

Feasibility and Effectiveness of a Novel Smartphone Music Application on Anxiety and Sleep in Elite Soccer Coaches

Dear Editor-in-chief

A considerable body of research has examined stress and wellbeing in athletes (e.g., Arnold et al., 2017). In contrast, similar experiences in sports coaches have received considerably less attention although these are widely exposed to numerous stressors which can potentially influence their well-being and performance. In 2017, a meta-analysis (Norris et al., 2017) highlighted various stressors influencing the performance of coaches. These include external scrutiny from the public and media, the need to constantly maintain high standards during training and competition and organizational stressors relating to administration, finances, overload, and environment. Regarding the elite football setting specifically, coaches must regularly deal with stressors such as job insecurity (Bentzen et al., 2020) and cope with the stress and adversity associated to a highly pressurized workplace environment (Knights and Ruddock-Hudson, 2016). These stressors can cause anxiety, in addition to sleep disturbance, thus there is a clear need to help coaches find ways to deal with such difficulties. In clinical health settings, music-based therapeutic interventions are systematically shown to help improve sleep quality (Chen et al., 2021) and anxiety levels (Umbrello et al., 2019). In sports settings, listening to music demonstrated a positive effect in reducing pre-competition anxiety levels in a cohort of elite shooters (John, Verma, Khanna, 2012) and amateur athletes (Elliott et al., 2014) respectively. Yet to our knowledge no study has investigated the potential benefits of music in sports coaches. In this preliminary study, we investigated 1) the feasibility of implementing a novel smartphone music application in a cohort of elite soccer coaches, and 2) its effectiveness in helping them fall asleep and reducing anxiety levels.

A total of 10 elite French soccer coaches (age 28.4 ± 3.9 years, working in clubs belonging to the 4 highest standards of football in France: Ligue 1: $n=1$, Ligue 2: $n=3$, Division 3: $n=1$ and Division 4: $n=5$) were invited to participate in the present study which was also proposed as part of their personal development plan during a year-long elite coach development course. Prior to their inclusion, participants were informed about the implementation of the study by means of an information document and oral presentation by the research team and were asked to sign an informed consent form to participate. The participants were asked to download the music application (Music Care©, Paris, France) on their personal smartphone/tablet and provided with a headphone set. This music application is typically used in health care settings (see www.music-care.com/en/clinical-evidence.html for list of related research works) and offers personalized music listening according to the patient's therapeutic need (pain, anxiety,

sleep) and musical preferences (e.g., classic, jazz, traditional...). The music sequences (each 20min duration) aim to progressively bring the user into a state of relaxation, and naturally treat pain, anxiety, and sleep disorders. Each participant was instructed to use the application at home in the morning on waking up (choice of anxiety or awakening session) and in the evening prior to falling asleep (sleep session) over a 1-month period. They were asked to record the date, time and duration of each session in a personal diary. Following the sleep session, participants were also requested to respond to the question: did the session help you to fall asleep: *yes*, *no* or *I don't know*? Finally, immediately before and at the end of each anxiety/awakening session, participants used a Likert scale to rate their current anxiety level ($0=no$ anxiety to $10=maximal$ anxiety). Data are presented as means, standard deviations and range values unless stated. Owing to the non-normality of the dataset collected for the pre-post session anxiety score ratings, Wilcoxon's signed-rank non-parametric test was used to compare mean data (significance level, $p<0.05$). Cohen's Effect Sizes were also calculated and classified as trivial (<0.2), small ($>0.2-0.6$), moderate ($>0.6-1.2$), large ($>1.2-2.0$) and very large ($>2.0-4.0$). The BiostaTGV (INSERM, France) package was used for all statistical calculations.

Results showed that out of the 10 participants, two did not choose to download the application while among the remaining 8, 2 did not record any information on their music sessions. Regarding the 6 remaining participants, half completed at least one session per day over the 30-day period while an average of 25 sessions were completed per participant (range: 18 to 29). In total, 150 sessions were completed by the participants of which 64% ($n=96$) were used to aid sleep, 19% ($n=28$) anxiety and 17% ($n=26$) wake-up respectively. Each music session was completed in its entirety (20mins duration) on 99.3% occasions. Of the 96 sleep-related sessions completed, 62.5% ($n=60$) were considered by the participants to have aided them in falling asleep (Figure 1). The comparison of anxiety levels demonstrated a significant reduction in mean values for the pre- versus post-session scores: 6.0 ± 1.0 vs. 4.3 ± 1.5 , -28%, $p < 0.0001$, effect size=1.2 (large).

To the best of our knowledge, this investigation is the first to report the feasibility of implementing a novel therapeutic music smartphone application in a group of elite soccer coaches and determine its effects on their current anxiety levels and helping them fall asleep. Altogether, 40% of coaches (4 out of 10) chose not to use the application which is greater than the 20% drop-out rates frequently reported in randomised controlled studies. However, half of the 6 remaining participants completed at least one music session per day over the 30-day period while an average of 25 sessions (with nearly all listened to in their entirety)

were completed per participant demonstrating in our opinion a satisfactory level of feasibility. The coaches most often chose sleep sessions (64% of the total) of which nearly two thirds were considered to have helped them to fall asleep. Anxiety sessions were less frequently utilised but nevertheless helped to significantly reduce the coaches' current anxiety levels (-28% reduction). These positive results follow those observed in clinical health settings (Chen et al., 2021; Umbrello et al., 2021) and athletes (Elliot et al., 2014, John et al., 2012). As such, we suggest that music can be used by elite soccer coaches as a tool to aid anxiety and falling asleep. Further research is nevertheless required to determine why not all the coaches used the application or tended to use it for sleep rather than anxiety purposes. Similarly, a stronger experimental approach employing a longitudinal randomized controlled study design, a larger sample size to increase statistical power in addition to inclusion of qualitative (e.g., questionnaires) and quantitative (e.g., physiological responses) metrics is necessary. We estimate that to achieve a statistical power level of 90%, a sample size of 62 participants (accounting for a 20% drop out rate) would be necessary for a future randomized controlled study.

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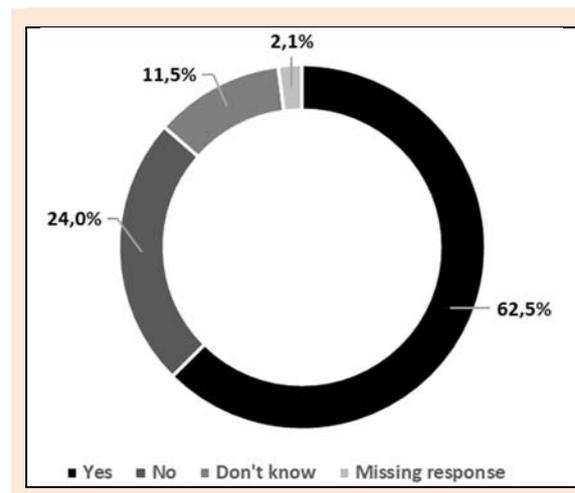


Figure 1. Effects of the music application on aiding participants fall asleep.

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