Music in the workplace: a narrative literature review of intervention studies

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Background Music is widely used in clinical and rehabilitative fields and recently also in the field of Occupational Medicine. This review aims at selecting the evidence-based studies regarding music interventions in workplaces. Methods In order to carry out a narrative literature review, two independent pairs of investigators searched in PubMed and PsycInfo databases to select Randomized Controlled Trials (RCTs) or Clinical Controlled Trials (CCTs) in English regarding music and music therapy interventions in workplaces; the trials were published in peer-reviewed journals from January 2000 to February 2017. Results Fourteen articles met the inclusion criteria and were included in this review. Among these, ten were RCTs and four CCTs. The vast majority of RCTs were conducted on students or medical personnel (n=8), while only a few RCTs (n=2) were carried out on air traffic controllers or sick leave workers. Firefighters, computer systems developers, nursing students and office workers were studied through a CCT study design (n=4). Conclusions Psychological factors, communication, rehabilitative outcomes and cognitive and work performances seem to be the principal areas of interest in the field of music and occupational medicine, with possible economic benefits. Future studies should adopt rigorous methodological criteria to carry out larger samples on a wide range of professional categories and music/music therapy interventions.

La musica di sottofondo è ampiamente usata nei campi clinico e riabilitativo e recentemente anche in quello della medicina occupazionale. Il presente articolo mira a selezionare gli studi basati sull'evidenza relativi agli interventi musicali nei luoghi di lavoro. Al fine di effettuare una revisione narrativa della letteratura, due coppie indipendenti di Ricercatori hanno analizzato i database di PubMed e PsycInfo per selezionare Studi Randomizzati Controllati (RCTs) o Studi Clinici Controllati (CCTs) in inglese, relativi agli interventi di musica e musicoterapia nei luoghi di lavoro: gli studi sono
Music therapy enhances executive functions and prefrontal structural neuroplasticity after traumatic brain injury: evidence from a randomized controlled trial

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Traumatic brain injury (TBI) causes lifelong cognitive deficits, particularly impairments of executive functioning (EF). Musical training and music-based rehabilitation have been shown to enhance cognitive functioning and neuroplasticity, but the potential rehabilitative effects of music in TBI are still largely unknown. The aim of the present cross-over randomized controlled trial (RCT) was to determine the clinical efficacy of music therapy on cognitive functioning in TBI and to explore its neural basis. Using an AB/BA design, 40 patients with moderate or severe TBI were randomized to receive a 3-month neurological music therapy intervention either during the first (AB, n = 20) or second (BA, n = 20) half of a 6-month follow-up period. Neuropsychological and motor testing and MRI scanning was performed at baseline and at the 3-month and 6-month stage. 39 subjects who participated in baseline measurement were included in an intention-to-treat analysis using multiple imputation. Results showed that general EF (as indicated by the Frontal Assessment Battery) and set shifting improved more in the AB group than in the BA group over the first 3-month period and the effect on general EF was maintained in the 6-month follow-up. Voxel-based morphometry (VBM) analysis of the structural MRI data indicated that grey matter volume (GMV) in the right inferior frontal
Predictability and uncertainty in the pleasure of music: a reward for learning?

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Music ranks among the greatest human pleasures. It consistently engages the reward system, and converging evidence implies it exploits predictions to do so. Both prediction confirmations and errors are essential for understanding one's environment, and music offers many of each as it manipulates interacting patterns across multiple timescales. Learning models suggest that a balance of these outcomes, i.e., intermediate complexity, optimizes the reduction of uncertainty to rewarding and pleasurable effect. Yet evidence of a similar pattern in music is mixed, hampered by arbitrary measures of complexity. In the present studies, we applied a well-validated information-theoretic model of auditory expectation to systematically measure two key aspects of musical complexity: predictability (operationalized as information content, IC), and uncertainty (entropy). In Study 1, we evaluated how these properties affect musical preferences in 43 male and female participants; in Study 2, we replicated Study 1 in an independent sample of 27 people and assessed the contribution of veridical predictability by presenting the same stimuli seven times. Both studies revealed significant quadratic effects of IC and entropy on liking that outperformed linear effects, indicating reliable preferences for music of intermediate complexity. An interaction between IC and entropy further suggested preferences for more predictability during more uncertain contexts, which would facilitate uncertainty reduction. Repeating stimuli decreased liking ratings but did not disrupt the preference for intermediate complexity. Together, these findings support long-hypothesized optimal zones of predictability and uncertainty in musical pleasure with formal modeling, relating the pleasure of music listening to the intrinsic reward of learning. Abstract pleasures like music claim much of our time,
energy, and money despite lacking any clear adaptive benefits like food or shelter. Yet as music manipulates patterns of melody, rhythm, and more, it proficiently exploits our expectations. Given the importance of anticipating and adapting to our ever-changing environments, making and evaluating uncertain predictions can have strong emotional effects. Accordingly, we present evidence that listeners consistently prefer music of intermediate predictive complexity, and that preferences shift towards expected musical outcomes in more uncertain contexts. These results are consistent with theories that emphasize the intrinsic reward of learning, both by updating inaccurate predictions and validating accurate ones, which is optimal in environments that present manageable predictive challenges, i.e. reducible uncertainty.

