The individual and combined effect of hypoxia and music on physical performance [Abstract]

The Individual and Combined Effect of Hypoxia and Music on Physical Performance.

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Humans ascending to high altitude are susceptible to debilitating psychological alterations which include severe mood changes, cognitive fatigue, and neuropsychological impairments. The combination of environmental stressors that occur at altitude can further inhibit both physical and cognitive performance. **PURPOSE:** Music has ergogenic effects on physical performance through enhancing psychological factors such as mood, emotion and cognition. This study aimed to explore the impact of music as a tool for mitigating the performance decrements observed at altitude. **METHODS:** Following ethical approval from Loughborough University, 13 healthy males (mean ± SD; 23.9 ± 4.01 years) completed one familiarisation session and four counterbalanced experimental trials; 1) normoxia (0.209 FiO_2) and no music; 2) normoxia (0.209 FiO_2) with music; 3) normobaric hypoxia (0.13 FiO_2) and no music; 4) normobaric hypoxia (0.13 FiO_2) with music. All conditions were completed at 21°C with 50% relative humidity. Music was self-selected by each participant prior to the familiarisation session. The songs were assessed for their motivational qualities using the Brunel Music Rating Inventory (BMRI-2). Each experimental trial included a 15-min self-paced time trial on an arm bike, followed by a 60-s isometric maximal voluntary contraction (MVC) of the biceps brachii. Supramaximal nerve stimulation was used to quantify central and peripheral fatigue with voluntary activation (VA%) calculated using the twitch interpolation method. Subjective measures included motivation (MS) and mood using the Brunel Mood Scale (BRUMS). **RESULTS:** Average power output (W) was reduced with a main effect of hypoxia ($p = 0.02$) and significantly increased with a main effect of music ($p = 0.001$). When combined the interaction was additive ($p = 0.87$). Average MVC force (N) was reduced in hypoxia ($p = 0.03$) but VA% of the biceps brachii was increased with music ($p = 0.02$). MS and BRUMS remained unchanged across all conditions ($p > 0.06$). Music reduced subjective scores of mental effort, breathing discomfort, and arm discomfort in hypoxia ($p < 0.001$). **CONCLUSION:** Music increased self-paced and maximal physical exertion through enhancing neural drive and diminishing detrimental mental processes, enhancing performance at both sea level and high altitude.