

Music can induce positive affect before football training, but is it maintained throughout training?

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ABSTRACT

In a sport setting, affective states interact with other constraints to influence athlete skill acquisition and performance. The importance of affect in skill acquisition is given weight through the underpinnings of representative and affective learning design frameworks. However, there is currently a lack of understanding how the affective states of athletes change throughout training activities. This study aimed to understand how association football players' affective states changed throughout training. Prior to four training sessions, positive and negative music was used as a treatment to induce affective states in 12 competitive-elite youth footballers ($M = 17.36$, $SD = 1.11$ years). During training, players participated in a series of six small-sided games, and their affective states (valence and arousal) were monitored prior to each game using the Affect Grid. RM-MANOVA revealed that the music treatment was able to effectively influence affective states. Further, positive affect remained high for some time throughout training, whereas affective states returned to pre-treatment levels at the beginning of training when athletes listened to negative music prior to the training session. Musical interventions may offer a suitable solution for practitioners to implement affective learning designs into their training.

1. Introduction

Positive affective states,¹ conceptualised as the subjective experience of pleasure and arousal (Russell & Barrett, 1999), have been shown to have a supportive influence on many subcomponents of sport performance and have become a captivating area of research (Fredrickson, 2013; McCarthy, 2011; Wang et al., 2011; Woodman et al., 2009). Given the influence of affective states on motor learning and skill acquisition (Festini, Preston, Reuter-Lorenz, & Seidler, 2016; Headrick, Renshaw, Davids, Pinder, & Araújo, 2015; Runswick, Roca, Williams, Bezodis, & North, 2018), it has been suggested that practitioners should endeavour to manipulate affective states prior to and during training tasks (Beatty & Janelle, 2019). Indeed, it is common that practitioners and athletes will make use of strategies to optimise affective states prior to competition, for example by

listening to music (Karageorghis, Bigliassi, Tayara, Priest, & Bird, 2018). Consequently, there is a need to understand the influence of these interventions on affective states and changes in these states throughout competition. Given the reported impact of positive affect on performance and learning, it is necessary to understand how affective states fluctuate throughout training and competition, as attempts to induce positive affect prior to competition may be irrelevant if the affective state is not maintained throughout play. By understanding these *dynamics of affect*, practitioners and researchers alike may have more confidence in the expected performance and learning advantages of positive affect during activities with longer duration and where athletes' affective states cannot be monitored often, such as association football. Therefore, the current study aimed to provide further understanding of the potential role of affective states in

¹ For the purpose of the current research, positive affective states refer to the subjective experience of the affective state as opposed to the function of the affective state.

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association football by providing an initial understanding of the dynamics of positive and negative affect throughout play.

Positive affective states have been linked to performance gains in basketball (Uphill, Groom, & Jones, 2014), softball (Vast, Young, & Thomas, 2010), table tennis (Martinet & Ferrand, 2009), cricket (Totterdell, 2000), cycling (Lane & Terry, 1998), and running (Lane, Davis, & Devonport, 2011). Further, positive affective states have been shown to influence subcomponents of sport performance in a range of ways (McCarthy, 2011). For example, positive affect has been found to influence perception, attention, memory, decision-making, and judgment (Forgas, 1995, 2002; Isen, 2000; Vast et al., 2010). In addition, positive affective states have been suggested to foster more relaxed and expansive bodily movement (Giraud, Focone, Isableu, Martin, & Demulier, 2016; Gross, Crane, & Fredrickson, 2012), as well as more automatic movement on well-learned tasks (Vast et al., 2010). Of specific relevance to association football, these performance subcomponents have been related to successful match-play. For example, attention and decision-making (Araújo, Hristovski, Seifert, Carvalho, & Davids, 2017; Hüttermann, Ford, Williams, Varga, & Smeeton, 2019), visual perception (McGuckian, Cole, Chalkley, Jordet, & Pepping, 2019, 2020; McGuckian, Cole, Jordet, Chalkley, & Pepping, 2018), and memory (Furley & Wood, 2016) are all widely recognised as important subcomponents of football match-play that can be reliably linked to positive football performance outcomes.

