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1 Running Head: MENTAL TOUGHNESS DEVELOPMENT

2

3 An Evaluation of a Mental Toughness Education and Training Program
4 for Early-Career English Football League Referees.

5

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1 **Abstract**

2 The present study evaluated the effectiveness of a Mental Toughness Education and Training
3 Program (MTETP) in elite football officiating. The MTETP consisted of four individual and
4 two group-based workshops designed to develop Mental Toughness (MT) and enhance
5 performance in three English Football League (EFL) referees. Adopting a single-subject,
6 multiple-baseline-across-participants design, MT and referee-assessor reports were evaluated.
7 Self and coach-ratings of MT highlighted an instant and continued improvement in all three
8 referees during the intervention phases. Performance reports of all referees improved
9 throughout the intervention phases compared to the baseline phase. Social validation data
10 indicated that an array of strategies within the MTETP facilitated MT development.
11 Discussions acknowledge theoretical and practical implications relating to the continued
12 progression of MT interventions in elite sport.

13

14 *Keywords:* Mental Toughness development, elite football officiating, situational Stress
15 Inoculation Training, behavioral modelling, objective performance measures

16

1 An Evaluation of a Mental Toughness Education and Training Program (MTETP) 2 for Early-Career English Football League Referees.

3 Research on Mental Toughness (MT) and its development has traditionally focused on the
4 identification of factors that facilitate MT in athletes (see Gucciardi & Gordon, 2011, for a review).
5 Within this line of enquiry, Connaughton, Hanton, and Jones (2010) acknowledged that the
6 development of MT is a long-term process that incorporates a host of effective sporting and non-
7 sporting support networks. Thus, researchers have examined the perspectives of key support
8 personnel in a bid to further understand the role of MT in sport (e.g., parents; Coulter, Mallett, &
9 Gucciardi, 2010). Gucciardi, Gordon, Dimmock, and Mallett (2009) reported several factors that
10 coaches perceived to positively (e.g., coach-athlete relationship) and negatively (e.g., coach success
11 deemed more important than athlete success) aid the development of MT. Further, Weinberg, Butt,
12 and Culp (2011) identified strategies that developed MT and comprised a tough physical training
13 schedule, a positive mental environment, and providing awareness opportunities, when interviewing
14 US National Collegiate Athletic Association (NCAA) coaches. Echoing Weinberg et al.'s (2011)
15 findings, Driska, Kamphoff, and Armentrout (2012) highlighted effective coaching behaviors, such
16 as transformational leadership and providing task-mastery feedback, in developing mentally tough
17 swimmers.

18 Away from the athletic context, Slack, Maynard, Butt, and Olusoga (2013) provided a
19 starting point for understanding MT and its development in other active elite performers, namely
20 football officials. Notably, drawing upon a progressive definition of MT (i.e., Coulter, Mallett, &
21 Gucciardi, 2010), Slack and colleagues (Slack, Butt, Maynard, & Olusoga, 2014) built upon their
22 initial findings to identify 70 situations requiring MT in English Premier League (EPL) officiating
23 throughout five areas: pre-match, during-match, post-match, general elite refereeing, and general-
24 life. MT behaviors (e.g., looking calm and composed) and cognitions (e.g., draw upon life
25 experiences) exhibited by EPL referees within these situations were also identified. Collectively,

1 Slack et al.'s (2013; 2014) findings have enhanced the literature by conceptualising MT, its
2 components, and their development in the context of elite football officiating. Thus, these findings
3 provide the theoretical underpinning for this study along with Coulter et al.'s (2010; p. 715) MT
4 definition:

5 Mental Toughness is the presence of some or the entire collection of
6 experientially developed and inherent values, attitudes, emotions, cognitions,
7 and behaviors that influence the way in which an individual approaches,
8 responds to, and appraises both negatively and positively construed
9 pressures, challenges, and adversities to consistently achieve his or her goals.

10
11 Although most of the MT research is qualitative in nature, one area of growing scrutiny is
12 the quantitative measurement of this construct. Indeed, the current knowledge-base still remains
13 equivocal amongst scholars, with evidence questioning the psychometric properties of many
14 instruments measuring MT. One often-criticized generic measure of MT is the Mental Toughness
15 Questionnaire-48 (MTQ-48; Clough, Earle, & Sewell, 2002). The MTQ-48 was developed in
16 conjunction with Clough and colleagues' (2002) theoretical framework of MT (i.e., the 4Cs
17 model) which combined the 3Cs of hardiness (control, commitment, challenge; Kobasa, 1979)
18 with confidence. Specifically, hardiness is considered a personality trait that is influential in
19 buffering the negative effects of stress, but is rooted in health psychology. Consequently,
20 researchers have questioned the 4Cs framework's use in sport settings along with the validity of
21 the MTQ-48. Although, Perry, Clough, Earle, Crust, and Nicholls (2013) concluded that their data
22 supported the factorial validity of the MTQ-48, an analysis conducted by Gucciardi, Hanton, and
23 Mallett (2012; 2013) raised possible concerns. These concerns included an inadequate review of
24 literature, an insufficient discussion of the Confirmatory Factor Analysis (CFA), and the use of
25 inappropriate participant samples. As such, we acknowledge the conceptual and empirical
26 limitations of the MTQ-48 and the use of this measure in the present research. Hence, the MTQ-48
27 was used as an adjunct to other measurement tools, rather than as the sole and principal measure of
28 MT in the current study.

1 In line with measurement tool developments, researchers have examined the effectiveness
 2 of interventions designed to measure and develop MT in sport-specific contexts (e.g., Gordon &
 3 Gucciardi, 2011; Gucciardi, Gordon, & Dimmock, 2009a; 2009b). Notably, Bell, Hardy, and
 4 Beattie (2013) conducted a longitudinal MT intervention that aimed to enhance performance under
 5 pressure with England and Wales Cricket Board (ECB) youth players. Adopting systematic
 6 desensitization methods (Wolpe, 1958), this MT program exposed performers to a variety of
 7 repeated punishment-conditioned pressures during training (e.g., cleaning the changing rooms).
 8 The results of this two-year program supported the effectiveness of the intervention on specific
 9 psychological (e.g., Mental Toughness Inventory) and performance indicators (e.g., competitive
 10 statistics, indoor batting assessments).

11 From an elite football officiating perspective, MT interventions of this nature are necessary
 12 given the on and off-field “mentally tough” situations faced (e.g., player/s reaction to a decision,
 13 television programs highlighting mistakes) when operating across numerous domestic
 14 competitions (Slack et al., 2014). Indeed, English football referees could well officiate across as
 15 many as 10 different competitions in a single season (e.g., English Football League [EFL]
 16 Championship, The Football Association [The FA] Cup). Thus, with existing research
 17 acknowledging that MT is warranted in determining success across multiple achievement settings
 18 that include academy to senior level (Cook, Crust, Littlewood, Nesti, & Allen-Collinson, 2014),
 19 elite to international level (Jones, Hanton, & Connaughton, 2007), and training to competition
 20 (e.g., Coulter et al., 2010), further MT interventions are needed that are tailored to meet the
 21 demands experienced across multiple competitive settings (e.g., league format and knockout
 22 competition). Following Bell et al.’s (2013) recommendations, the current Mental Toughness
 23 Education and Training Program (MTETP) was underpinned by situational Stress Inoculation
 24 Training (SIT; Meichenbaum, 1993) that targeted situations requiring MT in elite football
 25 officiating (Slack et al., 2014). It is believed that situational SIT via pressurized role-play and

1 behavioral modelling methods (social learning theory; Bandura, 1971), coupled with the use of
 2 Cognitive-Behavioral Therapy techniques (e.g., Acknowledge, Rationalize, Change; A.R.C; Neil,
 3 Hanton, & Mellalieu, 2013), would develop referee-specific MT attributes, behaviors, and
 4 cognitions (Slack et al., 2013; 2014) and enhance performance.

5 The present study adopted a single-subject, multiple-baseline-across-participants design
 6 similar to that employed in existing performance excellence research (e.g., Thomas, Maynard, &
 7 Hanton, 2007). This type of investigation enables the visual assessment of subtle positive
 8 behavioral, emotional, and cognitive changes in sport performers that might go undetected in
 9 nomothetic, group-based designs (McDougall, 2013). Likewise, ideographic designs allow
 10 individualized interventions tailored to performers in modern-day, elite-level sport (e.g., Bell,
 11 Skinner, & Fisher, 2009). Notably, support for long-term multimodal interventions intended to
 12 enhance factors associated with sporting excellence and improve performance is evident (see
 13 Barker, Mellalieu, McCarthy, Jones, & Moran, 2013, for a review). Indeed, the need for
 14 interventions of this nature are reflected within existing MT research (e.g., Gordon & Gucciardi,
 15 2011; Hardy, Bell, & Beattie, 2013). Thus, evaluating a MTETP in conjunction with referee-
 16 assessor performance reports over the course of an EFL season might further enhance the
 17 understanding of MT development in elite sport.

