offer sparse details concerning intervention procedures and
206 individual data). With the novel nature of the participant group, we felt that it was more
207 advantageous to be able to describe methods procedures in more detail, so that practitioners
208 are clear about what was done, why, and how.

209 An initial screening process was carried out with 30 members of the Rugby Football
210 Union's (RFU) Professional Game Match Officials Team (PGMOT). The respondents were
211 aged between 24 and 52 years old ($M = 38.5$; $SD = 8.04$) whose MO experience ranged from 2
212 to 15 years ($M = 5.00$; $SD = 3.86$). All members of the PGMOT had optional access to a sport
213 psychologist, and may have engaged with a sport psychologist in the past. The screening
214 process involved participants completing the irrational Performance Beliefs Inventory (iPBI;
215 Turner et al., 2016) using the Qualtrics online survey software (Qualtrics, Provo, UT). Two
216 participants with the highest irrational performance beliefs scores were selected to take part in
217 the intervention. Similar to previous research (Outar et al., 2018), this selection was based on
218 participants' average iPBI scores as compared to normative data put forth by Turner et al.,
219 (2018; 23.36 = demandingness beliefs, 23.05 = low frustration tolerance beliefs, 21.28 =
220 awfulizing beliefs, 16.03 = deprecation beliefs). Participant A was aged 28 and had 4 years of
221 experience, whilst Participant B was aged 36 and had 2 years of experience within the PGMOT,
222 whereby officiating appointments included European and International matches. Institutional
223 ethics approval was granted from the university, whilst consent was provided by participants
224 prior to the data collection and intervention process.

225 **Experimental Design**

226 In this study a single-case, staggered multiple-baseline across participants research
227 design was used, offering an ecologically valid setting in which to observe the intervention
228 effects (Barker et al., 2013). A pre-intervention (A), post-intervention (B) and follow-up (FU:
229 12 week post-intervention onset) design allowed for the short and longer-term assessment of
230 intervention effects on all outcome measures. Seven and eight baseline data points were
231 collected for Participants A and B respectively (irrational beliefs) to ensure that stable self-
232 report data were ascertained prior to the introduction of the REBT intervention (Barker et al.,
233 2020; Nock et al., 2007). A stable baseline allowed for the establishment of change between
234 pre-intervention (A) and post-intervention (B = post-intervention phase, FU = 12 week follow-
235 up time-point) phases. Guided by the GABCDE framework, the intervention was separated
236 into three sections: education, disputation, and reinforcement, with the sessions following
237 guidelines as laid out in the literature (e.g., Turner, 2019). Using a multiple baseline across
238 participants design, the pre-intervention phase and intervention were delivered sequentially
239 (one week apart) to Participants A and B, in turn, increasing the ability to attribute data change
240 to the intervention rather than extraneous factors (Barker et al., 2020). Internal validity was
241 enhanced by replicating the intervention effects across all participants (Barker et al., 2013) and
242 the Hawthorne effect controlled for by illustrating that only when the intervention is introduced
243 is there a data shift in the hypothesised direction (Deen et al., 2017).

244 **Measures**

245 **Irrational beliefs.** The iPBI (Turner et al., 2016) comprises 28-items for which
246 participants indicate their agreement to irrational statements on a 5-point Likert-scale from 1
247 (*Strongly Disagree*) to 5 (*Strongly Agree*). The iPBI assesses the four core beliefs
248 (demandingness, awfulizing, low frustration tolerance, and self-depreciation) of REBT with 7-
249 items per core belief. Mean subscale scores were calculated to provide an overall composite

250 score. Turner et al. (2016) demonstrate that the iPBI has good criterion, construct and
251 concurrent reliability (Cronbach's $\alpha = .87$ for the composite score).

252 **Decision-Specific Reinvestment Scale.** Participants decision making was assessed
253 using the Decision-Specific Reinvestment Scale (DSRS, Kinrade et al., 2010). The DSRS has
254 participants rate 13-items on a 5-point Likert scale ranging from 0 (*not characteristic*) to 4 =
255 (*very characteristic*). Of the 13, seven items assessed decision rumination (i.e., conscious
256 monitoring of processes involved in decision making) and six items assessed decision
257 reinvestment (i.e., tendency to focus on past and inaccurate decisions). Acceptable internal
258 consistency estimates have been shown for decision reinvestment ($\alpha = .91$) and decision
259 reinvestment ($\alpha = .89$; Kinrade et al., 2010).

260 **Sport Anxiety Scale-2.** The Sport Anxiety Scale-2 (SAS-2; Smith et al., 2006) was
261 used to assess the total anxiety scores of participants across three sub-scales of worry, somatic
262 anxiety, and concentration disruption. The SAS-2 had the participants score 15-items according
263 to a 4-point Likert scale; 1(*not at all*) to 4 (*very much*). Higher total across all items were
264 indicative of the higher levels of anxiety. The SAS-2 proved good internal consistency ($\alpha =$
265 $.91$), test-retest reliability, and construct validity. The same study also proved that SAS-2 was
266 an appropriate measure for assessing intervention efficacy at state levels (Smith et al., 2006).