From a team perspective, it appears that positive affective states may provide other benefits to performance. The experience of positive affect as a team becomes an important aspect of the team environment, as positive affective states may influence attachment, affiliation, resilience, cohesion, cooperation, and interpersonal trust (Morgan, Fletcher, & Sarkar, 2015; Oatley, Keltner, & Jenkins, 2006; Pepping & Timmermans, 2012). Creating an environment within a team where the athletes work toward a common goal and feel a connection to one another is an important aspect of performance, and this is enhanced by experiences of positive affect (Pepping & Timmermans, 2012).

The broaden-and-build theory of positive emotions posits that, compared to negative and neutral states, positive affective states widen the scope of one's thoughts and actions, fostering more flexible, creative, forward-looking, and efficient thought and action patterns (Fredrickson, 2013). In addition, the broadening effects of positive affect are suggested to spur the development of resources and encourage positive growth (Fredrickson, 2013). These broadening effects appear particularly relevant from a motor learning and skill acquisition perspective, as inducing positive affective states prior to and during training may support the development of motor skill through greater exploration of movements and adaptability (Komar, Potdevin, Chollet, & Seifert, 2019; Orth, Davids, & Seifert, 2017).

Efforts to induce positive affective states prior to and during sport competition are common (Terry, Karageorghis, Curran, Martin, & Parsons-Smith, 2020). Given the relationship between music and positive affective states (Croom, 2015), music is often used in sport and exercise domains (Bishop, Karageorghis, & Loizou, 2007; Karageorghis, Terry, Lane, Bishop, & Priest, 2012; Laukka & Quick, 2013). While many sports do not allow the use

of music during competition, it is very common for athletes to listen to music before competition and during warm-ups (Bishop et al., 2007; Karageorghis et al., 2012). The use of music in sport, and the notion that music can have a beneficial impact on affective states and performance before and during exercise participation, is well supported by research (Bishop et al., 2007; Boutcher & Trenske, 1990; Karageorghis et al., 2012; Lane et al., 2011; Terry et al., 2020). Music has been used to induce positive affective states in many applied and research domains, and it has been shown that careful selection of music can reliably induce positive affective states (Bishop, 2010; Bishop, Karageorghis, & Kinrade, 2009; Chen, Yuan, Huang, Chen, & Li, 2008; Crust, 2008; Terry et al., 2020). For music to have a maximal impact on affective states, it has been suggested that music should be selected methodically and that factors such as extra-musical associations, acoustical properties (such as tempo and rhythm), identification with lyrics, and familiarity of the music should be considered (Bishop, 2010; Karageorghis et al., 2012). In association football, music has been described to be used as a stimulant and regulator of affect prior to performance (Karageorghis et al., 2018). It was shown that music was able to elicit a range of psychological and group-level psychological responses among academy soccer players and that music could be employed as a useful performance-enhancing tool.