18 The collection of The FA match-day referee-assessor reports provide an ecologically valid
 19 competitive indicator which has seldom been evaluated in current MT interventions. In doing so,
 20 this will overcome a drawback of previous experimental-based studies regarding the effective
 21 transferability of results into applied football refereeing settings (e.g., Catteeuw, Helsen, Gilis,
 22 Van Roie, & Wagemans, 2009). Specifically, The FA match-day referee-assessor report is
 23 designed to objectively evaluate the on-field performance of referees against a stringent marking
 24 guide and list of competencies (e.g., application of the Laws of the Game and disciplinary control,
 25 management of game and players). It should be noted that in becoming an FA registered match-

1 experience at this level (i.e., National list). All participants who agreed to participate in the study
 2 gave their informed consent.

3 **Dependent Variables**

4 **Sport-general Mental Toughness.** As previously mentioned, although MT research in
 5 elite football officiating is now emerging (e.g., Slack et al., 2014), there is scant literature
 6 examining the effectiveness of MT interventions in this area. As such, there is no MT
 7 questionnaire specific to football refereeing at present. Therefore, due to an overlap of MT
 8 attributes between Slack and colleagues (Slack et al., 2013) and Clough and colleagues (Clough et
 9 al., 2002) 4Cs model of MT (i.e., challenge, commitment, confidence, control), the MTQ-48 was
 10 deemed an appropriate measure to use for this study. It is important to note that support for the
 11 construct and predictive validity of the MTQ-48 (Perry et al., 2013) in recent sport psychology
 12 literature and the implementation of this questionnaire with athletes in this specific sporting
 13 context (i.e., English football; Crust, Nesti, & Littlewood, 2010), would also warrant the use of
 14 this instrument. Given that the MTQ-48 is grounded in a trait conceptualisation of MT (Clough et
 15 al., 2002), this tool was administered to referees and the coach on only one occasion throughout
 16 the baseline phase (August, 2012). The MTQ-48 is designed to measure MT in a sport-general
 17 context and is a 48-item measure that comprises six subscales: (a) challenge (e.g., challenges
 18 usually bring out the best in me), (b) commitment (e.g., I don't usually give up under pressure), (c)
 19 control of emotions (e.g., even when under considerable pressure I usually remain calm), (d)
 20 control of life (e.g., I generally feel that I am in control of what happens in my life), (e) confidence
 21 in own abilities (e.g., I am generally confident in my own abilities), and, (f) interpersonal
 22 confidence (e.g., I usually take charge of a situation when I feel it is appropriate). The items are
 23 rated on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. During
 24 the intervention phase the MTQ-48 was administered three times (October, 2012; January, 2013;
 25 April, 2013).

1 **Referee-specific Mental Toughness.** Developed from Slack et al.'s studies (2013; 2014),
 2 football referee-specific measures of MT attributes, behaviors, and cognitions were issued to gain an
 3 evaluation of MT during performance. These measures was completed by referees after each EFL
 4 match undertaken. This three-part self-report instrument was rated on a 10-point Likert scale
 5 ranging from 1 = very poor to 10 = excellent. First, the MT attributes report-instrument consisted of
 6 21-items measuring seven MT attributes (Slack et al., 2013): (a) achievement striving (i.e., being the
 7 best referee you can be, striving for the next level of promotion, and setting high refereeing
 8 performance goals), (b) coping with pressure (i.e., maintaining a consistent level of high
 9 performance, coping with match-day pressures, and dealing with media scrutiny), (c) high work-
 10 ethic (i.e., giving 100% in every game, making every effort to enhance performance, and working
 11 hard to attain performance goals), (d) resilience (i.e., overcoming performance setbacks, not
 12 dwelling on decisions, and bouncing-back from a poor performance), (e) robust self-belief (i.e., trust
 13 in decision-making, strong self-belief, and having courage in convictions), (f) sport intelligence
 14 (i.e., having a feeling for the game, being a shrewd referee, and having an awareness of players'
 15 ability), and, (g) tough attitude (i.e., being fully-focused on performance, make sacrifices, and make
 16 tough refereeing decisions). Second, the MT behaviors report-instrument measured seven items
 17 (Slack et al., 2014): (a) act as a barrier between players, (b) clear commands and signals, (c) create
 18 on-field time for yourself, (d) looking calm and composed, (e) make eye-contact with player/s, (f)
 19 strong body language, and, (g) work hard [18 yard] box-to-box. And third, the MT cognitions
 20 report-instrument measured 10 items (Slack et al., 2014): (a) awareness of own emotions, (b)
 21 awareness of players' emotions, (c) block-out crowd noise, (d) draw upon life experiences, (e) draw
 22 upon refereeing experiences, (f) focus in blocks of fifteen minutes, (g) focus on the next decision,
 23 (h) park-up/bin a decision, (i) tactical awareness, and, (j) trust in decisions.

24 **Referee performance outcomes.** The FA match-day referee-assessor report used on
 25 officials evaluates four performance outcomes: (a) application of the Laws of the Game, and

1 disciplinary control during competition (e.g., decision-making accuracy), (b) management of game
 2 and players (e.g., match and emotional temperature control), (c) teamwork with match-officials
 3 (e.g., verbal and nonverbal communication, alertness, and awareness), and, (d) fitness, positioning,
 4 and movement on the field-of-play. All assessor reports merge all four performance outcomes into
 5 one overall score and is rated on a scale of 5.0-5.9 = very poor performance, 6.0-6.9 = poor
 6 performance, 7.0-7.9 = disappointing performance, 8.0-8.4 = good performance, 8.5-8.9 = very
 7 good performance, 9.0-10 = excellent performance.

8 **Intervention Design and Procedure**

9 The present study employed a single-subject, multiple-baseline-across-participants design
 10 to evaluate a MTETP in early-career EFL referees. This intervention occurred over the EFL 2012-
 11 2013 season and consisted of two phases: (a) baseline phase, and, (b) intervention phase. Given
 12 that the study contained two dependent variables (i.e., MT and performance), the team of
 13 researchers made an a priori decision to sequentially implement the intervention at specific
 14 junctures (Thelwell, Greenlees, & Weston, 2006). Therefore, the staggered multiple-baseline-
 15 across-individuals intervention phase, for Referee A, was started after three competitive EFL
 16 matches, Referee B received the intervention after match four, and Referee C received the
 17 intervention after match five. Following recommendations by Callow, Hardy, and Hall (2001),
 18 each participant received the intervention for the same number of EFL matches (18 matches) in an
 19 effort to control for threats to internal validity (e.g., type II error). Following this, the time taken to
 20 complete the intervention phase for Referee A was 203 days, 197 days for Referee B, and 189
 21 days for Referee C. Throughout the baseline phase, no MTETP was provided to the referees.
 22 During the intervention phase, referees received the MTETP which consisted of six workshops
 23 delivered monthly that included four individual-based ($M_{hours} = 2.33$) and two group-based
 24 elements ($M_{hours} = 3.56$) (see Table 1). The first author was the primary lead on all 14 workshops.
 25 Therefore, all the workshops were audio recorded and examined by the first author to ensure a

1 self-reflective process was undertaken (Knowles, Katz, & Gilbourne, 2012). Five pilot workshops
 2 were conducted with three youth referees independent to this study over an eight week period
 3 (May to June, 2012) prior to the start of the 2012-2013 EFL season and evaluated by the research
 4 team. As a result of this critique, numerous modifications were made to the timing, content, and
 5 structure of the MTETP in an effort to maximize its effectiveness (e.g., integration of EPL and
 6 EFL refereeing video footage; pressure-based role-play activities).

7 Sport psychology research have recently identified the value of social validation when
 8 examining intervention effects specifically within single-subject designs (Page & Thelwell, 2013).
 9 Therefore, referees and the coach's subjective accounts of the MTETP were gathered three weeks
 10 after the intervention was completed (May, 2013) by way of an open-ended Social Validation
 11 Questionnaire (SVQ). It was anticipated that understanding and detailing the impact that the
 12 MTETP had on refereeing performance would provide further support for the evaluation of the
 13 intervention's effectiveness. Following the recommendations of Martin, Thompson, and Regehr
 14 (2004), the open-ended SVQ was structured into three key sections: (a) thoughts about the aims,
 15 content, and structure of the MTETP, (b) how the MTETP and the workshops have affected the on-
 16 field performance of each referee, and, (c) the potential development areas of the MTETP and the
 17 workshops therein.

18 **Data Analysis**

19 The aim of the present study was to examine changes in MT and performance mean
 20 average scores of EFL referees across the baseline phase and early, middle, and late intervention
 21 phases. In accordance with recent single-subject design research (e.g., Neil et al., 2013), data
 22 analysis procedures were separated into three specific stages. First, referees MT and performance
 23 scores were plotted for each match over the course of the 2012-2013 EFL season. This protocol
 24 comprised: (a) the immediacy of an effect following the intervention, (b) the size of the effect after
 25 the intervention, (c) the number of times that effect was replicated across referees, where the

1 increased consistency indicates a generalized pattern of the experimental effect, and, (d) the
 2 number of overlapping data points between the pre-intervention and post-intervention phases,
 3 where the lack of overlapping data points supports the effectiveness of the intervention.

