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Experience of playing a musical instrument and lifetime change in general cognitive ability: evidence from the Lothian Birth Cohort 1936

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We tested whether experience of playing a musical instrument was associated with lifetime change in cognitive ability. Participants were 366 older adults from the Lothian Birth Cohort 1936 who had completed general cognitive-ability assessments at ages 11 and 70 and reported their lifetime experience of playing a musical instrument at age 82. This sample included 117 participants with musical-instrument experience, mostly at a beginner or an intermediate level. There was a small, statistically significant positive association between experience of playing a musical instrument and change in general cognitive ability between ages 11 and 70; specifically, individuals with more musical-instrument experience were likely to show greater gains in general cognitive ability. This association was reduced but remained statistically significant following adjustment for covariates (childhood and adulthood socioeconomic status, years of education, and disease history). These findings suggest that playing a musical instrument is associated with a long-term cognitive advantage.

In questo studio gli Autori esplorano l'ipotesi che l'esperienza di suonare uno strumento sia associato a un cambiamento duraturo dell'abilità cognitiva. I partecipanti erano 366 adulti anziani della Coorte delle nascite di Lothian del 1936, che avevano ricevuto valutazioni cognitive a 11 e 70 anni, e hanno riportato la loro esperienza se suonavano uno strumento all'età di 82 anni. Questo campione includeva 117 partecipanti che avevano esperienza musicale, in generale a livello principiante o intermedio. Vi era una piccola associazione statisticamente significativa fra l'esperienza di suonare uno strumento e un cambio nelle abilità cognitive fra gli 11 e i 70 anni. In particolare, coloro che suonavano mostravano maggiori guadagni nelle abilità cognitive. Tale associazione era ridotta, ma rimaneva statisticamente significativa a seguito degli aggiustamenti per le covariate (stato socio-economico da bambini e da adulti, anni di

educazione e anamnesi di malattia). Queste scoperte suggeriscono che suonare uno strumento è associato a un vantaggio cognitivo di lungo termine.

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Darwin's sexual selection hypothesis revisited: musicality increases sexual attraction in both sexes

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A number of theories about the origins of musicality have incorporated biological and social perspectives. Darwin argued that musicality evolved by sexual selection, functioning as a courtship display in reproductive partner choice. Darwin did not regard musicality as a sexually dimorphic trait, paralleling evidence that both sexes produce and enjoy music. A novel research strand examines the effect of musicality on sexual attraction by acknowledging the importance of facial attractiveness. We previously demonstrated that music varying in emotional content increases the perceived attractiveness and dating desirability of opposite-sex faces only in females, compared to a silent control condition. Here, we built upon this approach by presenting the person depicted (target) as the performer of the music (prime), thus establishing a direct link. We hypothesized that musical priming would increase sexual attraction, with high-arousing music inducing the largest effect. Musical primes (25 s, piano solo music) varied in arousal and pleasantness, and targets were photos of other-sex faces of average attractiveness and with neutral expressions (2 s). Participants were 35 females and 23 males (heterosexual psychology students, single, and no hormonal contraception use) matched for musical background, mood, and liking for the music used in the experiment. After musical priming, females' ratings of attractiveness and dating desirability increased significantly. In males, only dating desirability was significantly increased by musical priming. No specific effects of music-induced pleasantness and arousal were observed. Our results, together with other recent empirical evidence, corroborate the sexual selection hypothesis for the evolution of human musicality.

Diverse teorie sulle origini della musicalità hanno incorporato prospettive biologiche e sociali. Darwin ha sostenuto che la musicalità si è evoluta per selezione sessuale, funzionando come un'esibizione di corteggiamento nella scelta del partner riproduttivo. Darwin non considerava la musicalità un tratto sessualmente dimorfico, mettendo in parallelo l'evidenza che entrambi i sessi producono e apprezzano la musica. Un nuovo filone di ricerca esamina l'effetto della musicalità sull'attrazione sessuale riconoscendo l'importanza dell'attrattiva facciale. In precedenza, gli Autori hanno dimostrato che la musica che varia nel contenuto emotivo aumenta l'attrattiva percepita e il desiderio di un appuntamento dei volti di sesso opposto solo nelle donne, rispetto a una condizione di controllo silenzioso. Nello studio è stato costruito questo approccio presentando la persona raffigurata (target) come l'esecutore della musica (prime), stabilendo così un collegamento diretto. Gli Autori hanno ipotizzato che il priming musicale aumenti l'attrazione sessuale, con la musica altamente eccitante che indurrebbe l'effetto più grande. I prime musicali (25 secondi, musica per assolo di pianoforte) variavano in eccitazione e piacevolezza, e gli obiettivi erano foto di volti del sesso opposto mediamente attraenti e con espressioni neutre (2 secondi). I partecipanti erano 35 femmine e 23 maschi (studenti di psicologia eterosessuale, single e che non usavano contraccettivi ormonali) abbinati per sottofondo musicale, umore e apprezzamento per la musica utilizzata nell'esperimento. Dopo il priming musicale, le valutazioni delle donne sull'attrattiva e sul desiderio di un appuntamento sono aumentate in modo significativo. Nei maschi, il priming musicale faceva aumentare notevolmente solo il desiderio di un appuntamento. Non sono stati osservati effetti specifici della piacevolezza e dell'eccitazione indotti dalla musica. I loro risultati, insieme ad altre recenti evidenze empiriche, corroborano l'ipotesi della selezione sessuale per l'evoluzione della musicalità umana.