For the purposes of the current study, we follow an ecological approach (Gibson, 1979; Reed, 1996) and propose that music, as part of the sonic environment, can be an integral part of the athlete-environment system. As such, music has been shown to influence movement, synchronisation and interpretation of future events. Relevant to the current study, music can influence an athlete's action-tendencies (action readiness) and affective states (Reybrouck, 2015; Windsor & de Bézenac, 2012) and thereby perception and action in relation to the available affordances – the field of relevant affordances (Rietveld & Kiverstein, 2014). From this approach, emotions, or affective states, should be understood as means of establishing relationships with the environment (see Withagen, 2018; Withagen, de Poel, Araújo, & Pepping, 2012). A recognition of affective states in perception and action in relation to affordances in practice tasks also forms the basis of Affective Learning Design (Headrick et al., 2015; Renshaw, Headrick, & Davids, 2014) and more broadly Representative Learning Design (Connor, Farrow, & Renshaw, 2018; Krause, Farrow, Buszard, Pinder, & Reid, 2019; Pinder, Davids, Renshaw, & Araújo, 2011; Robertson, Spencer, Back, & Farrow, 2018). In short, these frameworks posit that practice situations should simulate the important aspects of the performance environment in order to best represent the affordances available in the performance environment and thereby facilitate learning and performance. Despite emotional aspects of sport contributing to performance, this area of practice design has been largely overlooked in research (Headrick et al., 2015), indicating a need to gain further understanding of affective states within motor learning environments. In doing so, an understanding of changes to both positive and negative affective states before and during training is necessary to help inform the implementation of Affective Learning Designs.

In many sports, the dynamics of affect (i.e., how affective states change over time) are currently not well understood. Lane et al. (2011) found that the affective state of runners did not change during a distance run, however affective valence appeared to decline when running intensity exceeded ventilatory threshold (Benjamin, Rowlands, & Parfitt, 2012; Hall, Ekkekakis, & Petruzzello, 2002). In contrast, Martinent and Ferrand (2009) reported rapidly varying emotions during competitive table tennis matches. Semi-structured interviews with athletes showed that athletes from a number of sports experienced varying affective states before, during, and after competition (Uphill & Jones, 2007). The limited research into affective states during *team* sport play shows similar results. Uphill et al. (2014) found that basketball players experienced a wide range of emotions throughout competition, however only a small percentage of playing time was described as emotional (9%). Runners (relatively stable affect) and basketballers (rapidly changing affect) compete under vastly different task constraints, therefore, these differing results across types of sport may be due to the differing timescales, intensities and demands of competition. The lack of current understanding in association football demonstrates the need for further research into the dynamics of affect throughout team-play activity.

To inform the implementation of Representative Learning Designs, Affective Learning Designs and the use of music to influence affective states, the aim of the current study was to describe the influence of pre-training music use on affective states, and the dynamics of musically induced affective states throughout football training. It was expected that listening to music before training would effectively influence affective states. It was expected that affective states would fluctuate throughout training, however investigation of these changes was considered exploratory and specific hypotheses relating to these changes were not made.

2. Methods

2.1. Participants

Twelve male youth football players aged between 16 and 19 years ($M = 17.36$, $SD = 1.11$) were conveniently recruited to participate in the study. Participants were all members of the same youth team competing in the Australian National Youth League. Players were eligible for participation in the study provided they were not injured and were available to train on data collection days. A typical training week for participants included 3-4 training sessions of approximately 70-minutes, plus a 90-minute match each weekend. All participants were deemed fit to train by the team physiotherapist.

The study was approved by the Human Research Ethics Committee (HREC) of the Australian Catholic University prior to the commencement of the study. The participants (and their legal guardians) were informed of the research procedures, risks, and benefits both verbally and via a written information letter. Prior to the beginning of the study, consent was obtained from participants over 18 years. For participants under 18 years, assent was obtained along with consent from their legal guardians.

2.2. Research Design

In this repeated-measures experimental study, two music conditions were implemented to explore the influence on affective state. Affective states were monitored eight times over the course of training sessions, for four separate training sessions. As a result, a 2 x 8 factorial design was used, with affective valence and arousal as the dependent variables.