4 Second, descriptive statistics were tabulated to determine whether an experimental effect
 5 had occurred. As such, the means, standard deviations, and mean difference scores of self and
 6 coach-ratings were calculated for all MTQ-48 subscales across baseline and intervention phases.
 7 When calculating an effect for single-subject design research, Percentage of Non-overlapping Data
 8 (PND) methods have been extensively used (e.g., Schlosser, Lee, & Wendt, 2008). This particular
 9 method, calculates the number of data points in the intervention phase above the highest data point
 10 in the baseline phase (Gage & Lewis, 2013). Scruggs and Mastropieri (2001) indicated that PND
 11 scores of 90%-100% signify very high experimental effect, 70%-90% signify high experimental
 12 effect, 50%-70% signify moderate experimental effect, and below 50% signify low experimental
 13 effect. Thus, means, standard deviations, mean difference scores, and number/percentage of non-
 14 overlapping data points were calculated for all referee-specific MT measures and performance
 15 scores for each match across the baseline phase and all intervention phases. Third, social validation
 16 evaluation procedures were undertaken. As part of this process, each participant was asked to
 17 individually complete and return the SVQ via email at a time most convenient to each participant. In
 18 total, 12 independent statements were extracted from the text of the open-ended SVQs. Slight
 19 amendments to the text were made by the first author to aid the flow of the SVQ statements. Each
 20 statement was then inductively content analyzed (Patton, 2002) by two researchers. Three meetings
 21 were held between the two researchers until all nine themes were established and consensus had
 22 been reached on all statements (Lincoln & Guba, 1985).

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Results

Sport-general Mental Toughness

All three early-career EFL referees reported higher MTQ-48 mean average scores for total MT in the intervention phase compared to the baseline phase (see Table 2). Referee A’s total MT score increased by .11, Referee B’s score increased by .66, and Referee C’s increased by .32. In addition, when inspecting the six MTQ-48 subscales, Referee A reported positive changes in four subscales (i.e., commitment, control of emotions, confidence in own ability, and interpersonal confidence), Referee B in five subscales (i.e., all but control of life), and Referee C in five subscales (i.e., all but commitment). Taken together, only three negative changes of the MTQ-48 subscales across all three referees were reported at the late intervention phase (Referee A: challenge, control of life; Referee C: commitment). The coach of all three referees also reported higher MTQ-48 mean average scores for total MT in the intervention phase compared to the baseline phase (see Table 3). The coach-report of Referee A’s total MT score increased by .19, Referee B’s score by .52, and Referee C’s increased by .23. In addition, when inspecting the six MTQ-48 subscales, the coach-report of Referee A acknowledged positive changes in three subscales (i.e., commitment, control of emotions, and confidence in own ability), Referee B in all six subscales, and Referee C in five subscales (i.e., all but control of emotions). In sum, the only negative change of the MTQ-48 subscales across all three referees was reported by the coach at the late intervention phase (Referee A: interpersonal confidence).

Referee-specific Mental Toughness

All three early-career EFL referees reported positive changes on all football referee-specific MT attribute, behavior, and cognition measures at the late intervention phase compared to the baseline phase. As a result, seven out of the nine PND points calculated at baseline and across intervention phases were greater than 70% and signified high experimental effects (see Table 4; Total Intervention). In addition, two officials reported higher mean average MT attribute

1 ratings across early, middle, and late intervention phases compared to the baseline phase (see
 2 Figures 1, 2, and 3). In total, Referee A reported a negative change of .12 with seven non-
 3 overlapping data points (PND score of 38.9%; low experimental effect), Referee B had a positive
 4 change of 1.05 with 18 non-overlapping data points (PND score of 100%; very high experimental
 5 effect), and Referee C had a positive change of .39 with 14 non-overlapping data points (PND
 6 score of 77.8%; high experimental effect).

7 All three participants reported higher mean average MT behavior ratings across all
 8 intervention phases compared to the baseline phase (see Figures 1, 2, and 3). Referee A reported a
 9 positive change of .97 with 17 non-overlapping data points (PND score of 94.4%; very high
 10 experimental effect) post-intervention. Referee B had a positive change of .16 with nine non-
 11 overlapping data points (PND score of 50%; moderate experimental effect), and Referee C had a
 12 positive change of .59 with 13 non-overlapping data points (PND score of 72.2%; high
 13 experimental effect). Finally, all three officials reported higher mean average MT cognition ratings
 14 across early, middle, and late intervention phases compared to the baseline phase (see Figures 1, 2,
 15 and 3). Overall, Referee A and B reported a positive change of .71 with 14 non-overlapping data
 16 points (PND score of 77.8%; high experimental effect), and Referee C had a positive change of .77
 17 with 17 non-overlapping data points (PND score of 94.4%; very high experimental effect).

18 **Referee Performance Outcomes**

19 All three early-career EFL referees reported higher mean average match-day assessor
 20 performance scores across all intervention phases compared to the baseline phase (see Table 4;
 21 Figures 1, 2, and 3). Specifically, Referee A reported a positive change of .04 with 10 non-
 22 overlapping data points (PND score of 55.6%; moderate experimental effect), Referee B had a
 23 positive change of .16 with 13 non-overlapping data points (PND score of 72.2%; high
 24 experimental effect), and Referee C had a positive change of .09 with 10 non-overlapping data
 25 points (PND score of 55.6%; moderate experimental effect).

1 **Social Validation**

2 The social validation procedures attempted to build upon the aforementioned quantitative
3 data by adding subjective accounts of the effectiveness of the MTETP. All three referees and
4 their coach provided 12 pages of type-written responses to the open-ended SVQ. In doing so, this
5 has strengthened the evaluation of the MTETP’s effectiveness on early-career EFL referees.
6 These findings are illustrated below within the three key sections of the SVQ.

7 **Aims, Structure, and Content of the MTETP.** All three referees suggested that the
8 implementation of video footage taken from recent matches had positive effects on MT and
9 performance. In particular, by drawing upon specific situations during competition that required
10 MT, referees were able to assess their MT behaviors and those of others more successfully. One
11 early-career EFL referee reported how he was able to adopt greater levels of self-analysis of
12 performance via the use of video footage:

13 During all the workshops there has been a clear structure and opportunity for me to
14 develop my own understanding of the MTETP. This has enabled constructive
15 learning opportunities, which has made me more aware of my methods and practices
16 and how they can be improved. Using video footage from my own games gave me
17 the opportunity to self-analyze and made me more conscious of my own actions.
18 (Referee C)

19
20 Building upon the pilot workshops, an amendment to the MTETP was the introduction
21 of two pressure-based role-play activities (workshops three and five). In both role-play
22 exercises, referees described the nature of the activity, the pressure experienced, and
23 what they subsequently learnt under such pressures during the debrief, for example:

24 The on-field role-play was a great idea and worked really well. There was plenty of
25 conflict to manage and difficult individuals to control. I personally benefitted from
26 the idea of better identifying a troublesome individual. In my game there was a
27 player whose role was to commit several offences and I didn't spot this until it was
28 brought to my attention in the debrief. (Referee B)

29
30 Not only did the MTETP prove beneficial for the referees, but also the referee coach. As
31 depicted the extract below, this intervention alleviated any scepticism about the nature of the

1 MTETP, provided further support of improvements in performance, and enhanced the referee-
2 coach relationship:

3 The main benefit I found as a coach was being able to work more closely on a one-
4 to-one basis with the individuals involved in my group. This enabled me to search
5 out the individual needs of each referee to help them be more professional in their
6 preparation both on and off-the-field to development MT. (Coach)
7

8 **The MTETP and its Impact on Performance.** Enhancing levels of self-reflection in
9 participants was one central procedure within the MTETP. As a result, referees noted that
10 throughout the season-long intervention they all perceived themselves to be more reflective
11 post-competition. In part, one early-career referee highlighted this enhanced level of
12 reflection in the following statement:

13 I've found all the workshops very beneficial and it has enabled me to develop my
14 game through greater reflection of my actions and actions taken by others. It has
15 made me reflect upon my performances much more and I now keep a log of games
16 with a few strengths and areas of improvement to remind myself before the next
17 and future games. (Referee A)
18

19 It was not a surprise that improved self-confidence as a referee was highlighted in the
20 social validation data. This finding was also reflected in the aforementioned results (see Table 2).
21 However, unique to this study was that the MTETP also enhanced levels of match-day team of
22 officials' confidence. As a result, referees noted that throughout the MTETP they perceived
23 themselves and their teams to be more confident in their abilities when undertaking their role-
24 specific duties in football (i.e., referee, assistant referees, and fourth-official). For example, one
25 referee highlights this enhanced level of team confidence prior to kick-off:

26 The program provided an understanding on how pre-match preparation on the day
27 is vitally important, so you get the best out of the officials you are working with
28 and deliver the best performance possible. This is through having routines that are
29 more or less identical each week, as it will breed confidence and will relax the
30 team while keeping them focused on the task ahead. (Referee B)
31

32 Finally, workshop four outlined various MT cognitions associated with elite football
33 refereeing. In doing so, the cognitive refocusing strategies offered within the MTETP highlighted
34 the mechanisms involved for staying focused during competition. These strategies and the

1 subsequent impact of these strategies were thoroughly conveyed by all three referees. One
2 referee highlighted the use of these strategies during the half-time period of a match:

3 A couple of refocusing strategies that have helped me since being involved in the
4 MTETP are parking up the decision up by picturing a bin and seeing the bigger
5 picture rather than one mistake. I definitely feel that I have moved on as a referee
6 since the start of the season as these strategies have helped with my self-belief. At
7 half-time it also gives the opportunity to refocus, self-analyze, and regroup as a
8 team, this is important as you can't dwell on decisions as the next decision is the
9 most important. (Referee B)

10
11 **Future development of the MTETP.** Building upon the pilot workshops, additional
12 SVQ feedback was provided in an effort to further enhance the MTETP. Central to this feedback,
13 two factors appeared most prominent. The first factor was the applied nature of the MTETP and
14 the second factor was the further development of on-field role-play pressure training. Although
15 the design of this intervention was relatively workshop-based, all three referees and their coach
16 suggested not only that should this continue throughout the course of next season (i.e., EFL
17 2013-2014 season), but also that the MT consultants involved should observe live performances
18 when further developing MT components. For example:

19 To better analyze the benefits of the program and to develop the performance
20 levels of the referees, I feel that the program should run for a minimum of two
21 seasons. As a result, it would be better for the development of the referees and to
22 better put the theoretical advice into practice if MT consultants were able to attend
23 games, possibly alongside the referee's coach. (Coach)

24
25 And finally, referees also stipulated that they would have liked to have seen the format of
26 workshop three amended slightly in a bid to maximize its effectiveness. As highlighted in the
27 following statement, this would then allow them to discuss the most prominent issues relating to
28 the initial role-play exercise, and then repeat the same exercise to develop MT behaviors further:

29 Video a referee in a set-play situation with a set limit of two minutes to see how
30 they react in that environment. Once the time limit is up, the referee will accompany
31 a sport psychologist and analyze the footage and identify areas for development.
32 The official then goes back and referees the same incident to try and adapt their
33 game by having to deal with new challenges and therefore having to use previous
34 experiences to make the correct decisions. (Referee A)

35
36

Discussion

The MTETP was an intervention designed for referees competing in modern-day, elite-level English football. A unique element that underpinned the MTETP was the identification and inclusion of behavioral and cognitive MT components specific to elite football officiating (Slack et al., 2014). Overall, all three referees and their coach reported positive changes in MTQ-48 and referee-specific MT attribute, behavior, and cognition measures across all intervention phases compared to the baseline phase. In particular, when visually inspecting referee-specific MT data across all intervention phases (i.e., early, middle, and late intervention), higher mean average differences in comparison to the baseline phase were evident at the late intervention phase (see Table 4). This is an important finding given Barker et al.'s (2013) suggestion that greater levels of confidence can be placed in the effectiveness of an intervention of this nature when improvements are replicated across participants.

Although clear improvements in most dependent variable measures across all referees were evident, on a few occasions relatively low match-day assessor performance scores were coupled with a decline in MT cognition self-ratings (see Figures 1 and 2). This raises an important issue within existing MT literature regarding the fluctuation of MT components during sub-optimal performances (Jones et al., 2007). Thus, MT is a psychological construct that once its components have been developed, might also need to be continually maintained and monitored in order to prevent decline. As a result, these findings support previous literature examining the trait and state dimensions of MT (e.g., Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015), and confirms that MT is both stable and dynamic in nature. By adapting Gucciardi, Gordon, and Dimmock's (2009c) process model of Mental Toughness to further examine referee-specific situations requiring MT during competition (e.g., being faced with multiple situations, on-field location of situations) and the use of MT components might well be a worthwhile endeavour. Indeed, having knowledge of the MT components deployed when approaching, appraising, and responding to these referee-specific

1 situations might further enhance the contextual understanding of competition-type demands (e.g.,
 2 returning to a perceived “bogey” ground, performing in a challenging stadium) and MT coupling of
 3 cognitions and behaviors that might elicit MT growth (Slack et al., 2014).

4 Throughout the course of the eight month intervention the social validation data also
 5 provided additional support for the effectiveness of the MTETP. Indeed, advancing current MT
 6 literature (e.g., Gucciardi et al., 2009; Weinberg et al., 2011), not only were there numerous
 7 positive factors reported within an EFL officiating context, but also from a coaching perspective as
 8 well (e.g., enhanced referee-coach working alliance, richer coaching philosophy, greater
 9 appreciation of impact of sport psychology). Therefore, when implementing long-term MT
 10 interventions, future MT programs should inform referees’ coaches of MT attributes, behaviors,
 11 and cognitions in football officiating. This finding offers further support for the possible benefits
 12 of coach MT profiling that has been previously reported in an athlete-coach context (Gucciardi et
 13 al., 2009a; 2009b). Also, building upon the pilot workshops, several factors relating to the
 14 MTETP’s impact on MT components and performance in early-career EFL referees are unique to
 15 the present study. In particular, parking-up decisions during live play and refocusing strategies
 16 during half-time are important findings that extend the MT research and further acknowledge the
 17 need to understand the timing of and breaks (i.e., when play stops) in competition when deploying
 18 specific MT cognitions and behaviors (Slack et al., 2014).

19 **Applied Implications for Mental Toughness Consultants**

20 All video footage used within the MTETP was taken from matches during the English
 21 football 2012-2013 season and thus, enabled each referee to gain an immediate insight into MT
 22 behaviors deployed. In particular, drawing upon behavioral modelling methods (social learning
 23 theory; Bandura, 1971), the second workshop challenged referees to reflect on MT behaviors
 24 demonstrated at the EPL level, and also on their applicability to level one, which was the level at
 25 which each referee was currently officiating. In doing so, workshop six allowed referees to

1 evaluate their own matches and stimulate thorough group discussion on the recent successful
 2 deployment of MT behaviors. As a result, constant positive changes in MT behaviors as well as
 3 performance were reported across all intervention phases. This finding, therefore, addresses recent
 4 calls regarding the successful development of effective, performance-based officiating training
 5 strategies (e.g., Gilis, Helsen, Catteeuw, Van Roie, & Wagemans, 2009). In an attempt to increase
 6 the amount and frequency of behavioral modelling training, coupled with immediate multi-source
 7 feedback, officials who specialize in their preferred roles (e.g., referee, assistant referee) early in
 8 their careers might benefit the most. Supporting expert performance literature (e.g., Ericsson,
 9 Charness, Feltovich, & Hoffman, 2006), this suggestion has important implications for the off-
 10 field MT training and development of future EPL officials. Indeed, like athletes, for officials to
 11 acquire the extensive hours of deliberate practice in pursuit of officiating excellence, this symbolic
 12 visual-based training whereby observing, monitoring, and evaluating MT behaviors is central,
 13 might well constitute a significant proportion of these hours.

14 It was evident from the quantitative and social validation data that workshops five and six
 15 enhanced MT components. These two workshops were conducted at the late intervention phase of
 16 the MTETP in which the highest mean average differences in referee-specific MT measures were
 17 reported when compared to the baseline phase (see Table 4). These high-pressurized workshops
 18 were environmentally engineered for the “business-end” of the EFL season (March and April
 19 2013) to facilitate a two-tiered reflective process that included self and group reflection on their
 20 deployment of MT components (Knowles et al., 2012). This process allowed referees to identify
 21 notable strengths and development points from a peer, coach, and sport psychology perspective
 22 and take this knowledge into their remaining matches. These task-mastery orientated workshops
 23 targeting MT development for pivotal times of competition (e.g., the run-in at the end of the EFL
 24 season; April 2013-May 2013), might well set the current benchmark in the timing of, exposure to,
 25 and evaluation of pressure training in elite football officiating. This suggestion supports existing

1 situational SIT research (i.e., Meichenbaum, 1993) by acknowledging that the application of
 2 pressure training methods should be implemented “in-situ” at a time of high psychological and
 3 performance output, and thus, strengthening performers’ coping skills over this critical period.
 4 Taken together, future MT interventions are encouraged to integrate similar situational SIT
 5 methods, for example, acute time-limited pressure training (e.g., sequential decision-making under
 6 uncertainty, having to defend unexpected evaluations on levels of fitness, professionalism, and
 7 performance) and/or chronic intermittent pressure training (e.g., repetitive physical fitness and
 8 sprint tests) at times of high competitive demand.

9 MT consultants should build upon the tailored one-to-one workshops and integrate them at
 10 specific intervals throughout the EFL season (e.g., pre-season, Christmas period, post-season) in an
 11 effort to maximize their effectiveness. From a structural standpoint, the implementation of
 12 roadmap goal-setting (Vidic & Burton, 2010), applied relaxation, and hypothetical “what-if”
 13 scenarios should take place during pre-season in a bid to develop effective individualized Pre-
 14 Performance Routines (PPR; Cotterill, 2010). The referee-specific MT profile evaluated
 15 throughout this study should build upon Slack et al.’s research (2014) to evaluate MT components
 16 across two other key performance areas (i.e., pre-match and post-match) as well as the two off-
 17 field areas (i.e., refereeing-general and general-life) throughout the competitive season. This
 18 format follows recommendations set by Gucciardi and Gordon (2009) when outlining that
 19 additional profiling information can be gathered throughout particular situations whereby MT
 20 components are deemed most important. Furthermore, future MT interventions that continue to be
 21 effective in MT development and performance enhancement might implement other key facets
 22 (e.g., technical, organisational) alongside the psychological in the continued development of this
 23 football referee-specific profile.