267 **Match official performance.** On-field performance was assessed using a recognised
268 and multi-sports analysis platform called Athlete Management System (AMS), currently
269 employed at international, European, and leading domestic rugby competitions. The AMS
270 system assigns ratings of dark green (4) = excellent to red (1) = unacceptable, given by the
271 officially appointed match performance reviewer. The match reviewers were not aware of the
272 research study being undertaken, and conducted the match reviews as they normally would.
273 The appointed performance reviewer is a trained individual who has received extensive
274 training in coherence exercises and demonstrates exceptional game understanding allowing

275 them to consistently judge match official performance on a weekly basis against a set of pre-
276 determined Key Performance Indicators (KPIs). Four reviewers rated each performance
277 which helped to mitigate variability as much as practically possible. This is standard practice
278 and could not be changed for the purposes of the study as this would introduce an unnatural,
279 artificial element to the performance review that would not be reminiscent of how the process
280 normally works. It was not possible to have the same four reviewers rate each match for both
281 participants, because again, this would not be in keeping with standard practice. Each colour
282 within the AMS system is assigned a single point weighting, whereby overall performance is
283 calculated on the mean points accrued across five key aspects of the game. The five key game
284 aspects include the decision accuracy and management of; the breakdown, scrums, lineout to
285 mauls, space and foul play/values. For the purposes of data analyses, we used the mean
286 performance scores across all matches officiated in the baseline phase, and all matches
287 officiated in the intervention phase, and created two scores reflecting amalgamations of
288 performance within each phase.

289 **Social Validation.** Typical to SCEDs social validation data was collected using an
290 online questionnaire to capture participants perceptions and feelings of both the intervention
291 delivery and effectiveness (Page & Thelwell, 2013). Questions were orientated to changes in
292 dependent variables (e.g., irrational beliefs, feelings of anxiety, decision making process &
293 performance), the intervention process, and participants satisfaction with the intervention
294 results. Participants reported their answers on a 7-point Likert scale ranging from 0 (*strongly*
295 *disagree*) to 7 (*strongly agree*) as well as providing written feedback to a number of
296 questions in terms of the overall study and applied intervention effects.

297 **Intervention**

298 Based upon the GABCDE framework, the intervention consisted of four one-to-one
299 sessions each lasting between 45 to 60 minutes, and two homework assignments (after sessions

300 one & two). The use of homework tasks are important to the REBT process (Dryden & Branch,
301 2008) and focused on cognitive and behavioral elements. The cognitive assignment was based
302 on self-help worksheets presented by Ellis & Dryden (1997, p. 52-53) that works to reinforce
303 the principles of ABC. The behavioral assignment was based upon the ‘acting as-if’ concept as
304 advocated by Dryden & Branch (2008, p. 176) where participants were encouraged to act ‘as-
305 if’ they already had a strong conviction in their newly established rational belief. The REBT
306 sessions closely adhered to guidelines advocated within the literature (e.g., Dryden &
307 DiGiuseppe, 1990; Ellis & Dryden, 1997) and specifically followed the process detailed by
308 Turner (2019) for the use of REBT with athletes. Turner’s process includes six stages:

309 (1) Recognize: Educate the participant about the GABC framework and help them to
310 gain access to, and understand the effects of their irrational beliefs.

311 (2) Evidence: Help the participant to dispute (D) their irrational beliefs on empirical
312 grounds (e.g., “where is the evidence that you ‘must’ perform well?”).

313 (3) Logic: Help the participant to dispute (D) their irrational beliefs on logical grounds
314 (e.g., “is it consistent with reality that just because you ‘want’ to perform well, then
315 you ‘must’?”).

316 (4) Pragmatics: Help the participant to dispute (D) their irrational beliefs on functional
317 grounds (e.g., “how is the belief that you ‘must’ perform well serving you? Is this
318 belief helping you to achieve your goals?”).

319 (5) Replace: Develop new rational beliefs with the participants, and enable them to
320 weaken their irrational beliefs and strengthen the new rational beliefs.

321 (6) Commit: Facilitate the client in integrating their new beliefs into their lives,
322 encouraging commitment to rationality and independent disputation.

323 The above process is underpinned by the development of rapport between practitioner
324 and participant (Wood et al., 2020) and disputation is achieved via Socratic dialogue rather

325 than didactic instruction (DiGiuseppe et al., 2014). The six stage process was distributed across
326 the four sessions, session 1: recognize; sessions 2 and 3: evidence, logic, and pragmatics;
327 session 4: replace and commit. Throughout, due to the deeply held nature of core beliefs
328 (DiGiuseppe et al., 2014), the practitioner was cognizant of the participants' use of irrational
329 language, respectfully reminding the participants to be aware of this. The intervention strikes
330 a balance between being didactic when helping the participants to challenge their thinking,
331 whilst maintaining the working alliance by also including elements of Socratic questioning and
332 taking a client-centered approach (Wood et al., 2020). Due to this, naturally, there were
333 differences in the interactions between the practitioner and each participant. Whilst the process
334 of REBT was the same for each participant, the ways in which the practitioner-participant
335 interactions played out were idiosyncratic to each participant in order to maintain a client-
336 centered approach to the work. However, REBT content was always the focus of the sessions,
337 and REBT theory was closely adhered to throughout.

338 Logistically, the four sessions took place every two weeks starting from the first week
339 of intervention for each participant (weeks 1, 3, 5, and 7 of the intervention phase). Sessions
340 took place face to face in a private meeting room convenient to each participant to ensure
341 participant comfort and environmental familiarity. All sessions were delivered by the first
342 author under the close guidance and supervision of the second and third authors, who are Health
343 Care Professions Council registered practitioner psychologists and trained in REBT (Primary
344 and Advanced Practicum at the Albert Ellis Institute). The first author is also a trained
345 professional referee, and qualified referee trainer, enabling greater buy-in from participants
346 than what might be possible by a psychologist without referee training. This offers a unique
347 aspect to the current study, whereby the delivery of the intervention was conducted by a
348 practitioner with a shared professional capacity with participants.

349 **Analytic Strategy**

350 Data were graphed and then visually analyzed in order to investigate intervention
351 effects on participants' irrational beliefs. In order to examine data visually and statistically, it
352 is important to first determine the extent to which data are serially dependent using
353 autocorrelation analyses (Ottenbacher, 1986). Autocorrelation analyses is important in single-
354 case designs, because in order to make accurate judgements about visually inspected data it is
355 advantageous for the data points to independent (i.e., low serial dependence). To ensure data
356 met parametric assumptions baseline total irrational belief scores for each participant were
357 assessed for serial dependence using auto-correlation analysis (Barker et al., 2013). For the
358 current data, non-significant auto-correlation was revealed for both participants, thus rendering
359 data suitable for statistical analyses (Ottenbacher, 1986).