2.3. Measures

Brunel Music Rating Inventory-2. The Brunel Music Rating Inventory-2 (BMRI-2; Karageorghis, Priest, Terry, Chatzisarantis, & Lane, 2006) was used as a methodological check to ensure the motivational quality of music selected by the participants and researcher. The BMRI-2 is considered a valid and internally consistent tool for music selection with Chronbach's alpha values ranging between 0.86 and 0.88 in samples of young men (Karageorghis et al., 2006), and has been used often in research with young adults (Barwood, Weston, Thelwell, & Page, 2009; Hutchinson & Sherman, 2014; Terry, Karageorghis, Saha, & D'Auria, 2012). Consisting of six items, the BMRI-2 assesses the motivational quality of six structural components of music using a 7-point Likert scale, which when added together give an overall score for the motivational quality of the song. A higher score indicates the musical piece has higher motivational quality, with a maximum score of 42. Songs rated between 18 and 30 on the BMRI-2 are classified as *oudeterous*, neither motivating nor demotivating (Terry et al., 2012). The BMRI-2 has been used a number of times in research of a similar nature (Lane et al., 2011; Simpson & Karageorghis, 2006; Terry et al., 2012). The instructions for each item on the BMRI-2 were modified from the original (... motivate me *during* exercise) to suit the context of pre-training music listening (... motivate me *before* exercise) (Karageorghis et al., 2006).

Affect Grid. To assess the *dynamics* of affect, affect should be measured often *throughout* the bout of exercise (Ekkekakis & Petruzzello, 2000; Rose & Parfitt, 2012). A modified version of the Affect Grid (Russell, Weiss, & Mendelsohn, 1989) was utilised to assess the affective state of participants throughout the study. The original grid was modified for the study to enhance the ease of verbal reporting; the participants could visually select the appropriate cell and communicate the two numbers in the cell very quickly. The first number represented valence via the displeasure-pleasure dimension while the second number represented arousal via the sleepiness-arousal dimension. Both dimensions use a numerical scale from 1-9. The simple and brief response required allowed the Affect Grid to be used on multiple occasions with brief periods between each response (Russell et al., 1989), while ensuring the participants do not tire from the scale. Participants were familiarised with the Affect Grid prior to data collection. The scale has been shown to have adequate reliability (Russell et al., 1989) and moderate validity (Killgore, 1998), and has been used in previous research concerning affect in exercise domains (Bishop et al., 2009; Golden, Tenenbaum, & Kamata, 2004; Hardy, Hall, & Alexander, 2001; Rikberg, Raudsepp, & Kais, 2011).

2.4. Procedure

It was assumed that highly motivating music (according to BMRI-2 ratings) would result in positive affective states, while less motivating music would result in negative affective states. Two types of music playlist were created prior to the first data collection day; a positive playlist intended to induce positive affect before training, and a negative playlist intended to induce negative affect before training. To avoid arbitrary selection of music and to maximise the effectiveness of the playlist, each participant’s positive playlist consisted of individually selected songs (Bishop, 2010; Karageorghis & Terry, 1997; Karageorghis et al., 2012). Further, to ensure music selection was perceived to be meaningful and valuable, participants were asked to select five songs that they felt would ideally prepare them prior to a match. The songs selected by participants were predominantly high-tempo electronic and dance songs. As the participants knew they would be required to listen to the songs prior to training, we presumed it unlikely that the participants would willingly select songs that effectively induce negative affective states. Therefore, songs for the negative playlist were preselected by the researchers and were the same for all participants (Table 1). These songs were low-tempo and had broadly sad lyrics in an attempt to induce a negative affective state.

Table 1: Songs preselected by the researchers for the negative music playlist

Title	Artist	Mean (SD) BMRI-2 rating
Yesterday	The Beatles	11.58 (2.61)
Mad World	Gary Jules	10.67 (3.58)
Everybody Hurts	R.E.M	13.33 (6.37)
Tears in Heaven	Eric Clapton	9.25 (3.05)
Wasting My Young Years*	London Grammar	18.33 (9.26)

* Removed from negative playlist

Prior to the first data collection day, participants assessed the motivational quality of each song on their own positive playlist and the negative playlist using the BMRI-2 (Karageorghis et al., 2006). One song was rated within the outdeterous range and was

therefore removed from the negative playlist. The resulting negative playlist to be used on data collection days included the remaining four songs.