24

25

1 **Limitations**

2 Three limitations were apparent within this MT intervention. First, a greater level of
 3 stability of multiple baseline measures as well as the implementation of a maintenance phase
 4 would have strengthened the overall evaluation of the MTETP. Following on from this suggestion,
 5 future long-term MT interventions should provide enhanced baseline stabilization as well as
 6 retention data that follows an ABA single-subject design. We acknowledge that there is no
 7 validated MT measure specific to football officiating. Consequently, this study implemented
 8 measures adapted from current MT findings in elite football officiating (Slack et al., 2013; 2014).
 9 Therefore, further research is warranted to establish a psychometrically sound and practical MT
 10 measure specific to this sporting context. Finally, it is important to recognize the limitations of the
 11 idiographic design used in this study. Accordingly, future MT research in a football refereeing
 12 context could adopt an experimental-control group design, which has previously been employed in
 13 MT interventions with athletes (e.g., Bell et al., 2013; Gucciardi et al., 2009a).

14 **Conclusion**

15 The purpose of this study was to evaluate the effectiveness of a MT intervention in early-
 16 career, level one EFL referees. From a theoretical perspective, the findings of this intervention
 17 provide support for the effectiveness of the MTETP on MT development and performance
 18 enhancement. Our MTETP is one of few interventions within the literature to investigate MT in
 19 conjunction with objective performance outcomes in elite sport. From an applied perspective,
 20 future guidelines for National Governing Bodies, coaches, and MT consultants on the effective
 21 integration of MT education and training in elite football officiating are also presented. In
 22 summary, the findings provide a solid conceptual foundation for future research to further develop
 23 a MTETP for EFL referees.

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1 **Figure and Table Captions**

2 *Figure 1.* Mental Toughness attribute, behavior, cognition, and referee-assessor
 3 performance scores for Referee A.

4 *Figure 2.* Mental Toughness attribute, behavior, cognition, and referee-assessor performance
 5 scores for Referee B.

6 *Figure 3.* Mental Toughness attribute, behavior, cognition, and referee-assessor performance
 7 scores for Referee C.

8 *Table 1.* A summary of the Mental Toughness Education and Training Program (MTETP) delivered
 9 to each referee throughout the course of the 2012-2013 English Football League season.

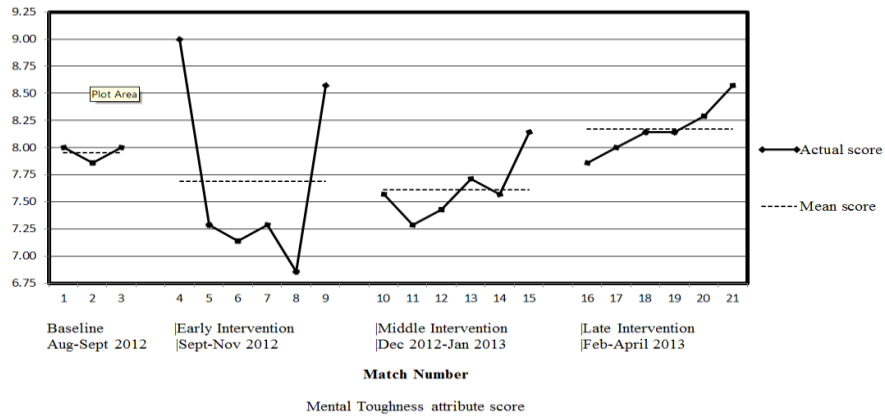
10 *Table 2.* Means (*SD*) for subscales of the Mental Toughness Questionnaire-48 throughout the
 11 Mental Toughness Education and Training Program (MTETP): Difference in Mental
 12 Toughness self-reports between the baseline phase and intervention phases for each referee.

13 *Table 3.* Means (*SD*) for subscales of the Mental Toughness Questionnaire-48 throughout the Mental
 14 Toughness Education and Training Program (MTETP): Difference in Mental Toughness
 15 coach-reports between the baseline phase and intervention phases for each referee.

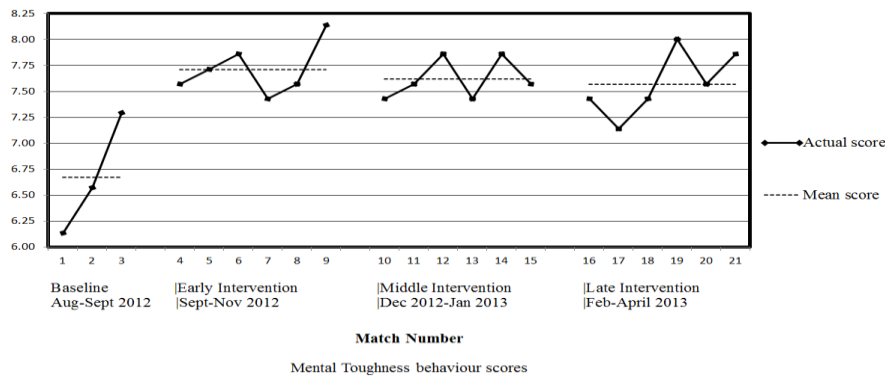
16 *Table 4.* Means, mean difference scores, and number of non-overlapping data points (%) across
 17 baseline and intervention phases for each referee.

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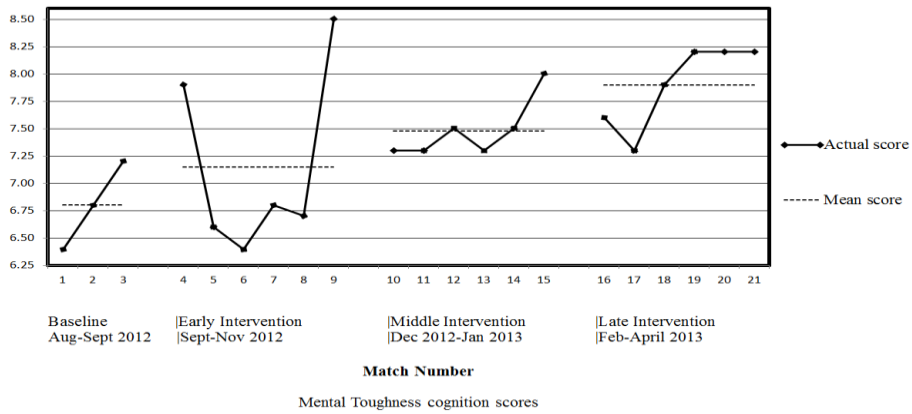
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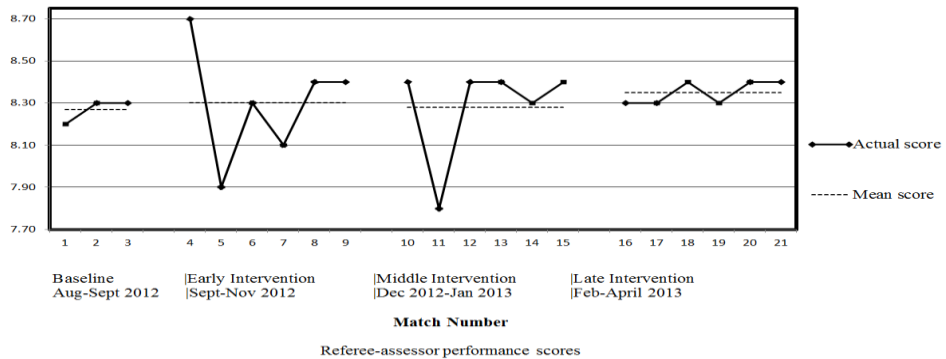
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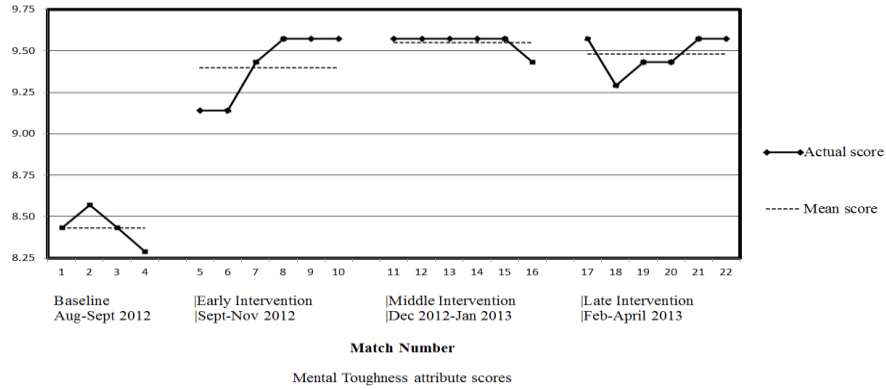
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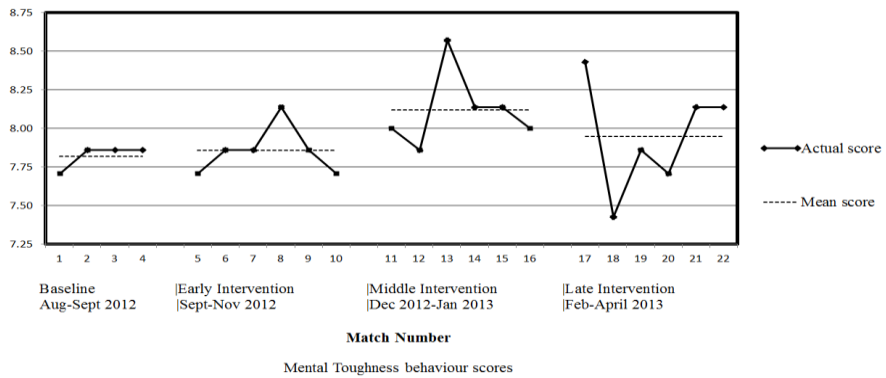
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Figure 1. Mental Toughness attribute, behavior, cognition, and referee-assessor performance scores for Referee A.

