CENTRO STUDI
ALVISE CORNARO
STUDI E RICERCHE SULL'INVECCHIAMENTO DELL'UOMO

Dott. Alfredo Raglio, PhD
Università degli Studi di Pavia
Istituti Clinici Scientifici Maugeri (PV)
Fondazione Istituto Ospedaliero di Sospiro (CR)
alfredo.raglio@unipv.it

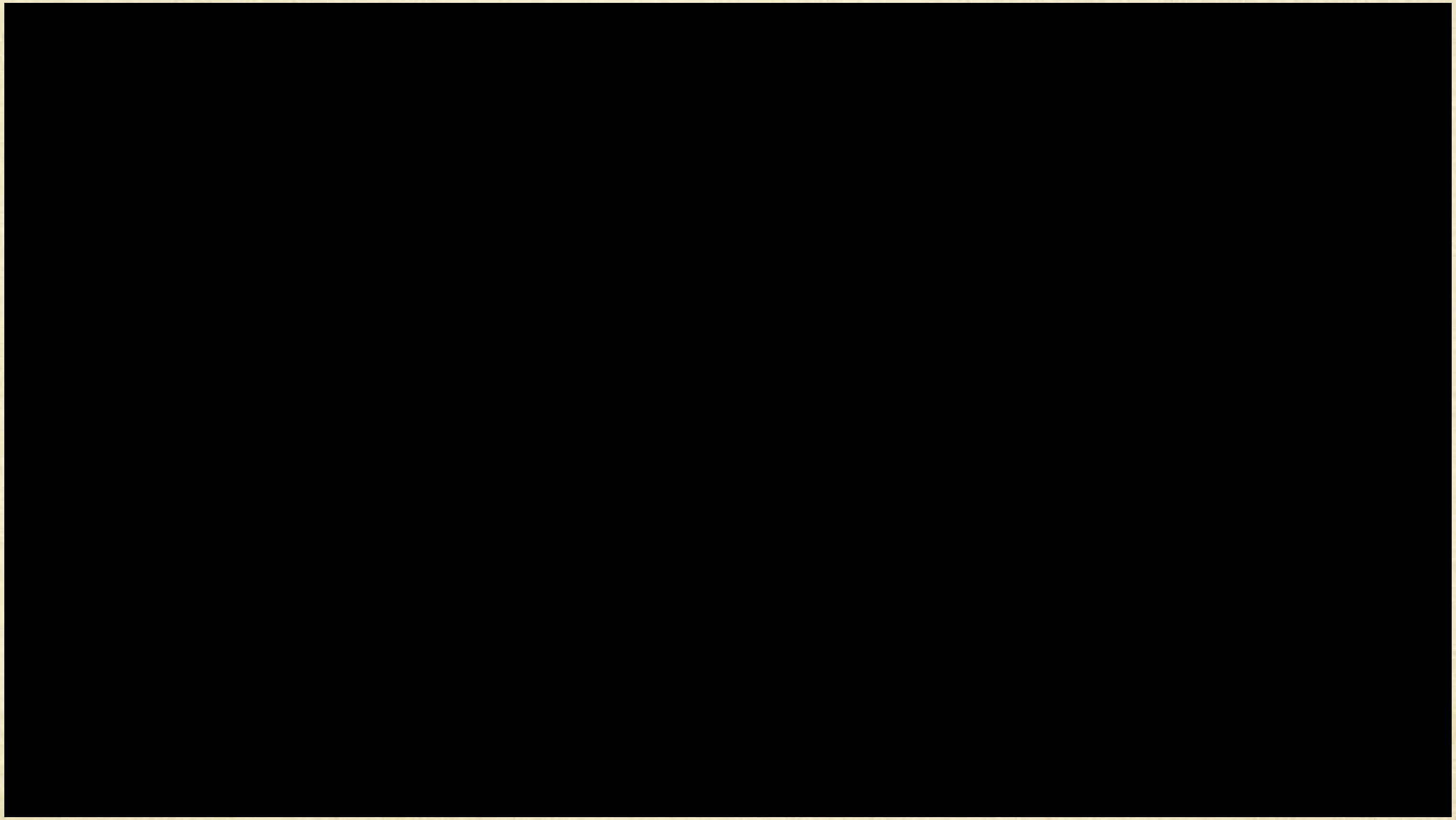
Aula Magna – Palazzo Bo, Università di Padova
9 novembre 2017

Summary

- “The power of music”
- Musica e salute
- Musica come terapia
- Fondamenti neuroscientifici e psicologici della terapia con la musica
- La musica in ambito psicogeriatrico: esperienze cliniche e di ricerca (evidenze scientifiche)
- Conclusioni

I suoni attraggono... E... Divertono...

I suoni aggregano...