360 Hrycaiko and Martin (1996) suggest that if an intervention has yielded a significant
361 effect then this will be graphically apparent based upon: a) immediacy of effects, b) effects
362 reflected across both participants, c) minimal number of overlapping data points and d)
363 magnitude of effect size between pre- and post-intervention phases. These four criterion are
364 best determined using visual inspection of the graphed data (Kazdin, 2011) where data points
365 and phases are clearly marked. Visual inspection of the graphs (see Figures 1 & 2) and
366 descriptive data (see Table 1 & 2) were conducted for each participant and a Cohen's *d* was
367 calculated between pre-intervention and post-intervention phases in order to gauge the
368 magnitude of the intervention effect. Data was interpreted in reference to small (<0.87),
369 medium (0.87-2.67), and large effect sizes (>2.67; Parker & Vannest, 2009). Statistical analysis
370 was used to compliment visual inspection of the irrational belief data.

371 In line with previous research and typical of single case research (Barker et al., 2020)
372 an independent samples *t*-test was used to examine the statistical difference in total irrational
373 belief scores between pre (A) and post-intervention phases (B) for each participant. Descriptive
374 statistics for irrational performance beliefs (i.e., *M* & *SD*) and magnitude of change scores (*d*)

375 were calculated between pre-intervention phase, post-intervention phase, and a 12 week
376 follow-up time point (see Table 1). In addition, the mean and magnitude of percentage change
377 scores (between pre- and post-intervention time-points) were calculated for measures of
378 anxiety, decision reinvestment and match officiating performance. We use a blend of visual
379 and statistical analyses in order to assess change across continuous data, and also more
380 generally across the two main phases using mean levels (i.e., Cohen's d and t -tests). In addition,
381 the contrasting methods of visual analysis and statistical analysis indicate that a treatment effect
382 has occurred, it enhances confidence in the validity of the intervention (Barker & Jones, 2008).
383 T-tests for extremely small samples sizes is feasible and even a sample size as small as 2 does
384 not pose a problem (de Winter, 2013). For coherence and in line with the single-case nature of
385 the study, the results section has been structured by participant, rather than by variable (Davis
386 & Turner, 2019).

387

Results

388 Participant A

389 Participant A reported a large ($d = 2.27$) decrease (-28.56%) in composite irrational
390 beliefs between pre- to post- intervention phases. As well, reporting medium to large reductions
391 across each of the four core irrational beliefs. Visual analysis indicated stable baseline data
392 during the pre-intervention phase, with only two overlapping data points between that and the
393 post-intervention phase. Furthermore, although there did not appear to be immediate change in
394 scores, there was some latency in the reduction of composite irrational beliefs three weeks after
395 the intervention onset, with reductions maintained throughout the duration of the post-
396 intervention phase. Compared to the celeration line, post-intervention data indicated larger
397 reductions in irrational beliefs than what would be expected without REBT. Reductions
398 in irrational beliefs were maintained at a 12 week follow-up time point (see Table 1). An
399 independent samples t -test demonstrated a significant decrease in irrational beliefs between

400 pre- and post-intervention phases, $t(19) = 4.64, p < .001$. In adjunct to changes in irrational
401 beliefs, Participant A reported an 8.75% reduction in anxiety, and a 23.40% reduction in
402 decision reinvestment between pre- and post-intervention time-points. Furthermore, as
403 assessed by the Athlete Management System (AMS), Participant A's match officiating
404 performance showed a 20.60% increase between pre- and post-intervention time-points.

405 Social validation data revealed that Participant A believed enhancing healthy emotions
406 and behaviors were important and considered the REBT sessions to have had a positive
407 influence on her psychological well-being. Participant A reported 'neutral' scores when
408 responding to the statements "the REBT sessions were very effective" and "the REBT sessions
409 having a positive influence on their performance" (i.e., score., 4 out of 7). Participant A also
410 noted that they "would have liked to have chatted on more occasions", indicating that the
411 number of sessions perhaps was insufficient to their expectations. This was despite completing
412 all of the planned four sessions and sessions being between 45-60 minutes in length.

413 In sum, Participant A showed slightly delayed yet large and maintained reductions in
414 irrational beliefs after receiving the REBT intervention. In conjunction, Participant A reported
415 reductions in anxiety (i.e., worry, somatic anxiety, and concentration disruption) and decision
416 reinvestment related to match officiating. Finally, referee performance as evaluated externally
417 (i.e., decision accuracy & game management) increased. (*INSERT FIGURE 1 HERE*)

418 **Participant B**

419 Participant B reported a large ($d = 2.80$) decrease (-28.82%) in irrational beliefs
420 between pre and post-intervention phases. As well, reporting large reductions across each of
421 the four core irrational beliefs. Visual analysis indicated stable baseline scores, with only one
422 overlapping data point between the phases. Participant B reported immediate reductions in
423 irrational beliefs after the intervention onset, which largely followed a downward trend through
424 the remaining post-intervention phase. Compared to the celeration line, post-intervention data

425 indicated reductions in irrational beliefs, whereas the trend had an upwards trajectory had
426 REBT not been applied. Notably, Participant B reported an acute spike in irrational beliefs
427 half-way through the intervention phase, which subsided in accordance to the initial downward
428 trend the following week. Participant B's spike in irrational beliefs occurred at the time of an
429 important job interview that would see them promoted within their organisation. An
430 independent samples *t*-test demonstrated a significant decrease in irrational beliefs between
431 pre- and post-intervention phases, $t(19) = 7.30, p < .001$. In conjunction to these reductions
432 Participant B demonstrated a 14.70% reduction in anxiety and a 18.50% decrease in decision
433 reinvestment related to match officiating. Due to a change in Participant B's circumstances - a
434 change in job role owing to the fact that she was successfully appointed to the job that she had
435 interviewed for - we were unable to collect performance data at a post-intervention time-point.