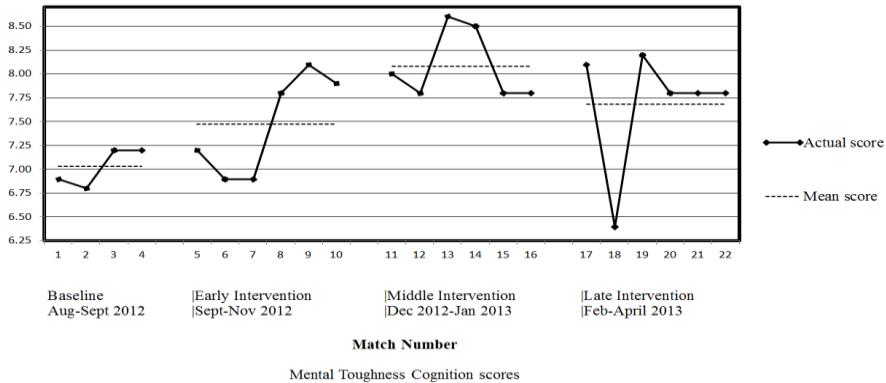
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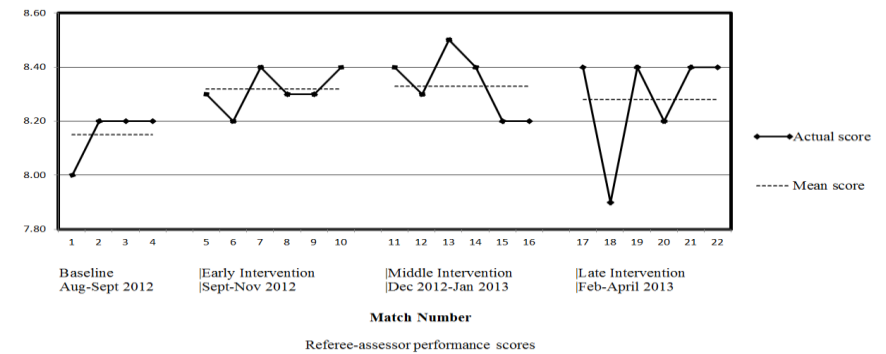
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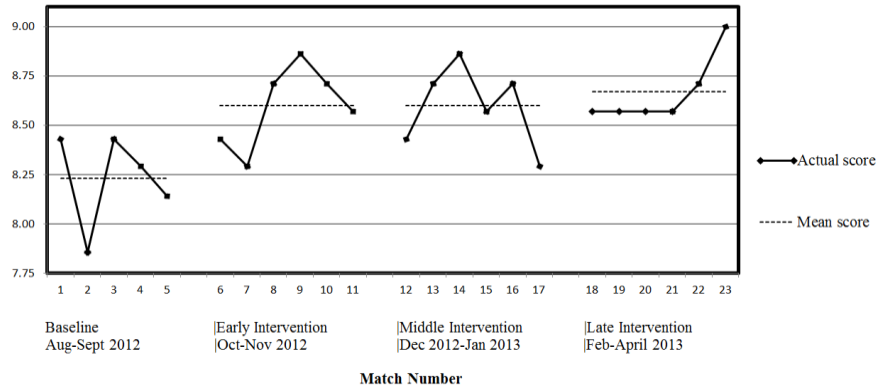
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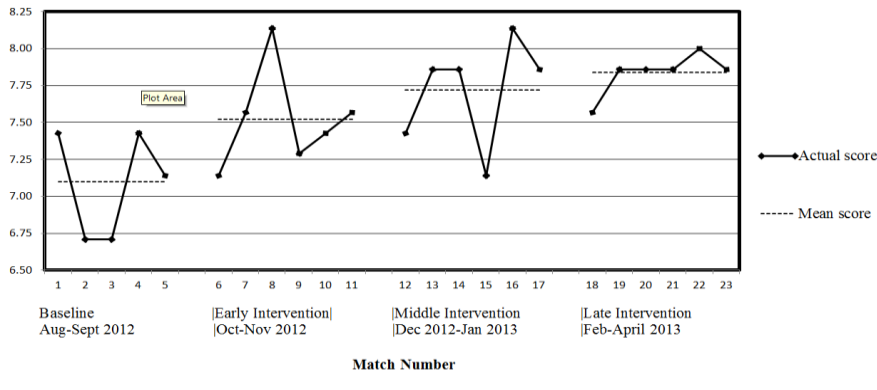
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Figure 2. Mental Toughness attribute, behavior, cognition, and referee-assessor performance scores for Referee B.

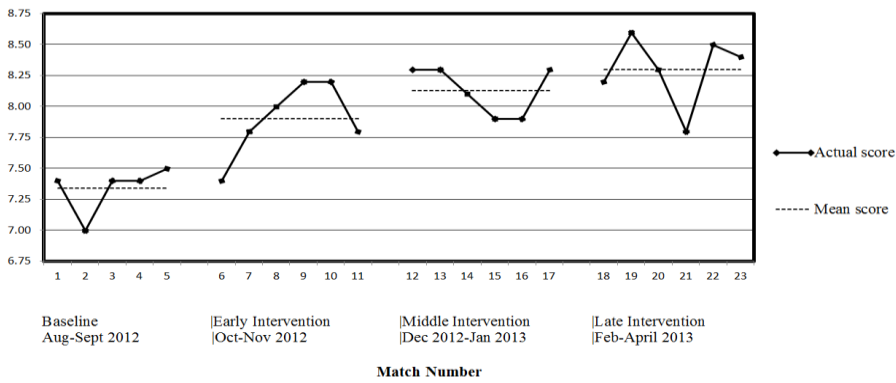
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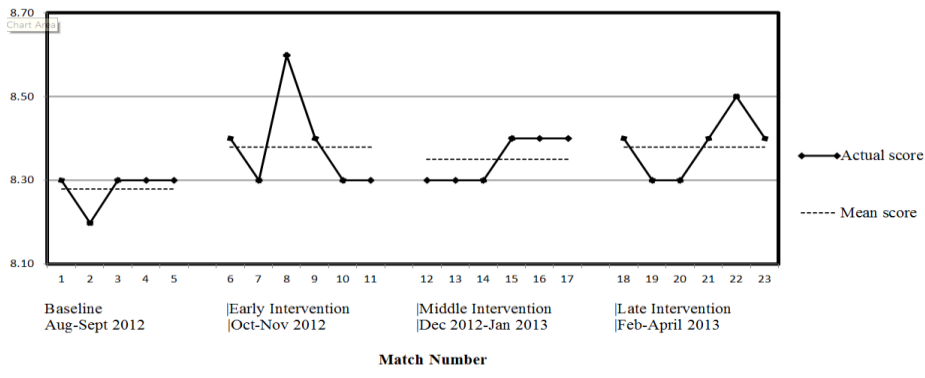
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5 *Figure 3. Mental Toughness attribute, behavior, cognition, and referee-assessor performance scores*
 6 *for Referee C.*

Table 1. A summary of the Mental Toughness Education and Training Program (MTETP) delivered to each referee throughout the course of the 2012-2013 English Football League season.

Timing of the MTETP	Workshop Theme	Content and Exercises	Overall Purposes of the Workshop
English Football League season Early Intervention (Sept-Oct 2012)	1. English Football League refereeing: Mental Toughness attributes a. Individual-based workshop	I. Coping with pressure exercise. a. Coping strategies activity. II. Tough attitude exercise. a. Quotes activity b. Controlling the controllables activity III. High work-ethic analysis. a. Video footage activity IV. Resilience evaluation. a. Football referee's activity. b. Self-activity. V. Robust self-belief exercise. a. What makes a confident football referee activity? VI. Achievement striving exercise a. Traffic-light activity b. Goal-setting activity VII. Sport Intelligence. a. What makes an intelligent referee activity? b. English Premier League referees' quotes. VIII. Applied Relaxation training a. Applied Relaxation introduction b. Progressive relaxation	I. To increase awareness about on and off-field situations where referees and oneself perceive pressurized situations. To increase awareness about one's own personal coping strategies and develop a list of adaptive coping strategies for football refereeing. II. To recall and identify a number of quotes/statements underpinning a tough attitude and develop a list of controllable and uncontrollable football refereeing factors. III. To identify elements of English Premier League football referees displaying a high work-ethic during matches. IV. To increase awareness about how other football referees and oneself have bounced-back and overcome adversity. V. To identify successful refereeing decisions and performances that maintain confidence. Identify sources and types of factors that build and enhance self-confidence. VI. To increase awareness about the guidelines to potential referee success/excellence. To illustrate the importance of short, intermediate, and long-term goals that one wants to achieve. Develop a Road Map of process, performance, and outcome goals. VII. To increase awareness about the importance of sport intelligence in English Football League refereeing. VIII. To increase awareness about physical, emotional, and psychological signs of pressure. To illustrate the importance of attaining effective thoughts and feelings pre, during, and post-match. To gain experience in relaxation techniques that enables this process.