OPEN ACCESS Freely available online PLOS ONE

Prenatal Music Exposure Induces Long-Term Neural Effects

Eino Partanen[1,2*], Teija Kujala[1,3], Mari Tervaniemi[1,2], Minna Huotilainen[1,2,4]

1 Cognitive Brain Research Unit, Cognitive Science, Institute of Behavioural Sciences, University of Helsinki, Helsinki, Finland, 2 Finnish Center of Excellence in Interdisciplinary Music Research, Department of Music, University of Jyväskylä, Jyväskylä, Finland, 3 Cicero Learning, University of Helsinki, Helsinki, Finland, 4 Finnish Institute of Occupational Health, Helsinki, Finland

Abstract

We investigated the neural correlates induced by prenatal exposure to melodies using brains' event-related potentials (ERPs). During the last trimester of pregnancy, the mothers in the *learning* group played the 'Twinkle twinkle little star' -melody 5 times per week. After birth and again at the age of 4 months, we played the infants a modified melody in which some of the notes were changed while ERPs to unchanged and changed notes were recorded. The ERPs were also recorded from a control group, who received no prenatal stimulation. Both at birth and at the age of 4 months, infants in the *learning* group had stronger ERPs to the unchanged notes than the control group. Furthermore, the ERP amplitudes to the changed and unchanged notes at birth were correlated with the amount of prenatal exposure. Our results show that extensive prenatal exposure to a melody induces neural representations that last for several months.

La musica fa bene alla madre e al nascituro

- L'uso della musica associata a tecniche di respirazione come parte della "antenatal care" è in grado di ridurre l'ansia e la depressione associate alla gravidanza.
- La musica, specie quella dal vivo influenza significativamente anche il feto, come si può derivare da un aumento della frequenza cardiaca, un segno di benessere.
- Le risposte fetali alla musica si possono obiettivare già a partire dalla 16° settimana di gestazione.
- Dopo la 28 settimana l'organo dell'udito è sviluppato e permette al feto di sentire nitidamente

...