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Musical activity during life is associated with multi-domain cognitive and brain benefits in older adults

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Regular musical activity as a complex multimodal lifestyle activity is proposed to be protective against age-related cognitive decline and Alzheimer's disease. This cross-sectional study investigated the association and interplay between musical instrument playing during life, multi-domain cognitive abilities and brain morphology in older adults (OA) from the DZNE-Longitudinal Cognitive Impairment and Dementia Study (DELCODE) study. Participants reporting having played a musical instrument across three life periods ($n = 70$) were compared to controls without a history of musical instrument playing (n

= 70), well-matched for reserve proxies of education, intelligence, socioeconomic status and physical activity. Participants with musical activity outperformed controls in global cognition, working memory, executive functions, language, and visuospatial abilities, with no effects seen for learning and memory. The musically active group had greater gray matter volume in the somatosensory area, but did not differ from controls in higher-order frontal, temporal, or hippocampal volumes. However, the association between gray matter volume in distributed frontal-to-temporal regions and cognitive abilities was enhanced in participants with musical activity compared to controls. We show that playing a musical instrument during life relates to better late-life cognitive abilities and greater brain capacities in OA. Musical activity may serve as a multimodal enrichment strategy that could help preserve cognitive and brain health in late life. Longitudinal and interventional studies are needed to support this notion.

Si propone che l'attività musicale regolare, come attività di stile di vita multimodale complessa, sia protettiva contro il declino cognitivo legato all'età e il morbo di Alzheimer. Questo studio cross-sezionale ha studiato l'associazione e l'interazione tra l'esecuzione di strumenti musicali durante la vita, le capacità cognitive multidominio e la morfologia del cervello negli anziani (OA) dallo studio DZNE-Longitudinal Cognitive Impairment and Dementia Study (DELCODE). I partecipanti che hanno riferito di aver suonato uno strumento musicale in tre periodi di vita (n = 70) sono stati confrontati con controlli senza una storia di strumenti musicali (n = 70), ben appaiati per proxy di riserva di istruzione, intelligenza, stato socioeconomico e attività fisica. I partecipanti con attività musicale hanno superato i controlli nella cognizione globale, nella memoria di lavoro, nelle funzioni esecutive, nel linguaggio e nelle abilità visuospatiali, senza effetti sull'apprendimento e sulla memoria. Il gruppo musicalmente attivo aveva un volume di sostanza grigia maggiore nell'area somatosensoriale, ma non differiva dai controlli nei volumi di ordine superiore frontali, temporali o ippocampali. Tuttavia, l'associazione tra il volume della sostanza grigia nelle regioni frontali e temporali distribuite e le capacità cognitive era aumentata nei partecipanti con attività musicale rispetto ai controlli. Gli Autori mostrano che suonare uno strumento musicale durante la vita si collega a migliori capacità cognitive in tarda età e maggiori capacità cerebrali negli anziani. L'attività musicale può servire come strategia di arricchimento multimodale, che potrebbe aiutare a preservare la salute cognitiva e cerebrale in tarda età. Sono necessari studi longitudinali e di intervento per supportare tale nozione.

Music Sci 2022 Sep;26(3):604-626 The dynamics of musical participation

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In this paper we argue that our comprehension of musical participation—the complex network of interactive dynamics involved in collaborative musical experience—can benefit from an analysis inspired by the existing frameworks of dynamical systems theory and coordination dynamics. These approaches can offer novel theoretical tools to help music researchers describe a number of central aspects of joint musical experience in greater detail, such as prediction, adaptivity, social cohesion, reciprocity, and reward. While most musicians involved in collective forms of musicking already have some familiarity with these terms and their associated experiences, we currently lack an analytical vocabulary to approach them in a more targeted way. To fill this gap, we adopt insights from these frameworks to suggest that musical participation may be advantageously characterized as an open, non-equilibrium, dynamical system. In particular, we suggest that research informed by dynamical systems theory might stimulate new interdisciplinary scholarship at the crossroads of musicology, psychology, philosophy, and cognitive (neuro)science, pointing toward new understandings of the core features of musical participation.

In questo articolo gli Autori sostengono che la loro comprensione della partecipazione musicale, la complessa rete di dinamiche interattive coinvolte nell'esperienza musicale collaborativa, può trarre vantaggio da un'analisi ispirata alle strutture esistenti della teoria dei sistemi dinamici e della dinamica di coordinazione. Tali approcci possono offrire nuovi strumenti teorici per aiutare i ricercatori musicali a descrivere in modo più dettagliato una serie di aspetti centrali dell'esperienza musicale congiunta, come

la previsione, l'adattabilità, la coesione sociale, la reciprocità e la ricompensa. Mentre la maggior parte dei musicisti coinvolti in forme collettive di musica ha già una certa familiarità con questi termini e le loro esperienze associate, attualmente non hanno un vocabolario analitico per affrontarli in modo più mirato. Per colmare tale lacuna, gli Autori adottano intuizioni da queste strutture per suggerire che la partecipazione musicale possa essere vantaggiosamente caratterizzata come un sistema dinamico aperto, di non equilibrio. In particolare, suggeriscono che la ricerca informata dalla teoria dei sistemi dinamici potrebbe stimolare lo studio interdisciplinare al crocevia di musicologia, psicologia, filosofia e (neuro)scienza cognitiva, puntando verso nuove comprensioni delle caratteristiche fondamentali della partecipazione musicale.

The Pierfranco and Luisa Mariani Foundation

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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), Boston (2017), and Aarhus (2021). 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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