MENTAL TOUGHNESS DEVELOPMENT

Table 1. A summary of the Mental Toughness Education and Training Program (MTETP) delivered to each referee throughout the course of the 2012-2013 English Football League season. (Continued).

Timing of the MTETP	Workshop Theme	Content and Exercises	Overall Purposes of the Workshop
English Football League season Early Intervention (Oct-Nov 2012)	2. On-field situations demanding Mental Toughness: Awareness training of MT-type behaviors a. Individual-based workshop	I. Player (s) reactions to a decision exercise a. Video analysis x1 b. Ranking of top three most important behaviors	I. To identify the Mental Toughness type behaviors displayed by English Premier League referees. To increase awareness of the Mental Toughness type behaviors and compare and contrast rankings with English Premier League referees.
		II. Manager (s) reaction to a decision/ manager confrontation exercise a. Video analysis x3 b. What-if scenario exercise	II. To increase awareness about manager situations demanding Mental Toughness. To increase awareness about situations demanding Mental Toughness that may arise during a match.
		III. Player vs. player altercation exercise a. Video analysis x2 b. Act as a barrier between players activity	III. To identify the Mental Toughness type behaviors displayed by English Premier League referees. To increase awareness about acting as a barrier during a match.
		IV. Mass-player confrontation exercise a. Video analysis x1 b. Ranking of top three most important behaviors	IV. To identify the Mental Toughness type behaviors displayed by English Premier League referees. To increase awareness of the Mental Toughness type behaviors and compare and contrast rankings with English Premier League referees' results.
		V. Applied Relaxation training a. Release-only relaxation b. Cue-controlled relaxation	V. To increase awareness about physical, emotional, and psychological signs of pressure. To illustrate the importance of attaining effective thoughts and feelings pre, during, and post-match.
English Football League season Middle Intervention (Dec 2012)	3. Situations demanding Mental Toughness: On-field role-play a. Individual-based workshop	I. First-half of the football match a. Player (s) reaction to a decision b. Player vs. player altercations	I. To expose English Football League referees to on-field situations demanding Mental Toughness.
		II. Second-half of the football match a. Mass-player confrontation b. A game-changing decision	II. To expose English Football League referees to on-field situations demanding Mental Toughness in refereeing.
		III. Post-match debrief a. Interview	III. To expose English Football League referees to competition-specific situations demanding Mental Toughness.
		IV. Applied Relaxation training a. Differential relaxation	IV. To increase awareness about physical, emotional, and psychological signs of pressure. To illustrate the importance of attaining effective thoughts and feelings pre, during, and post-match. To gain experience in relaxation techniques that enables this process.

MENTAL TOUGHNESS DEVELOPMENT

Table 1. A summary of the Mental Toughness Education and Training Program (MTETP) delivered to each referee throughout the course of the 2012-2013 English Football League season. (*Continued*).

Timing of the MTETP	Workshop Theme	Content and Exercises	Overall Purposes of the Workshop
English Football League season Middle Intervention (Dec 2012–Jan 2013)	4. On-Field Situations demanding Mental Toughness: I. Awareness training of MT-type cognitions a. Individual-based workshop	I. Attentional focus exercise a. Effective concentration activity b. External distractions activity c. Internal distractions activity II. P.A.R.C up decisions/performance exercise a. P.A.R.C up activity III. Personal dialogue exercise a. Awareness of self-talk activity IV. Acknowledge self-talk exercise a. Acknowledge thoughts and emotions activity V. Rationalize situations, thoughts, and emotions exercise a. Think positive quote b. Courage in convictions quote c. Keep moving forward quote d. Thought stopping quote e. Put things into perspective quote VI. Focus and refocusing techniques exercise a. Thought stopping activity b. Stay in the left lane activity c. Walk the self-talk activity d. Walk the walk activity VII. Not dwelling on decisions exercise a. Video analysis x2 b. What-if scenario activity VIII. A game-changing decision exercise a. Video analysis x2 b. What-if scenario activity	I. To increase awareness about cues that one normally attends to and should be attending to during the decision-making process and performance. To increase awareness about irrelevant external and internal cues. II. To understand the process of P.A.R.C. III. To understand the content and nature of own self-talk. IV. To increase awareness about the nature of own thoughts and emotions. V. To increase awareness about how English Premier League referees (and as a person) rationalize refereeing situations, performance, decisions, and personal thoughts and feelings. VI. To increase awareness and develop on-field focus and refocus techniques by identifying effective visual, cognitive, and behavioral responses during competition. VII. To increase awareness about on-field situations demanding Mental Toughness experienced by oneself during the current season. To identify and develop Mental Toughness type cognitions during these situations. VIII. To increase awareness about on-field situations demanding Mental Toughness experienced by oneself during the current season. To identify and develop Mental Toughness type cognitions during these situations.

MENTAL TOUGHNESS DEVELOPMENT

Table 1. A summary of the Mental Toughness Education and Training Program (MTETP) delivered to each referee throughout the course of the 2012-2013 English Football League season. (Continued).

Timing of the MTETP	Workshop Theme	Content and Exercises	Overall Purposes of the Workshop
		<ul style="list-style-type: none"> IX. A game-changing decision exercise <ul style="list-style-type: none"> a. Video analysis x2 b. What-if scenario activity 	IX. To increase awareness about on-field situations demanding Mental Toughness experienced by oneself during the current season. To identify and develop Mental Toughness type cognitions during these situations.
		<ul style="list-style-type: none"> X. Applied Relaxation training <ul style="list-style-type: none"> a. Rapid relaxation 	X. To increase awareness about physical, emotional, and psychological signs of pressure. To illustrate the importance of attaining effective thoughts and feelings pre, during, and post-match. To gain experience in relaxation techniques that enables this process.
English Football League season Late Intervention (March 2013)	5. Off-Field Situations demanding Mental Toughness: Media Role-Play and Training <ul style="list-style-type: none"> a. Group-based workshop 	<ul style="list-style-type: none"> I. Media exposure exercise <ul style="list-style-type: none"> a. Post-match media interview b. Post-match media interview debrief II. Media-based training exercise <ul style="list-style-type: none"> a. Sources of football media activity b. Type of football media issues activity c. The football media as a stressor activity d. Effective coping strategies activity e. What-if scenario activity x6 	<ul style="list-style-type: none"> I. To expose English Football League referees to off-field situations demanding Mental Toughness experienced by English Premier League referees. II. To increase awareness about sources and issues related to the football media as well as effective strategies when dealing with the media scrutiny in English football.
English Football League season Late Intervention (April 2013)	6. Off-Field Situations demanding Mental Toughness: Peer and Coach-Assessment of Performance <ul style="list-style-type: none"> a. Group-based workshop 	<ul style="list-style-type: none"> I. Video-based evaluation of performance <ul style="list-style-type: none"> a. A contentious decision x3 b. A game-changing decision x3 c. A mass-player confrontation x2 d. What-if scenario activity x2 	I. To increase awareness about on and off-field situations demanding Mental Toughness experienced by oneself and other Football League referees during the current season. To identify and develop Mental Toughness type attributes, behaviors, and cognitions during these situations.

MENTAL TOUGHNESS DEVELOPMENT

Table 2. Means (*SD*) for subscales of the Mental Toughness Questionnaire-48 throughout the Mental Toughness Education and Training Program (MTETP): Difference in Mental Toughness self-reports between the baseline phase and intervention phases for each referee.