MOMMY'S
HERO








Giornata







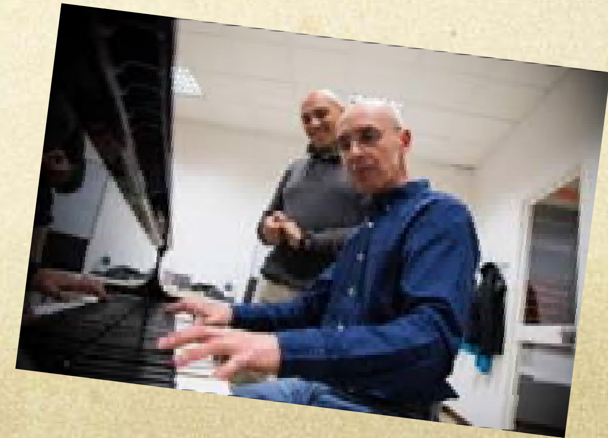


magic bus













MUSICA E SALUTE

PROGRESSI SCIENTIFICI

SOLIDE EVIDENZE A FAVORE

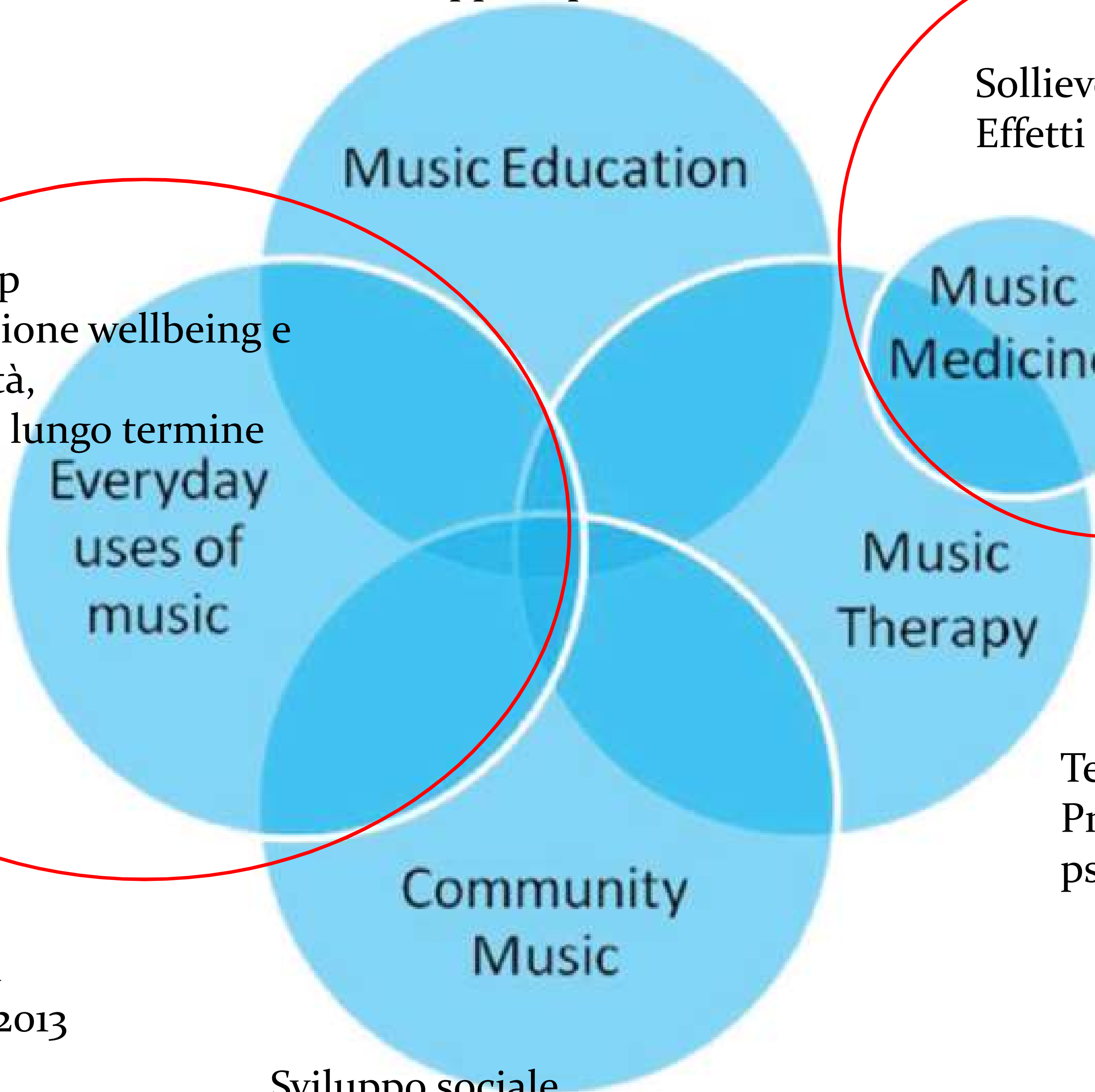
PLAUSIBILITA' BIOLOGICA

FATTORI CHE INFLUENZANO LO STATO DI SALUTE

Sviluppo capacità

Sollievo dallo stress
Effetti a breve termine

Self-help
Promozione wellbeing e longevità,
Effetti a lungo termine



Terapia
Problemi psico-cognitivi

Da Raymond Macdonald, 2013

Sviluppo sociale

MEDICAL HUMANITIES
Harvey B. Simon, MD, Section Editor

The American Journal of Medicine, Vol 128, No 2, February 2015

THE AMERICAN JOURNAL of MEDICINE®

Music as Medicine

CrossMark

Harvey B. Simon, MD[a,b,c]

[a]Department of Medicine, Harvard Medical School, Boston, Mass; [b]Health Sciences Technology Faculty, Massachusetts Institute of Technology, Cambridge; [c]Massachusetts General Hospital, Boston.

Music is a fundamental attribute of the human species. Virtually all cultures, from the most primitive to the most advanced, make music. It's been true through history, and it's true throughout an individual's lifespan. In tune or not, we humans sing and hum; in time or not, we clap and sway; in step or not, we dance and bounce.

The human brain is hardwired to distinguish music from noise and to respond to rhythm and repetition, tones, and tunes. The auditory nerve transmits the electrical signals of music and other sounds to the auditory cortex in the temporal lobe. Studies using magnetic resonance imaging and positron emission tomography scans suggest that nerve

composed of doctors and medical students perform regularly in Boston, Los Angeles, Philadelphia, and Houston.[4] Many surgeons play music in their operating rooms to enhance concentration and focus, and many practitioners rely on music for relaxation, stimulation, and pleasure.

Music is important for many physicians—but can doctors use music to promote the health and well-being of their patients? A variety of studies suggest the answer may be yes. Some are blinded, randomized trials, but most are relatively small and brief. Still, they present an interesting group of observations.

La formazione del musicoterapeuta:

MUSICALE

RELAZIONALE

CLINICA

Modello di riferimento:

BACKGROOUND TEORICO/METODOLOGICO
(PSICOLOGICO E/O NEUROSCIENTIFICO)

Dr. Raglio Alfredo, PhD

Setting terapeutico strutturato:

CONTENITORE MENTALE, RELAZIONALE E MATERIALE ATTO A FAVORIRE L PROCESSO TERAPEUTICO

Obiettivi terapeutici:

PREVENZIONE SECONDARIA (RIDUZIONE E/O STABILIZZAZIONE DEI SINTOMI) E **TERZIARIA** (RIDUZIONE E/O STABILIZZAZIONE DELLE COMPLICANZE); CAMBIAMENTI SUL PIANO PSICOLOGICO, RELAZIONALE, COGNITIVO, MOTORIO, FISIOLOGICO…

OBIETTIVI TENDENTI ALLA STABILIZZAZIONE DEI RISULTATI (IN RAPPORTO ALLA GRAVITA' DELLE CONDIZIONI CLINICHE CONSIDERATE)

Contenuti (tecniche):