436 Social validation data revealed that Participant B agreed with the notion that
437 enhancing healthy emotions and behaviors were important to them and that the REBT sessions
438 had a positive influence on their psychological well-being. Participant B also reported that they
439 were 'neutral', (score., 4 out of 7) in relation to the statement "the REBT sessions were very
440 effective" and that their perception as to the REBT sessions having a positive influence on their
441 performance. Despite this neutrality rating Participant B indicated the value they ascribed to
442 the intervention, stating that: "I do think deeper about emotive thoughts and feelings... I'm
443 always interested to understand the emotional and mental side of performance".

444 In summary, Participant B reported immediate, and maintained large reductions in
445 irrational beliefs after receiving the REBT intervention. In adjunct, Participant B demonstrated
446 reductions in anxiety (i.e., worry, somatic anxiety, and concentration disruption) and decision
447 reinvestment related to match officiating. Further, Participant B's endorsement of irrational
448 beliefs appeared to be contextually sensitive, that is, important and meaningful events may
449 enhance one's propensity to endorse irrational beliefs.

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(INSERT FIGURE 2 HERE)

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Discussion

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In the present study, we conducted a single-case examination into the effects of REBT on irrational beliefs, decision reinvestment, and match officiating performance with two elite rugby union MOs. Overall, the data supports the study hypotheses, indicating that the application of REBT brought about reductions in irrational beliefs, decreased decision reinvestment, and enhanced matched officiating performance (i.e., decision making and management). Given the psychological demands that MOs are faced with (Hill et al., 2016), the present study offers a valuable examination into the applicability and effects of REBT within a specialised and elite sample that appears relatively absent from the extant literature.

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As hypothesised, participants reported large reductions in irrational beliefs between pre- and post-intervention time-points, which were maintained at a 12 week follow-up time-point. Statements within social validation data affirmed a rational shift: “I want to perform well, not worry about it all going wrong, and the consequences. I now recognise that if a performance wasn’t that great it would not be the end of the world...and I cannot be defined by a single action or performance” (Participant A). Such findings add to a growing body of work that supports REBT as an effective psychological approach for those operating in elite sport (see Jordana et al., 2020, for a systematic review). In addition, the results support the GABCDE framework as an identifiable and structured framework by which practitioners can work with clients to bring about sustained changes in their beliefs (e.g., Wood et al., 2020).

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In contrast to our hypothesis (i.e., reductions in irrational beliefs) Participant A initially reported a small increase in irrational beliefs after the intervention onset, which then showed sustained reductions thereafter. This finding is not uncommon (e.g., Wood et al., 2017b) and can be explained by the following reasoning. First, the aim of sessions one and two were to recognise and consider disputing irrational beliefs, thus we may not expect reductions in

475 irrational beliefs as an extension of raising a client's awareness. Second, this finding may
476 reflect a phenomenon known as cognition - emotion mismatch (Stott, 2007), which is
477 frequently reported in the application of cognitive behavioural therapies (Dryden, 2012). That
478 is, the participant may have experienced a disassociation between their logical, empirical, and
479 pragmatic beliefs (cognitions), and how they felt about themselves (emotion). For example, an
480 athlete may say: "I know that I'm not a failure if I have not met my standards, but I still feel
481 like a complete failure". To this end, this finding suggests that the education of the GABCDE
482 model, alone, maybe insufficient in bringing about meaningful changes in client core beliefs
483 (Wood et al., 2018). Further, we recommend practitioners to be sensitive to the 'cognition –
484 emotion mismatch' and manage the pace and/or length of the REBT sessions to ensure
485 sufficient cognitive and emotional insight into their newly formed rational beliefs (Dryden &
486 Neenan, 2015).

487 Unlike Participant A, Participant B reported an immediate reduction in irrational
488 beliefs. Across the milieu of cognitive-behavioural approaches, engagement with intersession
489 tasks are considered central to positive psychological outcomes (Dryden, 2012). Participant
490 B's commitment to complete the intersession tasks were evident during the intervention
491 process, which may account for the immediate reduction in irrational beliefs. Although not
492 assessed in the study, an alternative explanation is that once Participant B was initially educated
493 on irrational beliefs and their debilitating effects, they may have completed the questionnaire
494 in a more socially desirable manner, in turn reporting lower irrational beliefs than they truly
495 believed. After reporting immediate reductions in irrational beliefs, data for Participant B
496 indicated an isolated spike between sessions two and three. Notably, at this juncture Participant
497 B was approaching a job interview with an international sporting body that had substantial and
498 positive ramifications on their career prospects. To explain, the job represented Participant B's
499 motivationally relevant goal (G) and the interview itself represented the adversity (A). Both,

500 in combination created a perception of motivational incongruence (i.e., “this interview may
501 allow me or prevent me from achieving my goals”; Chadha et al., 2019). All of which brought
502 the deeply held irrational beliefs to the surface, allowing the participants to be more aware of
503 their irrational beliefs. This acute awareness was reflected in the data. In future, practitioners
504 should be prudent to imminent and upcoming significant events for their clients, as they will
505 likely endorse higher levels of irrational beliefs during this period (Visla et al., 2016).
506 Nevertheless, these significant events also provide windows of opportunity for clients to
507 recognize, re-appraise, and behaviourally dispute their irrational beliefs in situ, about events
508 that are contextually outside of the precise remit of the intervention work being done. That is,
509 practitioners should recognise that events from outside of sport can influence the intervention
510 process, and that these events are not ‘off limits’ for a humanistic practitioner.