Data collection was completed over four days during the National Youth League season in Australia (Figure 1). On each data collection day, participants were split evenly into either a positive affect or negative affect group. In order to induce positive and negative affect, the positive affect group was assigned a positive playlist of music (i.e., their own selected playlist), while the negative affect group was assigned the negative playlist of music. Over the four data collection days, participants were alternatively assigned to each affect group twice each. This assignment ensured the positive and negative affect groups had six participants each day, and each participant was in the positive affect group twice and the negative affect group twice.

Participants arrived at the training facility approximately 60 minutes prior to the beginning of training, at which point they gave a rating of their affective state (time point 1, check-in). At 15 mins prior to training, participants were given an mp3 device loaded with either their positive playlist or the negative playlist. If the participants had their own personal headphones, they were allowed to use them, otherwise they were given headphones to use. To cater for individual preferences, participants were permitted to self-select the volume of their music. Music exposure lasted for 10 mins. At 5 mins prior to training, participants stopped listening to music and verbally gave a second rating of their affective state (time point 2, post-music). Participants began training with a standard warm-up conducted by the coaching staff. The warm-up lasted 15 mins and was completed as a team. Coaching staff, who were blinded to music exposure, then split the participants into random teams in preparation for a series of small-sided games (SSG), each lasting 2 mins. SSG’s of this nature were a commonly used activity for the participants. Prior to each of the six SSG, participants verbally communicated their affective state (time point 3, 4, 5, 6, 7, and 8).

2.5. Statistical Analysis

As a methodological check for the predicted effectiveness of the positive and negative playlists, a paired samples t-test with Bonferroni correction was performed to compare the BMRI-2 ratings of participants’ own positive playlists and the negative playlist.

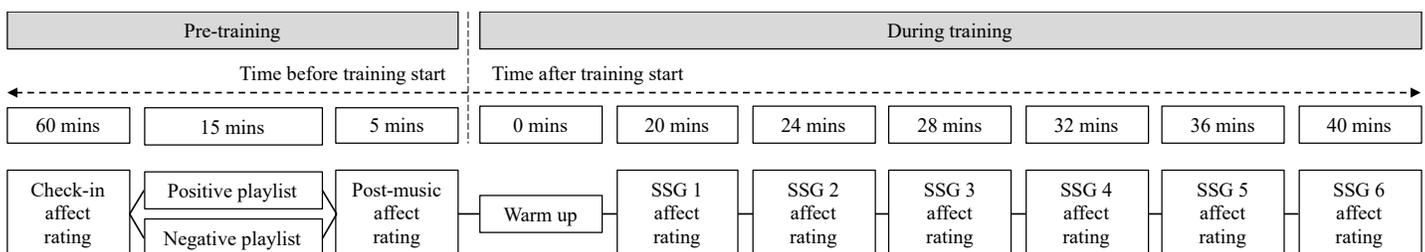


Figure 1: Experimental design and timeline for each of the four data collection days

Repeated-measures multivariate analysis of variance (MANOVA) was performed to assess the effect of type of music and moment in time on ratings of valence and arousal on the Affect Grid. The independent variables were type of music (two levels, positive and negative) and moment in time (8 levels; check-in, post-music exposure, and before SSG 1, 2, 3, 4, 5, and 6), and the dependent variables were valence and arousal as measured by the scores on the Affect Grid. When Mauchly's test indicated the assumption of sphericity had been violated, Greenhouse-Geisser correction was applied to the degrees of freedom. To assess affect differences over time from baseline, planned simple contrasts were performed separately for the positive and negative music groups with valence and arousal scores at check-in as the reference category. Alpha was set at 0.05 throughout.

3. Results

3.1. Affect Responses to Music

The mean (SD) BMRI-2 rating for the negative playlist was 11.21 (2.82) and 36.35 (2.66) for the individualised positive playlists. Paired samples t-test revealed a significant difference between the BMRI-2 ratings of the positive and negative playlists, $t(11) = 19.86, p < .001$, indicating that the positive playlist was rated significantly higher than the negative playlist.