Attive

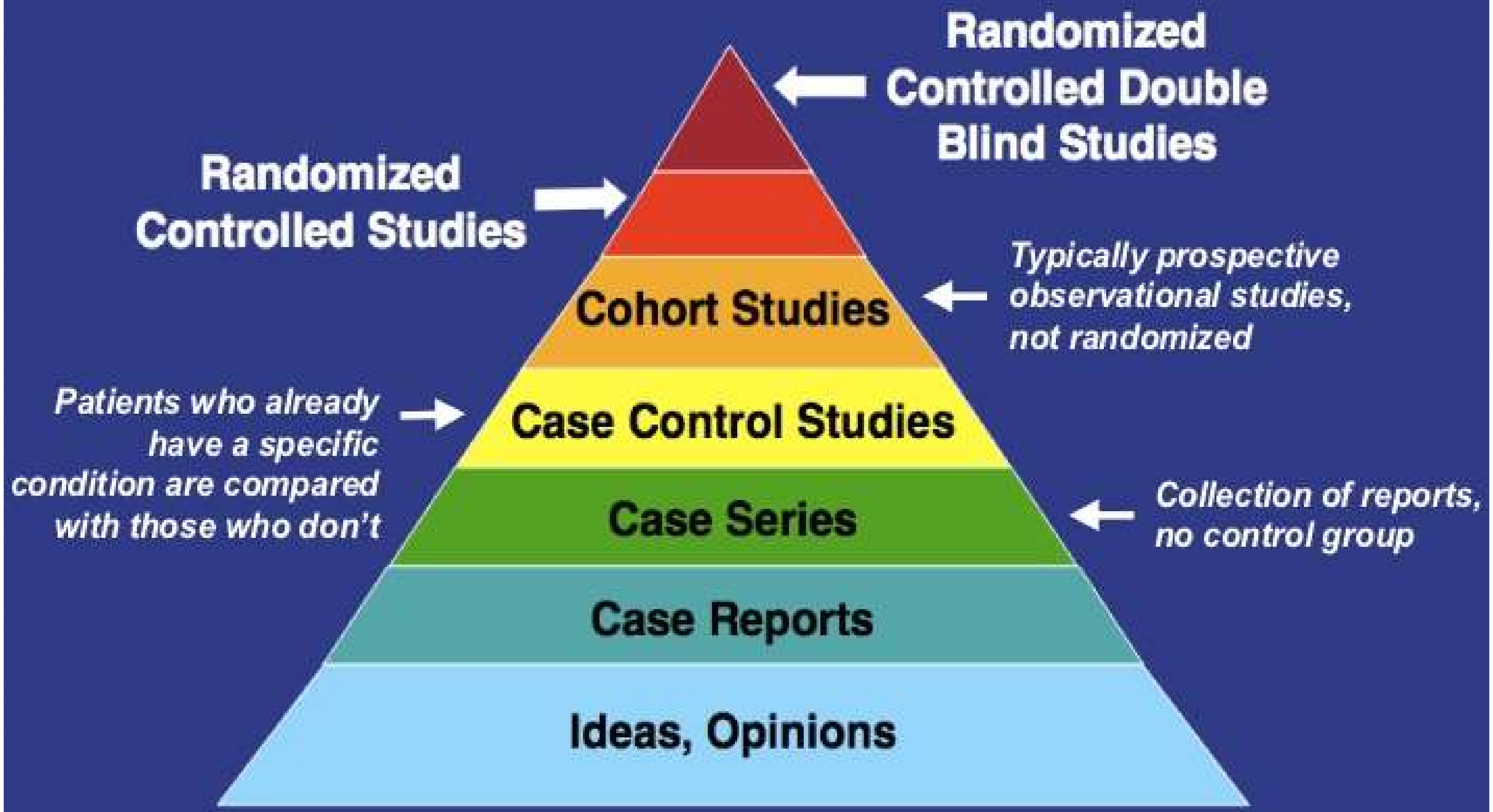
Recettive

Rigorosi criteri di verifica:

Valutazione del processo

Valutazione degli esiti

Evidence-Based Pyramid



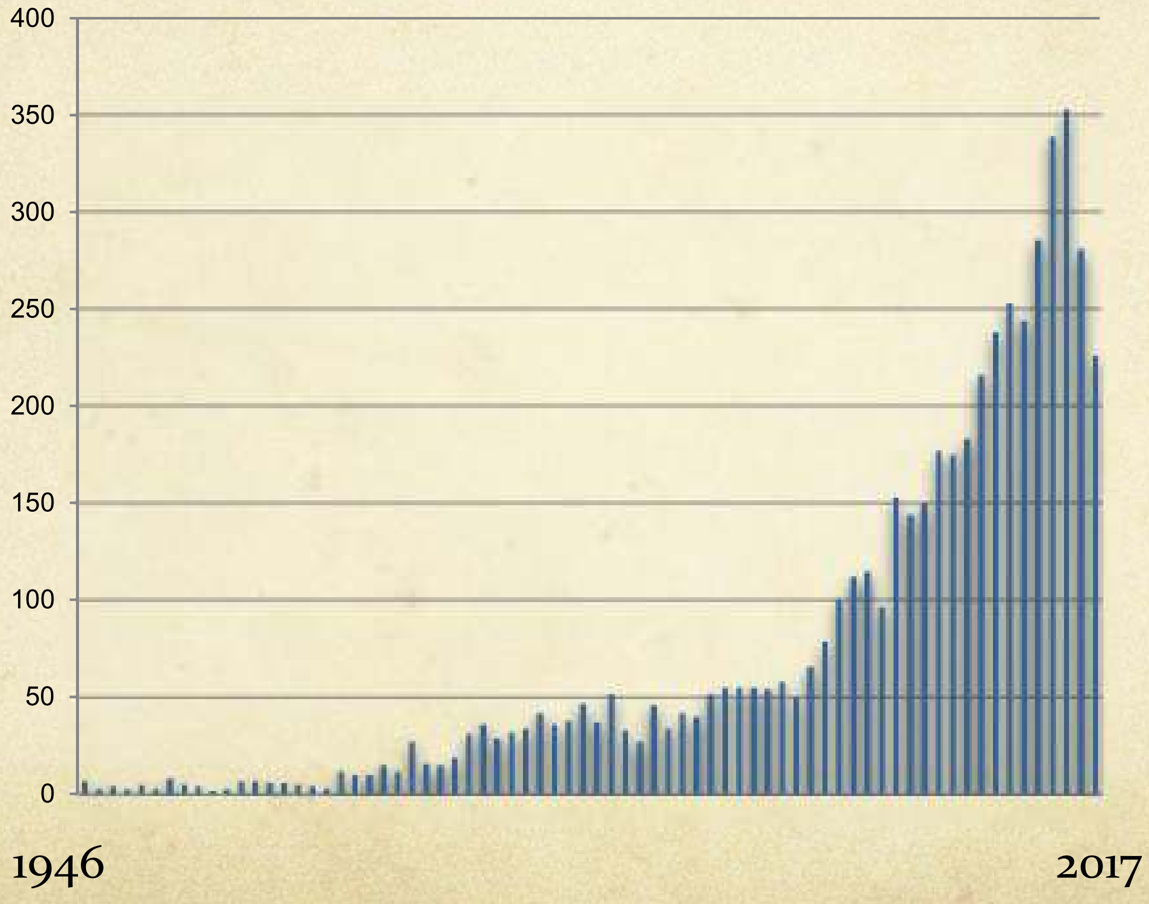
EVIDENCE BASED MEDICINE

↓

EVIDENCE BASED MUSIC THERAPY

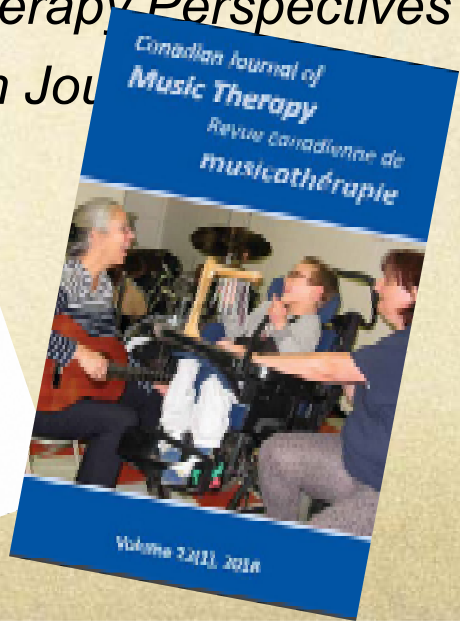
(Edwards, 2002; 2004; Vink & Bruinsma, 2003; Rolvsjord et al., 2005; Abrams, 2010)

Ricerca in PubMed: parola chiave "Music Therapy"



Journals of Music Therapy:

- *Journal of Music Therapy*
- *Nordic Journal of Music Therapy*
- *British Journal of Music Therapy*
- *Australian Journal of Music Therapy*
- *Music Therapy Perspectives*
- *dian Jou y*

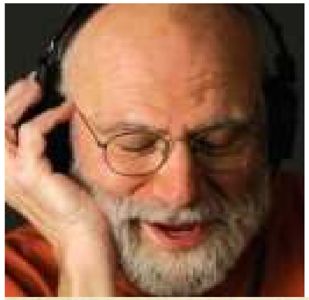


La letteratura scientifica...

Musicoterapia e…

- Cancro (Bradt et al., 2016)
- Depressione (Maratos et al., 2008)
- Cure di fine vita (Bradt & Dileo, 2014)
- Danno cerebrale acquisito (Magee et al., 2017)
- Autismo (Geretsegger et al., 2014)
- Demenza (van der Steen et al., 2017)
- Schizofrenia (Geretsegger et al., 2017)
- Ansia pre-operatoria (Bradt et al., 2013