511 As established in previous research (e.g., Jordana et al., 2020) reductions in both
512 participant irrational beliefs were matched with decreases in anxiety. That is, as MOs
513 endorsement of absolutist and dogmatic beliefs about an A (e.g., faced with an important
514 decision) that thwarted their Goal (G; e.g., to be seen as an accomplished referee) decreased,
515 so did their self-reported anxiety levels (i.e., worry, somatic anxiety and concentration
516 disruption). To begin to explain the mechanisms by which reductions in irrational beliefs are
517 coupled with improved affective states (i.e., reduced anxiety) research has drawn upon
518 Lazarus’ (1991) cognitive appraisal theory (e.g., Chadha et al., 2019). In a study with elite
519 golfers, researchers showed irrational beliefs to positively relate to threat appraisals (i.e.,
520 evaluation of future harm or loss, Lazarus, 1991), negative emotions (e.g., cognitive and
521 somatic anxiety) and debilitating directional interpretation of anxiety. In the present study, this
522 explanation would indicate that for the MOs taking part in the study, if they endorse more
523 rational beliefs (e.g., “I really want to have a successful game, but it doesn’t mean I have to,
524 and if I didn’t it would be bad, but certainly not terrible and certainly does not make me a

525 complete failure) they could be less likely to appraise a match or situation as harmful or
526 threatening, and respond with lower levels and/or facilitative interpretations of anxiety, which
527 may have subsequent effects on their decision making and match officiating performance.

528 Decision making is considered a key determinant of coping and successful officiating
529 in rugby union (Mascarnhas et al., 2004). One mechanism that underpins successful decision
530 making is the propensity to reinvest and ruminate over the decision-making process. As
531 measured in the study, both participants reported reductions in decision making reinvestment
532 as a result of the intervention. That is, reductions in irrational beliefs and anxiety were coupled
533 with a reduced propensity to consciously monitor the processes involved in decision making
534 (i.e., decision rumination) and the tendency to focus on previous inaccurate decisions (i.e.,
535 decision reinvestment). Indeed, data supports previous suppositions that rumination is strongly
536 related to irrational beliefs due to their very negative and self-critical nature (Rude et al., 2007).
537 By extension, a more flexible, logical and non-extreme belief (rational beliefs) about various
538 adversities (A) during a game meant the participants were less likely to ruminate on and/or
539 over the prospect of making a ‘poor’ decision during a game. Beyond that of the performance
540 arena, researchers have indicated that increased self-consciousness itself can be both beneficial
541 (i.e., adaptive reflection) and detrimental (i.e., rumination) for psychological wellbeing; as
542 well, data implicates rumination as a mediator in the positive relationship between irrational
543 beliefs and psychological distress (Artiran et al., 2020). Rumination reflects self-attentiveness
544 motivated by threat, losses or injustices to the self, where instead, reflection represents self-
545 attentiveness motivated by curiosity and or epistemic interest in the self (Trapnell & Campbell,
546 1999). To this end, we suggest that the application of REBT (reduction of irrational beliefs)
547 did not completely assuage the participants self-consciousness regarding any pending/previous
548 decisions, rather, it may have propagated an adaptive shift from rumination to reflection.
549 Indeed, within the modern game, an MO’s ability to move on from a range of adversities is

550 considered critical for their performance. MOs are faced with a range of possible and amplified
551 adversities, due to the use of technology and large screens that can often identify a referee's
552 incorrect decision to the present and televised audience, which in turn make them susceptible
553 to triggering additional irrational beliefs. Essentially, REBT may offer a plausible intervention
554 to enhance a MO's ability to make effective decisions.

555 In the present study we objectively assessed MO performance using the 'athlete
556 management system' (AMS) as adopted across domestic, European and International
557 competition. The performance data for Participant A indicated an increase between pre- and
558 post-intervention phases. Specifically, via reductions in irrational beliefs, anxiety, and decision
559 reinvestment and rumination, it is possible that MOs were then able to make better game related
560 decisions. The application of REBT may have given the MOs the ability to place decisions
561 made (correct/incorrect) into perspective, allowing a more flexible, adaptive, and pragmatic
562 view of the decision-making process. This finding, in part, contributes to extant research that
563 documents the beneficial effects of reducing irrational beliefs on behavioural outcomes (i.e.,
564 performance markers; Wood et al., 2017b; Wood et al., 2020). Whilst the objective data offers
565 promising links between the REBT intervention and performance changes, it should be noted
566 that we were unable to collect performance data for Participant B. Nevertheless, Participant B
567 was presented with an alternative and significant performance situation (i.e., interview)
568 towards the latter stages of the REBT intervention, which they were successful in achieving.
569 The application of REBT, specifically the disputation of irrational beliefs is described as an
570 elegant solution. That is, a practitioner works to help the participant dispute beliefs associated
571 with success/failure in regards to the human experience. Hence newly formed rational beliefs
572 are highly applicable to other adversities related to success and/or failure inside and outside the
573 context of on-field performance.

574 In addition, social validation data from both participants indicated that the REBT
575 intervention only ‘slightly helped performance’. It is clear that future studies should employ
576 repeated and objective measures of performance to enhance our conclusions regarding
577 irrational beliefs and athletic performance. Furthermore, recent investigations suggest that
578 irrational beliefs are detrimental for performance, if one is highly anxious, and in an
579 imminently anxiety provoking situation (Mesagno et al., 2020). Future research should
580 examine the role of irrational beliefs amongst a wider range of interacting antecedents that
581 predict decision making performance in MOs. Conclusions regarding the facilitative effects of
582 REBT on decision making performance are promising, but remain tentative.