Repeated measures MANOVA revealed a simple main effect of music type on valence ($F(1,11) = 6.967, p = .023, \eta_p^2 = .388$), and arousal ($F(1,11) = 4.867, p = .050, \eta_p^2 = .307$). Results show that music was able to effectively alter the valence and arousal states of youth football players prior to their training (Table 2).

3.2. Dynamics of Affect Throughout Play

Valence ratings over time for the positive and negative music conditions are shown in Figure 2. Arousal ratings over time for the positive and negative music conditions are shown in Figure 3. Repeated measures MANOVA showed no simple main effect of time on valence scores ($F(3.28, 36.09) = 1.173, p = .335$), however there was a simple main effect of time on arousal scores ($F(3.38, 37.21) = 2.946, p = .040, \eta_p^2 = .211$). Repeated measures ANOVA showed an interaction effect of type of music x time on valence scores ($F(2.66, 29.33) = 3.799, p = .024, \eta_p^2 = .257$) and an interaction effect of type of music x time on arousal scores ($F(3.53, 38.78) = 4.630, p = .005, \eta_p^2 = .296$). Planned simple

contrasts of valence and arousal over time with time at check-in as the reference category for the positive and negative music type are displayed in Table 3.

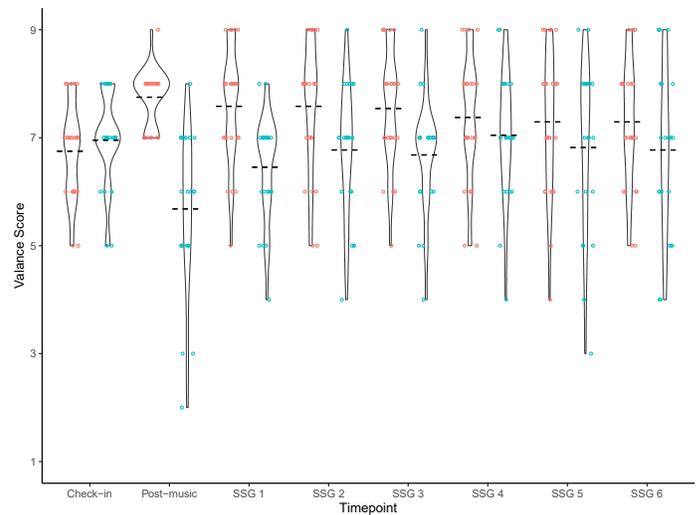


Figure 2: Violin plots showing valence scores over time for the positive and negative music conditions. Points indicate individual observations, dashed lines indicate group means.

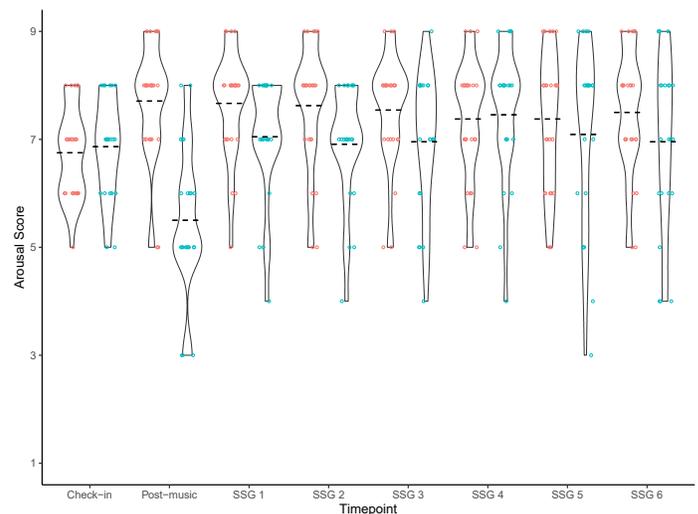


Figure 3: Violin plots showing arousal scores over time for the positive and negative music conditions. Points indicate individual observations, dashed lines indicate group means.