…



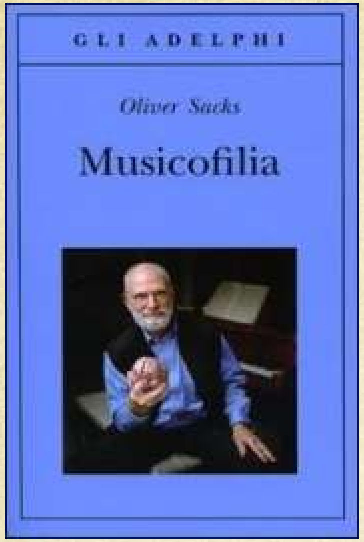
doi:10.1093/brain/awl234

Brain (2006), **129**, 2528–2532

COMMENTARY

The power of music

Dr. Alfredo Raglio, PhD



Oliver Sacks, Musicofilia (2007), p. 14

"…D'altra parte, sulla quasi totalità di noi, la musica esercita un enorme potere, indipendentemente dal fatto che la cerchiamo o meno, o che riteniamo di essere particolarmente «musicali». Una tale inclinazione per la musica traspare già dalla prima infanzia, è palese e fondamentale in tutte le culture e probabilmente risale agli albori della nostra specie. Questa **«musicofilia»** è un dato di fatto della natura umana. Può essere sviluppata o spalmata dalla cultura in cui viviamo, dalle circostanze della vita o dai particolari talenti e punti deboli che ci caratterizzano come individui; ciò nondimeno è così profondamente radicata nella nostra natura da imporci di considerarla innata, proprio come Edward O. Wilson considera innata la **«biofilia»**, il nostro sentimento verso gli altri esseri viventi. (Forse la stessa musicofilia è una forma di biofilia, giacchè noi percepiamo la musica quasi come una creatura viva). …"

THE YEAR IN COGNITIVE NEUROSCIENCE 2009

Current Advances in the Cognitive Neuroscience of Music

Daniel J. Levitin and Anna K. Tirovolas

McGill University, Montreal, QC Canada

Ann. N.Y. Acad. Sci. 1156: 211–231 (2009).