Participant	Variable	Means (<i>SD</i>)						
		Baseline	Early Intervention			Middle Intervention		Late Intervention
		Self-report	Self-report	Mean Diff.	Self-report	Mean Diff.	Self-report	Mean Diff.
Referee A	<i>Chall.</i>	3.75 (.71)	3.38 (.74)	-.37	3.5 (.53)	-.25	3.5 (.34)	-.25
	<i>Comm.</i>	3.75 (.89)	3.82 (.60)	+.07	3.91 (.30)	+.16	4 (.63)	+.25
	<i>Cont Emo.</i>	2.86 (1.36)	2.86 (.98)	0.0	3.14 (.69)	+.28	3.29 (.91)	+.43
	<i>Cont Life.</i>	4 (.58)	3.86 (.69)	-.14	3.86 (.53)	-.14	3.86 (.69)	-.14
	<i>Conf Abil.</i>	3.44 (1.23)	3.44 (1.04)	0.0	3.67 (1.00)	+.23	3.67 (.95)	+.23
	<i>Inter Conf.</i>	2.83 (1.17)	2.83 (1.03)	0.0	2.67 (.82)	-.16	3 (1.02)	+.17
	<i>MT.</i>	3.44 (1.07)	3.37 (.97)	-.07	3.46 (.74)	+.02	3.55 (.87)	+.11
Referee B	<i>Chall.</i>	3 (1.25)	3.38 (.87)	+.38	3.63 (.52)	+.63	3.63 (.43)	+.63
	<i>Comm.</i>	3.09 (1.04)	3.49 (.91)	+.40	4 (.63)	+.91	4 (.51)	+.91
	<i>Cont Emo</i>	2.86 (1.07)	2.86 (1.07)	0.0	3 (.82)	+.14	3.29 (.98)	+.43
	<i>Cont Life</i>	3.57 (.98)	3.57 (.72)	0.0	3.57 (.53)	0.0	3.57 (.98)	0.0
	<i>Conf Abil.</i>	2.77 (.67)	3.33 (.61)	+.56	3.67 (.87)	+.90	3.67 (.52)	+.90
	<i>Inter Conf.</i>	3.66 (.82)	3.66 (.76)	0.0	3.83 (.98)	+.17	4 (.76)	+.34
	<i>MT.</i>	3.13 (.98)	3.45 (.98)	+.32	3.65 (.76)	+.52	3.69 (.81)	+.66
Referee C	<i>Chall.</i>	3.5 (1.07)	3.75 (.71)	+.25	3.88 (.35)	+.38	3.75 (.71)	+.25
	<i>Comm.</i>	4 (.63)	3.45 (.69)	-.55	4.1 (.70)	+.10	3.84 (.60)	-.16
	<i>Cont Emo.</i>	2.9 (1.00)	3.57 (1.13)	+.67	3.29 (.76)	+1.00	3.45 (.98)	+.55
	<i>Cont Life.</i>	3.15 (.90)	3.29 (.95)	+.14	3.29 (.76)	+.14	3.6 (.53)	+.45
	<i>Conf Abil.</i>	3.33 (.87)	3.33 (.87)	0.0	3 (.87)	-.33	3.7 (.71)	+.37
	<i>Inter Conf.</i>	2.7 (.82)	3.83 (.75)	+1.13	3.33 (.52)	+.63	3.54 (.84)	+.74
	<i>MT.</i>	3.33 (.97)	3.52 (.80)	+.19	3.52 (.77)	+.19	3.65 (.70)	+.32

Legend: Mental Toughness Questionnaire-48 (MTQ-48): *Chall.* = Challenge; *Comm.* = Commitment; *Cont Emo.* = Control of Emotions; *Cont Life.* = Control of Life; *Conf Abil.* = Confidence in Own Abilities; *Inter Conf.* = Interpersonal Confidence; *MT.* = Total Mental Toughness; *Mean Diff.* = Difference in mean response from baseline phase (+/- = direction of the change).

MENTAL TOUGHNESS DEVELOPMENT

Table 3. Means (*SD*) for subscales of the Mental Toughness Questionnaire-48 throughout the Mental Toughness Education and Training Program (MTETP): Difference in Mental Toughness coach-reports between the baseline phase and intervention phases for each referee.

Participant	Variable	Means (<i>SD</i>)						
		Baseline	Early Intervention		Middle Intervention		Late Intervention	
		Coach-report	Coach-report	Mean Diff.	Coach-report	Mean Diff.	Coach-report	Mean Diff.
Referee A	<i>Chall.</i>	3.75 (.46)	3.75 (.46)	0.0	3.25 (.46)	-.50	3.75 (.46)	0.0
	<i>Comm.</i>	3.73 (.90)	3.82 (.70)	+09	3.82 (.92)	+09	4.1 (.74)	+23
	<i>Cont Emo.</i>	2.29 (.49)	2.29 (.49)	0.0	2.29 (.49)	0.0	3 (.83)	+71
	<i>Cont Life.</i>	3.57 (.79)	3.71 (.65)	+14	3.71 (.49)	+14	3.57 (.79)	0.0
	<i>Conf Abil.</i>	3.33 (.87)	3.44 (.99)	+11	3.44 (.83)	+11	3.78 (1.20)	+45
	<i>Inter Conf.</i>	4.18 (.41)	4 (.37)	-.18	4 (.63)	-.18	3.5 (.84)	-.68
	<i>MT.</i>	3.48 (.87)	3.5 (.94)	+02	3.42 (.84)	-.06	3.67 (.86)	+19
Referee B	<i>Chall.</i>	3 (.53)	3.5 (.53)	+50	3.25 (.71)	+25	3.38 (.52)	+38
	<i>Comm.</i>	3.54 (.82)	4 (.45)	+46	3.82 (.75)	+28	3.91 (.54)	+37
	<i>Cont Emo.</i>	2.43 (.53)	3 (.58)	+57	2.72 (.49)	+29	3.14 (.38)	+71
	<i>Cont Life.</i>	3.29 (.76)	3.71 (.49)	+42	3.86 (.69)	+57	4 (.58)	+71
	<i>Conf Abil.</i>	3 (.87)	3.56 (.53)	+56	3.44 (.88)	+44	3.56 (.73)	+56
	<i>Inter Conf.</i>	3 (.89)	3.83 (.41)	+83	3.5 (.55)	+50	3.5 (.55)	+50
	<i>MT.</i>	3.08 (.79)	3.63 (.57)	+55	3.46 (.77)	+38	3.60 (.61)	+52
Referee C	<i>Chall.</i>	3.45 (.52)	3.38 (.74)	-.07	3.13 (.89)	-.32	3.63 (.52)	+18
	<i>Comm.</i>	4 (.63)	3.82 (.60)	-.18	4.1 (.83)	+10	4.18 (.60)	+18
	<i>Cont Emo.</i>	2.72 (.90)	2.72 (.95)	0.0	2.72 (.95)	0.0	2.72 (.76)	0.0
	<i>Cont Life.</i>	3.15 (1.21)	3.86 (.69)	+71	3.43 (1.13)	+28	3.57 (.98)	+42
	<i>Conf Abil.</i>	3.22 (.83)	3.22 (.67)	0.0	3.33 (.71)	+11	3.56 (.53)	+34
	<i>Inter Conf.</i>	2.83 (.75)	3.17 (.41)	+34	3 (.63)	+17	3 (.63)	+17
	<i>MT.</i>	3.29 (.90)	3.4 (.79)	+11	3.35 (.89)	+06	3.52 (.80)	+23

Legend: Mental Toughness Questionnaire-48 (MTQ-48): *Chall.* = Challenge; *Comm.* = Commitment; *Cont Emo.* = Control of Emotions; *Cont Life.* = Control of Life; *Conf Abil.* = Confidence in Own Abilities; *Inter Conf.* = Interpersonal Confidence; *MT.* = Total Mental Toughness; Mean Diff. = Difference in mean response from baseline phase (+/- = direction of the change).

MENTAL TOUGHNESS DEVELOPMENT

Table 4. Means, mean difference scores, and number of non-overlapping data points (%) across baseline and intervention phases for each referee.

Participant	Measure	B	EI	MDS	NNDP	MI	MDS	NNDP	LI	MDS	NNDP	TI	MDS	NNDP (%)
Referee A	<i>Referee-specific MT</i>													
	MT Attributes	7.95	7.69	-.26	2/6	7.62	-.33	1/6	8.17	+.22	4/6	7.83	-.12	7/18 (38.9)
	MT Behaviors	6.67	7.71	+1.04	6/6	7.62	+.95	6/6	7.57	+.90	5/6	7.64	+.97	17/18 (94.4)
	MT Cognitions	6.8	7.15	+.35	2/6	7.48	+.68	6/6	7.9	+.90	6/6	7.51	+.71	14/18 (77.8)
	<i>Performance</i>													
Referee-assessor Score	8.27	8.3	+.03	3/6	8.28	+.01	4/6	8.35	+.08	3/6	8.31	+.04	10/18 (55.6)	
Referee B	<i>Referee-specific MT</i>													
	MT Attributes	8.43	9.40	+.97	6/6	9.55	+1.12	6/6	9.48	+1.05	6/6	9.48	+1.05	18/18 (100)
	MT Behaviors	7.82	7.86	+.04	1/6	8.12	+.30	5/6	7.95	+.13	3/6	7.98	+.16	9/18 (50)
	MT Cognitions	7.03	7.47	+.44	3/6	8.08	+1.05	6/6	7.68	+.65	5/6	7.74	+.71	14/18 (77.8)
	<i>Performance</i>													
Referee-assessor Score	8.15	8.32	+.17	5/6	8.33	+.18	4/6	8.28	+.13	4/6	8.31	+.16	13/18 (72.2)	
Referee C	<i>Referee-specific MT</i>													
	MT Attributes	8.23	8.6	+.37	4/6	8.6	+.37	4/6	8.67	+.44	6/6	8.62	+.39	14/18 (77.8)
	MT Behaviors	7.1	7.52	+.42	3/6	7.72	+.62	4/6	7.84	+.72	6/6	7.69	+.59	13/18 (72.2)
	MT Cognitions	7.34	7.9	+.56	5/6	8.13	+.79	6/6	8.3	+.96	6/6	8.11	+.77	17/18 (94.4)
	<i>Performance</i>													
Referee-assessor Score	8.28	8.38	+.10	3/6	8.35	+.07	3/6	8.38	+.10	4/6	8.37	+.09	10/18 (55.6)	

Legend: B. = Baseline; EI. = Early Intervention; MI. = Middle Intervention; LI. = Late Intervention; TI. = Total Intervention; MDS. = Mean Difference Score; NNDP (%). = Number of Non-overlapping Data Points (%).