Table 2: Mean (SD) valence and arousal scores pre- and post-music for the positive and negative music conditions.

	Mean (SD) valence		Mean (SD) arousal	
	Pre	Post	Pre	Post
Positive music	6.75 (0.81)	7.71 (0.40)	6.67 (0.81)	7.63 (1.07)
Negative music	6.96 (0.86)	5.50 (1.64)	6.88 (0.86)	5.33 (1.35)

Table 3. Planned simple contrasts of valence and arousal over time with time at check-in as reference category for the positive and negative music conditions.

Time point	Positive Playlist				Negative Playlist			
	Valance		Arousal		Valance		Arousal	
	<i>F</i>	η_p^2	<i>F</i>	η_p^2	<i>F</i>	η_p^2	<i>F</i>	η_p^2
Post-music vs. Check-in	16.769*	.604	8.830*	.445	15.834*	.590	27.939**	.718
SSG 1 vs. Check-in	6.102*	.357	8.250*	.429	3.541	.244	0.000	.000
SSG 2 vs. Check-in	5.754*	.343	5.711*	.342	1.035	.086	0.137	.012
SSG 3 vs. Check-in	4.666	.298	5.848*	.347	3.000	.214	0.147	.013
SSG 4 vs. Check-in	3.143	.222	2.983	.213	0.187	.014	1.220	.100
SSG 5 vs. Check-in	1.709	.134	2.936	.211	1.692	.133	0.155	.014
SSG 6 vs. Check-in	2.462	.183	5.189*	.321	1.960	.151	0.542	.047

Note: Bold text indicates mean value is higher than check-in value. * $p < 0.05$, ** $p < 0.01$.

4. Discussion

To inform the implementation of Affective Learning Designs and the use of music to influence affective states, the aim of the current study was to describe the dynamics of affective states throughout football training. Music was used as a treatment to induce positive and negative affective states prior to training, and affective states were monitored numerous times throughout training. Results indicated that positive affect could reliably be induced with self-selected positive music, however, negative music resulted in neutral affective states. Positive affective states were partially maintained during training, whereas neutral affective states returned to pre-music treatment levels shortly after the training had started. Whilst this was an exploratory study and no specific hypotheses were developed, our expectation that listening to music before training would effectively influence affective states and that affective states would fluctuate throughout training, were partially confirmed.

The change in affective states following music treatment further supports the use of music as a means of inducing affective states before training in association football. These results fall in line with similar research regarding affect responses to music (Bishop et al., 2009; Karageorghis et al., 2018; Lane et al., 2011; Terry et al., 2020), while also expanding on their findings. The present study had participants choose their own selection of positive music, which may have accounted for the higher affect scores compared to Lane et al. (2011). When selecting music, it has been suggested athletes make extra-musical associations - associations between certain songs and significant people, places or events - which maximises the effectiveness of the selected songs (Bishop, 2010; Bishop et al., 2007). By self-selecting

positive songs, it is likely the participants made extra-musical associations with the songs, which may have accounted for the positive affect following music exposure. Given the frequency that athletes use music prior to competition, this finding has important implications for applied practitioners. Self-selecting music is a relatively straightforward task for athletes competing in individual sports, however, this may present a challenge in team sport settings. It is common that teams will listen to the same music through a single set of speakers, which may limit the value of this musical intervention if some athletes do not have strong extra-musical associations with the music that is used. In this case, it may be more beneficial for athletes to listen to self-selected music through personal music devices in order to maximise the benefits associated with musical interventions.

