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On the role of lyrics in the music–exercise performance relationship

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ABSTRACT

Objectives: To examine the role of lyrics on a range of psychological, psychophysical, and physiological variables during submaximal cycling ergometry.
Design: Within-subject counterbalanced design.
Method: Twenty-five participants performed three 6-min cycling trials at a power output corresponding to 75% of their maximum heart rate under conditions of music with lyrics, same music without lyrics, and a no-music control. Cycling cadence, heart rate, and perceived exertion were recorded at 2-min intervals during each trial. Positive and negative affect was assessed before and after each trial.
Results: Participants cycled at a higher cadence towards the end of the cycling trials under music with lyrics. Main effects were found for perceived exertion and heart rate, both of which increased from min 2 through to min 6, and for affect: positive affect increased and negative affect decreased from pre- to post-trials.
Conclusions: Participants pedalled faster in both music conditions (with and without lyrics) while perceived exertion and heart rate did not differ. The inclusion of lyrics influenced cycling cadence only at min 6 and had no effect on the remaining dependent variables throughout the duration of the cycling trials. The impact of lyrical content in the music–exercise performance relationship warrants further attention in order for us to better understand its role.

Music is used to accompany all types of activities (e.g., driving, cooking, cleaning, writing, relaxing, exercising), whether this is to distract, energize, or provide a rhythmic cue for the listener (Sloboda, Lamont, & Greasley, 2009). In exercise and sport settings, the use of music has become extremely widespread (see Karageorghis & Priest, 2012a, 2012b, for a review); it is used as a means to enhance performance and evoke a range of physiological and psychological responses (Brownley, McMurray, & Hackney, 1995; Laukka & Quick, 2011; Razon, Basevitch, Land, Thompson, & Tenenbaum, 2009). In particular, music has been shown to enhance positive affect, which bears strong influence on an individual's intention to exercise and adhere to an exercise programme (Ekkekakis, Parfitt, & Petruzzello, 2011). Numerous studies have supported the use of *motivational music* to induce positive feelings during exercise (e.g., Crust, 2008; Hutchinson et al., 2011). Typically, motivational music has a high tempo (> 120 bpm), catchy melodies, inspiring lyrics, an association with physical endeavour, and a bright, uplifting harmonic structure (Karageorghis, Terry, & Lane, 1999).

The benefits of music use in the exercise domain have been attributed to a *rhythm response* or entrainment to music rhythm that has been associated with greater neuromuscular efficiency (e.g., Bacon, Myers, & Karageorghis, 2012), and the limited processing capacity of the central nervous system (e.g., Razon et al., 2009). Music competes with bodily cues in afferent neural pathways and thus blocks unpleasant cues replacing them with more positive ones (cf. Rejeski, 1985; Tenenbaum, 2001). Music in exercise has also been linked with a phenomenon known as *emotional contagion*, which refers to the process by which an exerciser "catches" (feels) emotion in response to music (see Juslin, 2009, for a review). The notion of emotional contagion (musically-induced/evoked emotions) has received support from research in neuroscience (e.g., Koelsch, 2010; Koelsch, Fritz, von Cramon, Müller, & Friederici, 2006), which shows that listeners can understand the intended expression (e.g., happiness or sadness) of the melody or lyrical content of music by perceiving the "motion" of the signal (Molnar-Szakacs & Overy, 2006).

Long-duration, repetitive exercise tasks such as rowing, running, and cycling, performed by recreationally active

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participants (not elite athletes) appear to be positively influenced by both asynchronous (background) and synchronous music (see Terry & Karageorghis, 2011, for a review). Additional benefits of music have been explained with reference to the dissociation effect (Rejeski, 1985), wherein music delays the onset of fatigue and allows individuals to increase work output/duration before internal negative sensations are perceived (Boutcher & Trenske, 1990). That is, perceptions of effort and fatigue diminish with the presence of music, thus participants are able to produce greater work output (e.g., Elliott, Carr, & Savage, 2004).

The aforementioned benefits are load-dependent to a degree, given that music does not appear to moderate perceptions of effort at high exercise intensities (>75% maximal heart rate reserve [HRRmax]; e.g., Karageorghis et al., 2009). Nonetheless, in direct contrast with the posits of extant theory (e.g., Rejeski, 1985; Tenenbaum, 2001), music does appear to moderate affect even at very high intensities (>85% HRRmax; e.g., Hutchinson et al., 2011; Terry, Karageorghis, Mecozzi Saha, & D'Auria, 2012). The combination of exercise with well-selected music can have a bearing on how people feel during as well as immediately after exercise (see Karageorghis & Jones, 2014; Karageorghis, Jones, & Stuart, 2008). Indeed, the mood-enhancing properties of exercise per se have been particularly well documented (see e.g., Berger & Motl, 2000). Moreover, research has shown that post-exercise mood is enhanced/more positive when compared with pre-exercise mood (e.g., Carels, Coit, Young, & Berger, 2007; Gauvin, Rejeski, & Norris, 1996).