583 **Limitations and Future Recommendations.**

584 The findings of the current study offers the first data to support the use of REBT as a
585 means to assuage MO’s propensity to reinvest and ruminate over decision making. As well, in
586 this study REBT was able to equip the MOs with a set of rational beliefs that may have
587 facilitated and maintained optimal decision-making performance in what can be considered
588 highly pressurised and testing circumstances. Nevertheless, it would be judicious to identify
589 the relative strengths, limitations and future recommendations for the readership. First, the
590 assessment of MO performance using established and independent assessment criteria
591 provided an objective means by which to examine the effects of REBT on performance.
592 However, due to various seasonal constraints we were unable to collate repeated and a long-
593 term assessment of MO performance, as such, future researchers are recommended to do so.
594 Second, and related to a temporal analysis in referees, it might be that certain game situations
595 activate specific irrational beliefs. For example, whilst I may not be aware of my demand for
596 fairness, in the event that I am treated unfairly (by a player, for example) the irrational belief
597 may become more conscious. Therefore, future research should investigate ways to examine

598 situation specific irrational beliefs to understand to what extent, across different individuals,
599 particularly events are conducive to irrational beliefs activation.

600 Third, the psychological challenges for MOs are not bound to the field, but also in
601 their daily lives. For example, a recently retired top flight rugby league referee left the game
602 because of abuse (i.e., death threats) directed at him and his family (Cleary, 2018).
603 Accordingly, future researchers may wish to better understand if, and by what mechanisms
604 may the application of REBT bring about positive changes in the general psychological
605 wellbeing of an elite MO. Fourth, as we did here, the disputation of irrational beliefs is known
606 as ‘elegant’ REBT, nevertheless the GABCDE framework offers the practitioner a broader
607 suite of additional intervention options and/or techniques to adopt. One approach we would
608 recommend specifically for MOs which can be utilised within REBT is ‘assertiveness training’.
609 Specifically, MOs would undergo an REBT programme focussed on developing their social
610 skills to express themselves, persist in the face of resistance, and standing up for themselves in
611 the middle of conflict (Obiageli, 2014). Fifth, social validation data indicated that the
612 magnitude and maintained effects of REBT appear contingent on intervention dose (Visla et
613 al., 2016). As such future studies should examine and compare the acute and maintained effects
614 of REBT between different dosages (e.g., no. of contacts, total contact time).

615 Finally, and perhaps more notably, the current paper relied on the repeated
616 administration of self-report measurements, with participants completing the iPBI 19 and 20
617 times. This of course risks test fatigue and participant boredom, as the burden on participants
618 is more than if we took one pre-intervention measure and one post-intervention measure.
619 However, it is suggested in single-case design guidelines (Ottenbacher, 1986) that researchers
620 should collect at least eight baseline data points. In a recent meta-regression of SCEDs in sport
621 (Barker et al., 2020) it is specifically recommended that researchers increase the number of
622 baseline observations. So there is a disjunction between what is necessary for rigorous SCEDs,

623 and what is appropriate to ask participants to do. In the current study, we were pragmatic and
624 only repeated the measurement of the iPBI each week, and adhered to the lower guideline of
625 eight baseline data points. But with certain clients and participants, completing eight baseline
626 measure with nothing to show for it may not be acceptable. Also in relation to the self-report
627 nature of the assessment we used, social desirability has to factored into the results. In the
628 current study, to try to assuage response bias, the experimenter blinded participants from the
629 purpose of the study, participants were unaware of the selection criteria for the study, and we
630 reminded participants each time to be honest in their answers. Whilst variation in data indicates
631 non-uniformity in responses (i.e., spike in data driven by contextual factors), we cannot exclude
632 the possibility of response bias in the current study. Future research needs to formulate a
633 reliable method of ameliorating response bias, or develop ways in which irrational beliefs can
634 be measure non-psychometrically.

635 **Conclusion**

636 Match officials are seldom used as participants for sport psychology interventions
637 despite being integral to the developed of elite sport and its integrity. Acknowledging this
638 absence in the literature and the psychological challenges they are faced with, this study is the
639 first to document the application of REBT to bring about facilitative changes in irrational
640 beliefs, anxiety, decision making reinvestment, and performance in elite MOs. This study
641 contributes more evidence that the application of REBT is an effective means by which to
642 successfully reduce levels of irrational beliefs, anxiety, decision reinvestment, and in part
643 facilitate performance. Considering both the centrality of decision making for MO
644 performance, and the scrutiny officials are under (e.g., media, social media), we put forth
645 REBT as a potentially efficacious approach to equip MOs to deal with the plethora of
646 psychological challenges they will inevitably encounter.