The negative music was unable to induce negative affective states. Rather, the findings demonstrate that neutral (or less positive) affective states can be induced through the use of music. Although it may seem counter-intuitive to try to induce negative affect in a sport setting, this idea may warrant further attention in an affective learning design domain (Headrick et al., 2015). Although a positive affective state may be ideal in a competitive environment, it is inevitable that athletes will experience negative affective states at some point during competition, and that these states will interact with other constraints to influence the athlete's performance capabilities. Therefore, the ability to induce negative affective states and include these states as an element of a representative learning environment may provide some value. When further using music to induce negative emotions to investigate their role in affective learning designs, it would be important to ascertain whether the induced affect is representative of the negative affect experienced during competition.

Results indicated that neutral affective states were apparent immediately following the music intervention but were not maintained throughout training, however the exact reason for this is unclear as the present study did not include a control condition. It may be that affective states became more positive in anticipation of training starting, either through self-regulation strategies (e.g., self-talk, Hardy et al., 2001) or the enjoyment of participating in the team warm-up. Further, since the negative music was not self-selected, these songs may have lacked the meaning (“aboutness”) or association compared to the music used to illicit positive affective states. Future research in this area should further investigate the factors influencing the endurance of affect and the importance of the ability to self-select music, as the findings may provide valuable insight into the use of various affective states in learning environments.

A range of individual and team performance factors, such as involvement, interaction with teammates/coaches/opponents, other than the music intervention, are likely to have influenced the affective state of players in the SSGs. Further, whilst the players trained in teams, in the current study we have focussed on presenting individual participant affective states. That is, on the basis of the presented data, we cannot draw conclusions in relation to the effects of the individual affective states on the team or on interpersonal processes (e.g., interpersonal dynamics, team performance) (Beatty & Janelle, 2019). Nevertheless, the findings give an initial understanding of the dynamics of affect throughout play in a team sport setting. This was the first study of its kind in team sport, which is important considering the greater range of interacting constraints that are present in team sport compared to the individual sports that this type of research typically investigates (Benjamin et al., 2012; Hall et al., 2002; Lane et al., 2011). Athletes’ positive affective states remained elevated for some time; however, this effect was not sustained for the entire training session. A possible explanation for this may come from the intensity of play as a training session progresses. It has been shown that, as exercise intensity rises above an athletes preferred level of intensity, affect, typically, decreases (Lind, Ekkekakis, & Vazou, 2008; Parfitt & Hughes, 2009). Benjamin et al. (2012) found that adolescents’ affective states remained fairly constant for moderate intensity exercise, however when exercise reached higher intensity, affective states showed a significant decline. Small sided games, as used in the current research, are typically high intensity (Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011), so as training progressed it is likely the athletes’ affective states declined in line with the perceived intensity of training. Further, participants were asked to select and rate music in preparation for a match, whereas data were collected prior to and during training. It is unclear how the difference in the intended context may have influenced the music selection and rating, and consequent impact of music on affective states.

The present study aimed to understand football players’ affective responses to positive and negative music treatment before training, and the dynamics of football players’ affective states throughout team play. The results supported the use of music as a means of inducing affective states, particularly in the case of positive affective states, as they were maintained for a

longer period throughout training. Researchers should seek to expand on the present study to further understand the potential benefits of using musically induced affective states in a training environment.

It is recommended that practitioners consider the impact that music may be having on athletes’ affective states prior to training and games (Karageorghis et al., 2018; Terry et al., 2020). To ensure the maximum impact of music use, it is recommended that music is self-selected and a validated measure such as the BMRI-2 (Karageorghis, 2016; Karageorghis et al., 2006) is used to verify the potential value of the selected music. Given the prevalence of music use prior to games, practitioners may wish to make systematic use of music prior to training to enhance the representativeness of activities (Krause et al., 2019; Pinder et al., 2011) or to implement affective learning designs (Headrick et al., 2015) into their training. It is recommended that affective states are monitored frequently to ensure that the expected states are achieved and maintained.

Conflict of Interest

The authors declare no conflict of interests.

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