Numerous studies in the exercise domain indicate that people routinely use music to regulate emotions and affect for activities that vary in their physical intensity demand (e.g., Brownley et al., 1995; Priest & Karageorghis, 2008). The neurophysiological concomitants of such benefits are as yet unknown; nonetheless, an important determinant of such affective qualities of music is the lyrical component, or words used in a song (Crust, 2008; Crust & Clough, 2006; Stratton & Zalanowski, 1994). While other constituents of music such as tempo (bpm) and loudness (dB) have garnered considerable attention from researchers (Brownley et al. Edworthy & Waring, 2006; Karageorghis & Jones, 2014), there is a dearth of research into the possible influence of lyrics, despite numerous qualitative and anecdotal accounts of their potential influence (e.g., Bishop, Karageorghis, & Loizou, 2007; Karageorghis et al., 2013; Priest & Karageorghis). Therefore, systematic investigation of the role of lyrics in the sport and exercise performance relationship is warranted given both the widespread use of music in applied and research settings and the fact that lyrical music is often used in preference to instrumental music (Priest & Karageorghis).

The lyrical content of music is known to influence people's behaviour (see North & Hargreaves, 2008, for a review). For example, Jacob, Guéguen, and Boulbry (2010) found that listening to prosocial song lyrics during the eating period in a restaurant (lunch and dinner) increased patrons' tipping behaviours, in terms of both the proportion of customers leaving a tip and the amount of money they gave per tip. Greitemeyer (2009) showed that exposure to songs with prosocial lyrics fostered prosocial tendencies by increasing prosocial thoughts, affect, and behaviour in different situations (e.g., empathy towards others in need, donations to non-profit organizations, etc.).

Findings from the study of the effects of music with and without lyrics on mood and emotions are equivocal. Stratton and Zalanowski (1994) found that the lyrics of a song had greater capacity to alter mood than music without lyrics. More recently, Omar-Ali and Peynircioğlu (2006) asked participants to rate the intensity of four emotions (happy, sad, calm, and angry) in instrumental music or in music with lyrics. The authors found that melody had a stronger influence on emotion than lyrics. Nonetheless, in lyrical music, the lyrics "carry" the melody which adds a level of complexity in assessing the influence of lyrics and melody as singular phenomena.

Within the context of sport and exercise performance, lyrics may well relate to the task demands of repetitive activity (e.g., the potentially powerful influence of general affirmations [e.g., "Search for the hero inside yourself"], task-specific verbal cues [e.g., "Keep on running"], and positive self-statements [e.g., "I am the one and only"]). In particular, lyrical content has been suggested to be the musical constituent that is most likely to promote a dissociation effect and thus reduce perceptions of effort (see Crust & Clough, 2006). Lyrics have also been suggested to play a role in inducing optimal mood and emotional states (Bishop et al., 2007; Crust, 2008; Laukka & Quick, 2011; Terry & Karageorghis, 2011).

The purpose of the present study was to examine the role of lyrics with reference to a range of psychological, psychophysical, and psychophysiological variables during submaximal cycle ergometry. It was hypothesized that, at the same individualized workload, cycling cadence would be significantly higher in the two music conditions (music with lyrics [ML] and music with no lyrics [NL]) when compared to a no-music control (NM), with the ML condition eliciting the largest increase in cycle cadence (H_1); as is common in the exercise science literature (e.g., Karageorghis et al., 2009) heart rate was used as a proxy for physiological stress and was expected to increase equally across the three conditions throughout the cycling task (H_2); perceived exertion (the feeling of how heavy and strenuous a physical task is; Borg, 1998, p. 8), was expected to be lower in the two music conditions when compared to NM (H_3); lastly, positive affect was expected to increase and negative affect to decrease from pre- to post-trials, in all three conditions (H_4), with distinct trends observed for positive affect (ML > NL > NM) and negative affect (NM > NL > ML).

Methods and results

Ethical approval was gained from the ethics committee of the UK university at which the research was conducted and participants provided written informed consent. The research consisted of two phases: music selection (Stage 1) and the experimental protocol (Stage 2).

Stage 1: music selection

Participants

Forty-nine undergraduate students (M_{age} = 19.9 years, SD = 1.2 years) from a sport and exercise science undergraduate course at a university in northern England, UK volunteered to participate in the selection of motivational musical tracks for use in the experimental phase of the study. In keeping with the methodological guidelines of Karageorghis and Terry (1997), these participants were of a similar socio-cultural background and age profile to participants in Stage 2.

Measures

The Brunel Music Rating Inventory-2 (BMRI-2; Karageorghis, Priest, Terry, Chatzisarantis, & Lane, 2006) was employed to select the tracks that would be used in Stage 2. This questionnaire was designed to measure the motivational qualities of music for use in an exercise environment. It is a single-factor, six-item instrument presented on a 7-point Likert scale anchored by 1 (*strongly agree*) and 7 (*strongly disagree*). For the purposes of the study, participants were informed that the word "motivate" meant music that would "make you want to exercise harder and/or longer in a cycling performance task". The mean Cronbach alpha coefficient for the single