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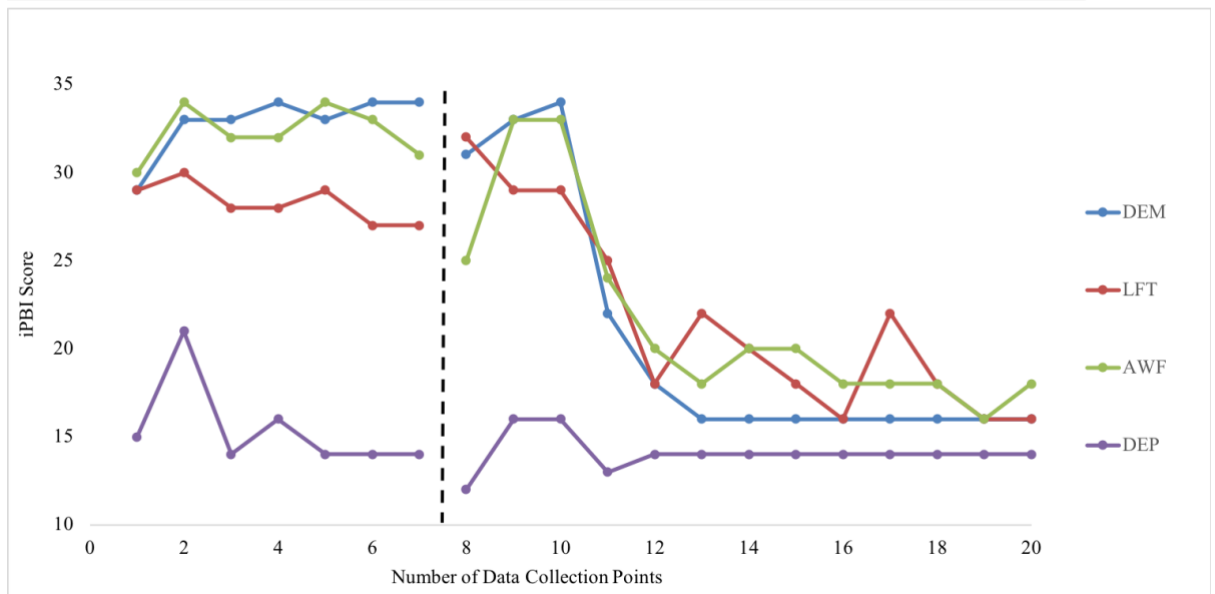
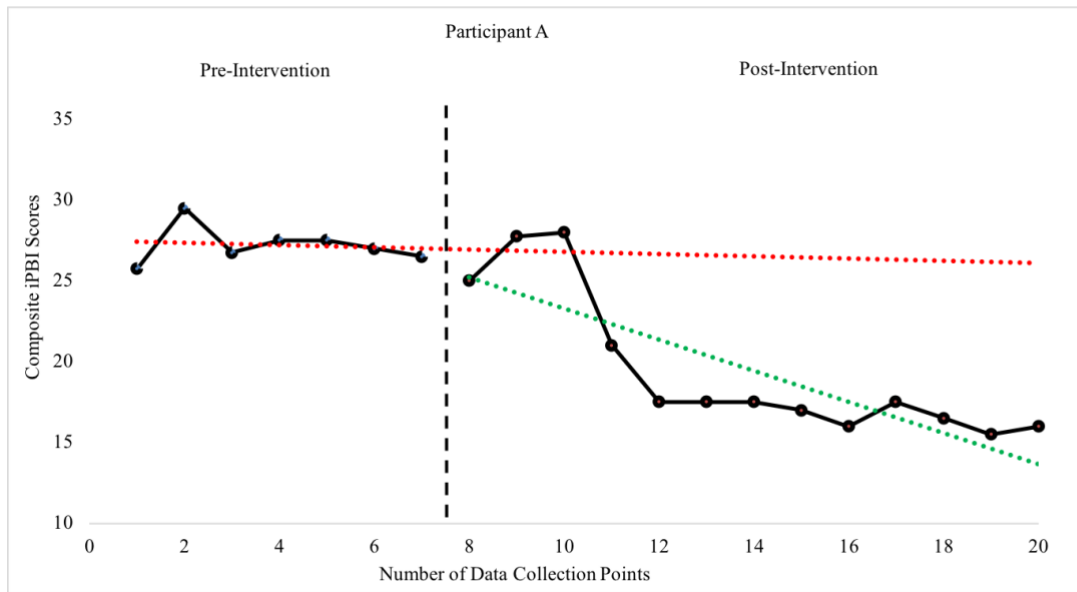
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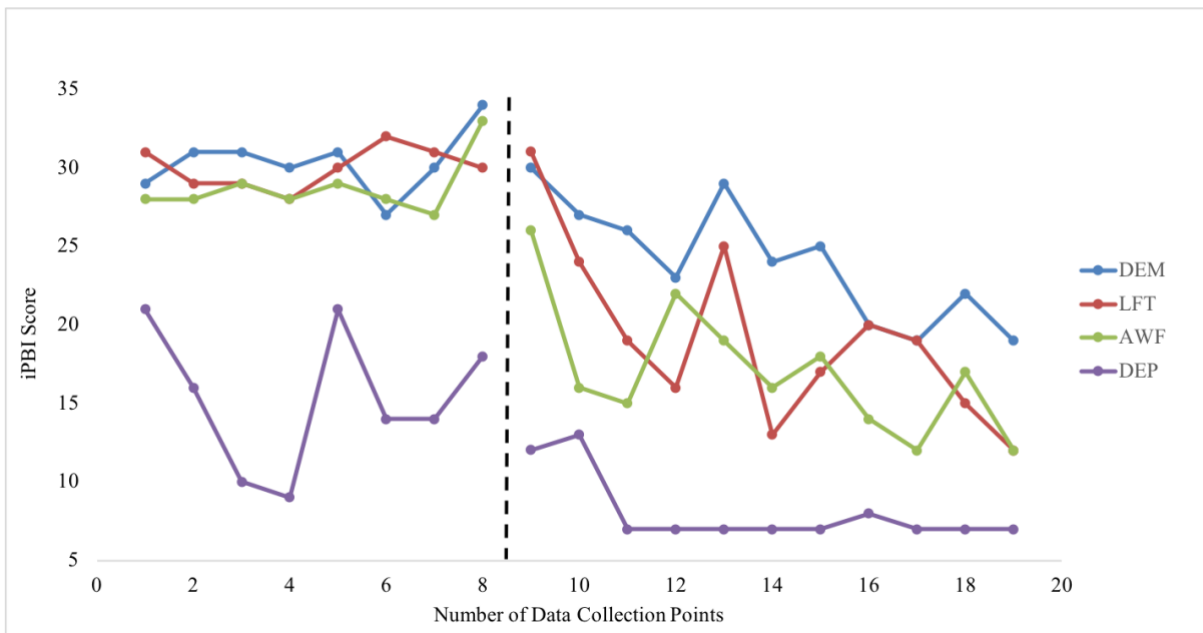
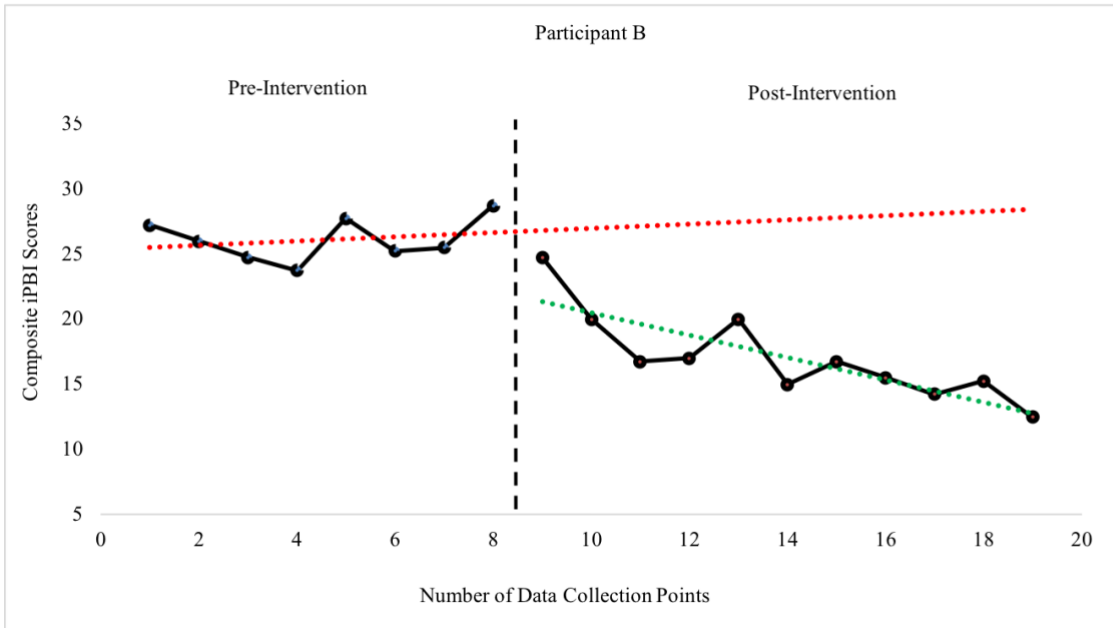
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867 Figure 1. Composite and individual irrational performance belief scores for Participants A
868 across pre-intervention and post-intervention phases.