La musica si colloca tra i più grandi piaceri umani. Coinvolge costantemente il sistema della ricompensa e l'evidenza convergente implica che la musica sfruti le previsioni per farlo. Sia le conferme sia gli errori delle previsioni sono essenziali per comprendere il proprio ambiente, e la musica offre gli uni e le altre mentre manipola schemi di interazione su più scale temporali. I modelli di apprendimento suggeriscono che un equilibrio di questi risultati, come la complessità intermedia, ottimizza la riduzione dell'incertezza a un effetto gratificante e piacevole. Eppure l'evidenza di un modello simile in musica è mista, ostacolata da misure arbitrarie della complessità. Negli studi qui presentati, i Ricercatori hanno applicato un modello teorico dell'informazione validato sull'aspettativa utitiva per misurare sistematicamente due aspetti chiave della complessità musicale: la prevedibilità (operazionalizzata come contenuto informativo, IC) e l'incertezza (entropia). Nello Studio 1 i Ricercatori hanno valutato come queste proprietà influiscano sulle preferenze musicali in 43 partecipanti maschi e femmine; nello Studio 2 hanno replicato lo Studio 1 in un campione indipendente di 27 persone e valutato il contributo della prevedibilità veridica presentando gli stimoli 7 volte. Entrambi gli studi rivelano significativi effetti quadratici di IC ed entropia sul gradimento, che hanno determinato prestazioni migliori degli effetti lineari, indicando quindi preferenze affidabili per la musica di complessità intermedia. Un'interazione tra IC ed entropia ha inoltre suggerito preferenze per una maggiore prevedibilità in contesti più incerti, il che faciliterebbe la riduzione dell'incertezza. La ripetizione degli stimoli ha ridotto le valutazioni di gradimento, ma non ha interrotto la preferenza per la complessità intermedia. Insieme, questi risultati supportano zone ottimali a lungo ipotizzate di prevedibilità e incertezza nel piacere musicale con la modellistica formale, mettendo in relazione il piacere dell'ascolto musicale con la ricompensa intrinseca dell'apprendimento. I piaceri astratti come la musica rivendicano gran parte del nostro tempo, energia e denaro, malgrado manchino eventuali e chiari benefici adattativi come cibo o riparo. Tuttavia, mentre la musica manipola schemi di melodia, ritmo e altro, sfrutta abilmente le nostre aspettative. Data l'importanza di anticipare e adattarsi ai nostri ambienti in continua evoluzione, fare e valutare previsioni incerte può avere forti effetti emotivi. Di conseguenza, i Ricercatori presentano prove del fatto che gli ascoltatori preferiscono costantemente la musica di complessità predittiva intermedia e che le preferenze si spostano verso i risultati musicali attesi in contesti più incerti. Tali risultati sono coerenti con le teorie che enfatizzano la ricompensa intrinseca dell'apprendimento, sia aggiornando previsioni imprecise, sia validando quelle accurate, il che è ottimale in ambienti che presentano sfide predittive gestibili, cioè incertezza riducibile.

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The benefits of an afterschool music program for low-income, urban youth: the music haven evaluation project

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This study was an evaluation of an afterschool music program that serves primarily low-income, urban children, and adolescents. The evaluation examined academic and nonacademic outcomes through a mixed-method design. Focus group participants included 10 parents/caregivers and 8 youth. Focus groups yielded several themes regarding academic and nonacademic (musical skills, responsibility/discipline, self-efficacy, empowerment, social competence, and family bonding) benefits of involvement with the program. An annual questionnaire for the program was created based on these themes. Fifty-three parents/caregivers completed the questionnaire and rated their children highly on all outcomes. The independent t tests revealed that lower-income students were rated higher on responsibility/discipline than higher-income students and that those children who attended the program more than three times per week were rated higher on responsibility/discipline than those
who attended less. Implications of these results, particularly the need for increased access to afterschool music programs for low-income youth, are discussed.

Questo studio rappresenta una valutazione di un programma di musica doposcuola rivolto soprattutto a bambini e adolescenti a basso reddito in ambito urbano. La valutazione ha esaminato i risultati accademici e non attraverso un disegno a metodi misti. I partecipanti al focus group includevano 10 genitori/caregiver, e 8 bambini/adolescenti. I focus group hanno raccolto diversi temi riguardanti i vantaggi accademici e non accademici del coinvolgimento con il programma (abilità musicali, responsabilità/disciplina, autoefficacia, senso di empowerment, competenza sociale e legame familiare). Sulla base di questi temi è stato creato un questionario annuale per il programma. 53 genitori/caregiver hanno completato il questionario e valutato i loro figli su tutti i risultati. I test t hanno rivelato che gli studenti a basso reddito sono stati classificati a livello più alto sull’area responsabilità/disciplina rispetto agli studenti a più alto reddito, e che quei bambini che hanno frequentato il programma più di tre volte a settimana hanno avuto un punteggio maggiore per la responsabilità/disciplina rispetto a quelli che lo hanno frequentato di meno. Vengono discusse le implicazioni di questi risultati, in particolare la necessità di aumentare l’accesso ai programmi di musica doposcuola per i ragazzi a basso reddito.

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Since its beginnings in 1985, the Mariani Foundation has established itself as a leading organization in the field of paediatric neurology by organizing a variety of advanced courses, providing research grants, and supporting specialized care. The Foundation works in close cooperation with major public healthcare institutions, complementing their scientific programs and other activities. In 2009 it became the first private entity in Italy to join the founding members of the National Neurologic Institute “Carlo Besta” in Milan. In addition to its services, the Foundation aims, through its continuing medical education courses and publications, to spread knowledge in the field of paediatric neurology in order to help treat or alleviate a large number of paediatric neurologic disorders.

In the year 2000, the Mariani Foundation has added a new and important dimension to its activities: fostering the study of the multiple links between the neurosciences and music, including music education and early intervention. This significant commitment has inspired the series of “Neurosciences and Music” conferences, held in Venice (2002), Leipzig (2005), Montreal (2008), Edinburgh (2011), Dijon (2014) and Boston (2017). The next congress is planned for 2020 in Aarhus, Denmark, in collaboration with the Center for Music in the Brain. All these meetings have led to the publication of major volumes in the Annals of the New York Academy of Sciences.

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