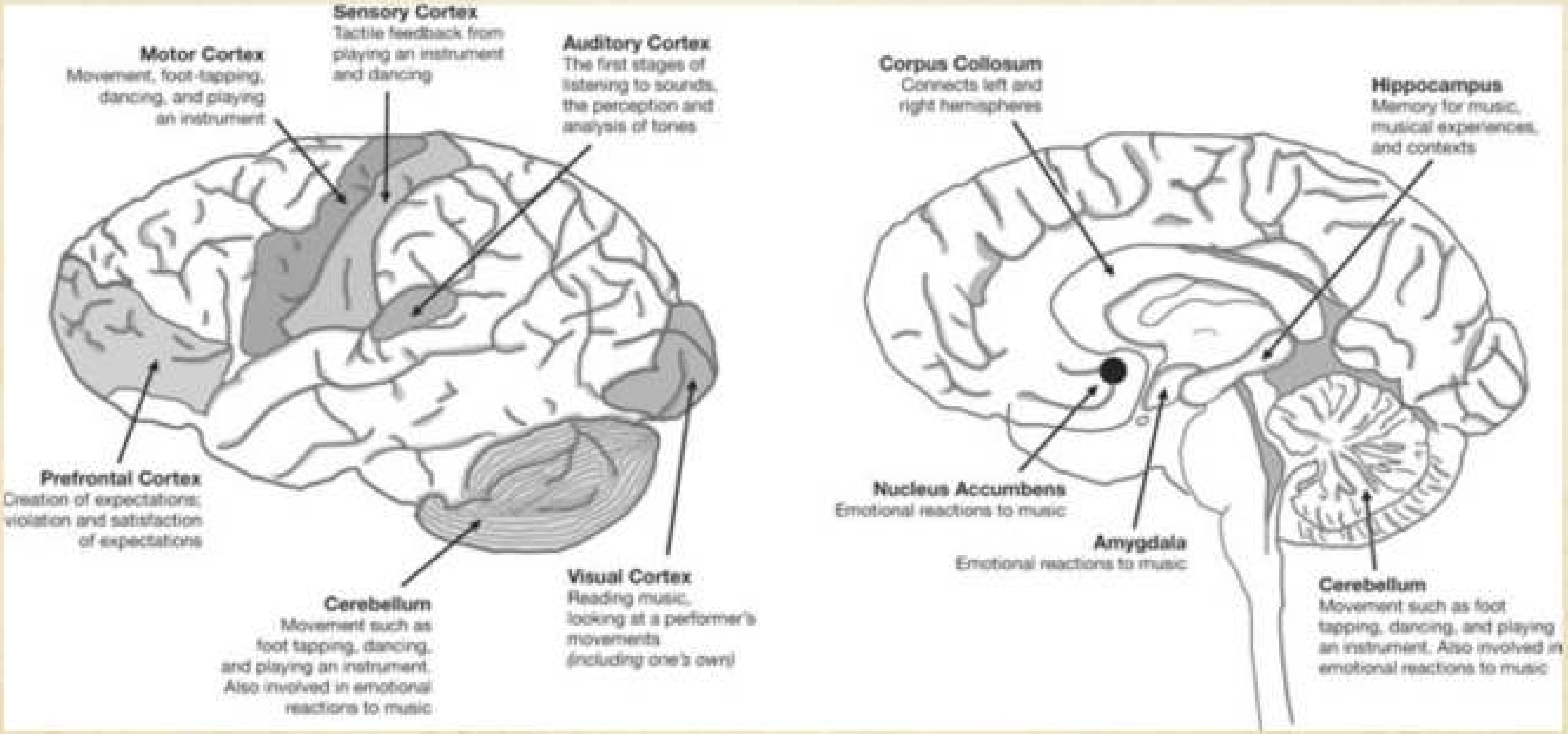
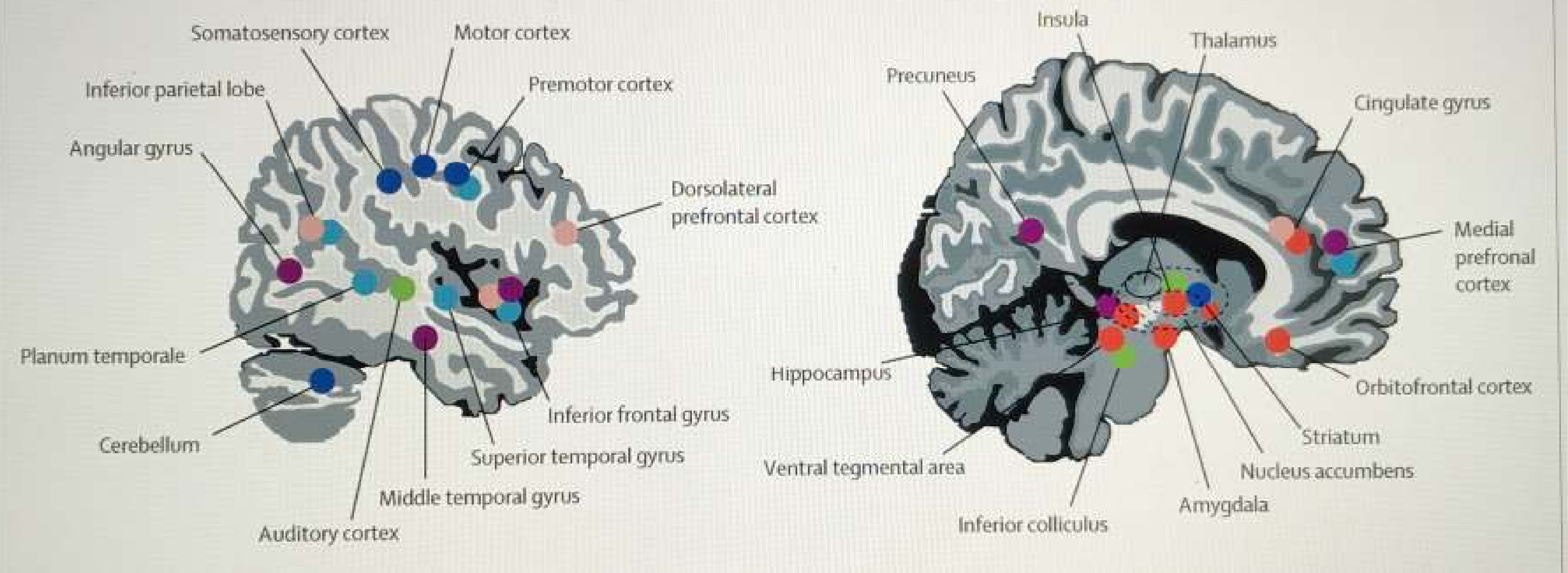


Figure 1. Core brain regions associated with musical activity. Based on Tramo 2001 and updated in 2006 (from Levitin 2006).

da Sihvonen et al., 2017, Lancet Neurology



- Basic auditory pathway: perceiving the basic acoustic features of music
- Musical–syntactic network: perceiving higher-order musical features
- Attention and working memory network: focusing and keeping track of music in time
- Episodic memory network: recognising music and recalling associated memories
- Motor network: playing, singing, and moving to the beat of music
- Reward and emotion network: music-evoked emotions and experiencing pleasure and reward

Figure 2: **Key brain areas associated with music processing**
Areas identified from neuroimaging studies of healthy people. Although the figure displays the lateral and medial parts of the right hemisphere, many musical processes are largely bilateral (with the exception of pitch and melody processing, which are lateralised, the activity in the right hemisphere being dominant). Adapted from Särkämö and colleagues.[16]