869 Note. DEM = Demanding Beliefs, LFT = Low-Frustration Tolerance Beliefs, AWF =
870 Awfulizing Beliefs, DEP = Depreciation Beliefs. Graph legend. Dashed red line represents
871 the predicted continuation of the celeration line in the intervention phase. Dashed green line
872 represents the trend line during the intervention phase.

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875 Figure 2. Composite and individual irrational performance belief scores for Participants B
 876 across pre-intervention and post-intervention phases.

877 Note. DEM = Demanding Beliefs, LFT = Low-Frustration Tolerance Beliefs, AWF =
 878 Awfulizing Beliefs, DEP = Depreciation Beliefs. Graph legend. Dashed red line represents
 879 the predicted continuation of the celeration line in the intervention phase. Dashed green line
 880 represents the trend line during the intervention phase.

Table 1.

Mean values, standard deviations, percentage change and effect size scores for the core and composite irrational belief scores between pre-intervention phase (A), post-intervention phase (B) and 12 week follow-up time point (FU). Mean and percentage change scores have also been presented for the outcome measures of anxiety, decision reinvestment and match officiating performance for pre- and post-intervention time-points.

Participant A	<i>Pre-Intervention (A)</i>	<i>Post-Intervention (B)</i>	<i>A-B (% change)</i>	<i>A-B (Effect Size)</i>	<i>12 week Follow-up (FU)</i>	<i>A-FU (% change)</i>	<i>B-FU (% change)</i>
Demandingness	32.86 (1.77)	20.46 (7.18)	-37.74	-2.37	16	-51.30	-21.80
FI	28.29 (1.11)	21.62 (5.52)	-23.58	-1.68	24	-15.16	11.01
Awfulizing	32.29 (1.50)	21.62 (5.64)	-33.04	-2.61	20	-38.06	-7.49
Depreciation	15.43 (2.57)	14.08 (1.04)	-8.75	-0.69	14	-9.27	.57
Composite	27.21(1.78)	19.44 (4.51)	-28.56	-2.27	18.50	-32.01	-4.84
Anxiety	40.00	36.50	-8.75	N/A	N/A	N/A	N/A
Decision Reinvestment	31.33	24.00	-23.40	N/A	N/A	N/A	N/A
Performance	2.70	3.40	20.60	N/A	N/A	N/A	N/A
Participant B	<i>Pre-Intervention (A)</i>	<i>Post-Intervention (B)</i>	<i>A-B (% change)</i>	<i>A-B (Effect Size)</i>	<i>12 week Follow-up (FU)</i>	<i>A-FU (% change)</i>	<i>B-FU (% change)</i>
Demandingness	30.38 (2.00)	24.00 (3.82)	-21.00	-2.09	22	-27.58	-8.33
FI	30.00 (1.31)	19.18 (5.65)	-36.07	-2.64	19	-36.67	-.09
Awfulizing	28.75(1.83)	17.00 (4.20)	-40.87	-3.63	14	-51.30	-17.65
Depreciation	15.38 (4.53)	8.09 (2.21)	-47.40	-2.05	7	-54.49	-13.47
Composite	26.13 (1.70)	18.60 (3.40)	-28.82	-2.80	15.50	-40.68	-16.67
Anxiety	36.33	31.00	-14.70	N/A	N/A	N/A	N/A
Decision Reinvestment	50.33	41.00	-18.50	N/A	N/A	N/A	N/A
Performance	2.90	N/A	N/A	N/A	N/A	N/A	N/A