da Sihvonen et al., 2017, Lancet Neurology

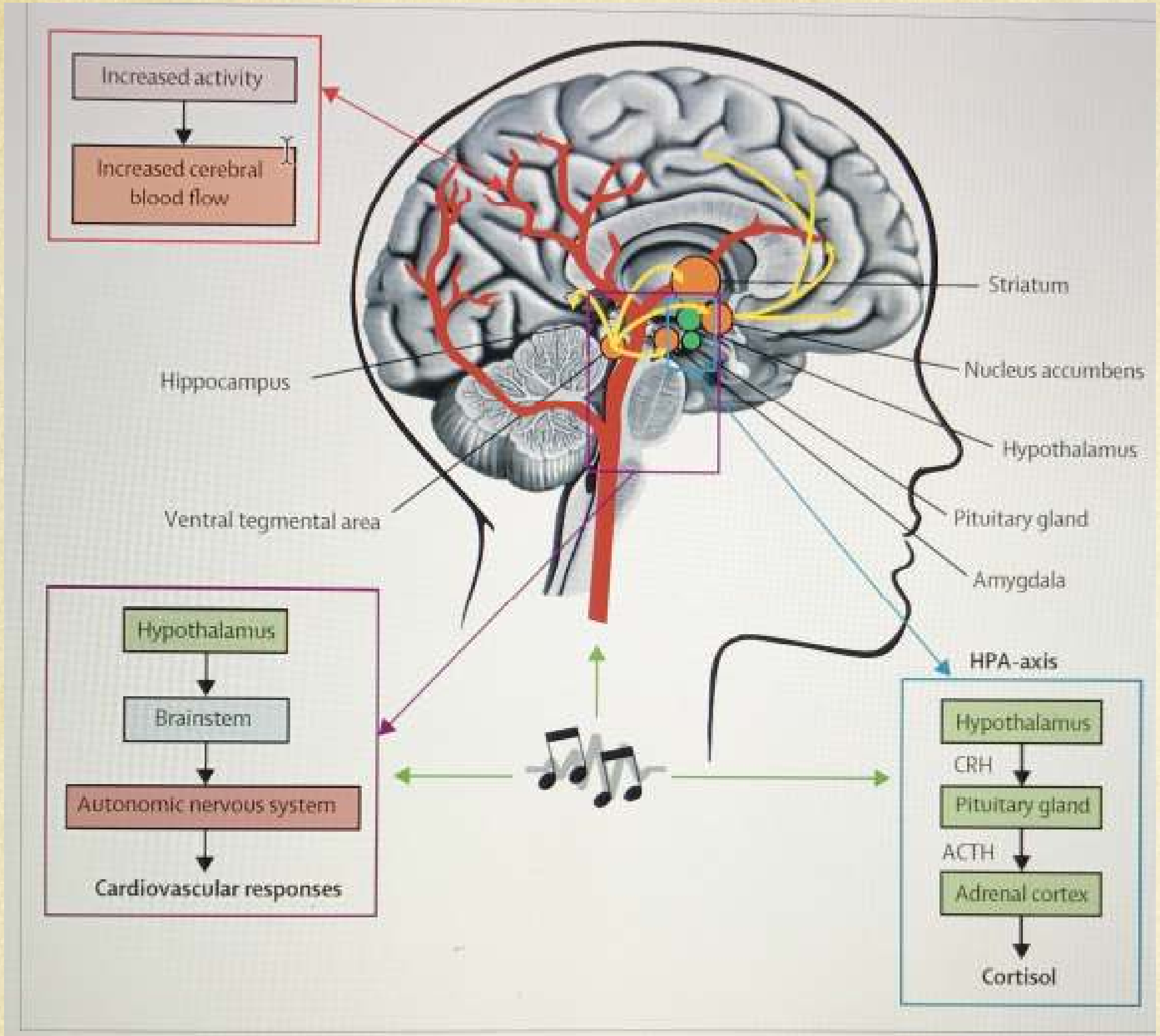
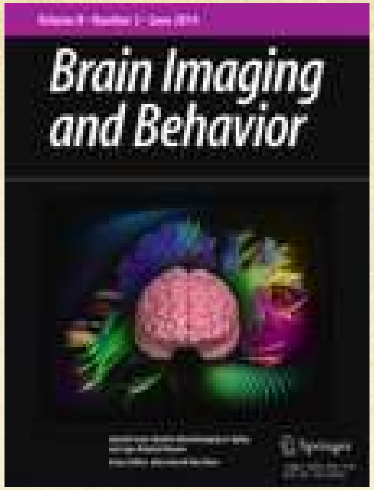


Figure 3: **Possible neurobiological mechanisms for the rehabilitative effect of music**
Orange circles and yellow arrows represent the mesolimbic system, and the green circles represent the HPA axis. ACTH=adrenocorticotropic hormone. CRH=corticotropin-releasing hormone. HPA axis=hypothalamic-pituitary-adrenal axis.

- Attivazione globale
- Aumento flusso ematico arteria cerebrale media
- Plasticità (cognitiva, motoria), connettività
- Stimolazione circuiti piacere, ricompensa, arousal (produzione dopamina): effetti positivi su memoria, attenzione, funzioni esecutive, umore, motivazione…
- Attivazione parasimpatico (effetto rilassante della musica, risposte cardiovascolari)
- Riduzione cortisolo (effetti sullo stress, asse ipotalamo-ipofisi-surrene)
- Entrainment ritmico
- Canto e attivazione bilaterale delle regioni frontotemporali del linguaggio e motorio-vocali (MIT)



Raglio A, Galandra C, Sibilla L, Esposito F, Gaeta F, Di Salle F, Moro L, Carne I, Bastianello S, Baldi M, Imbriani M

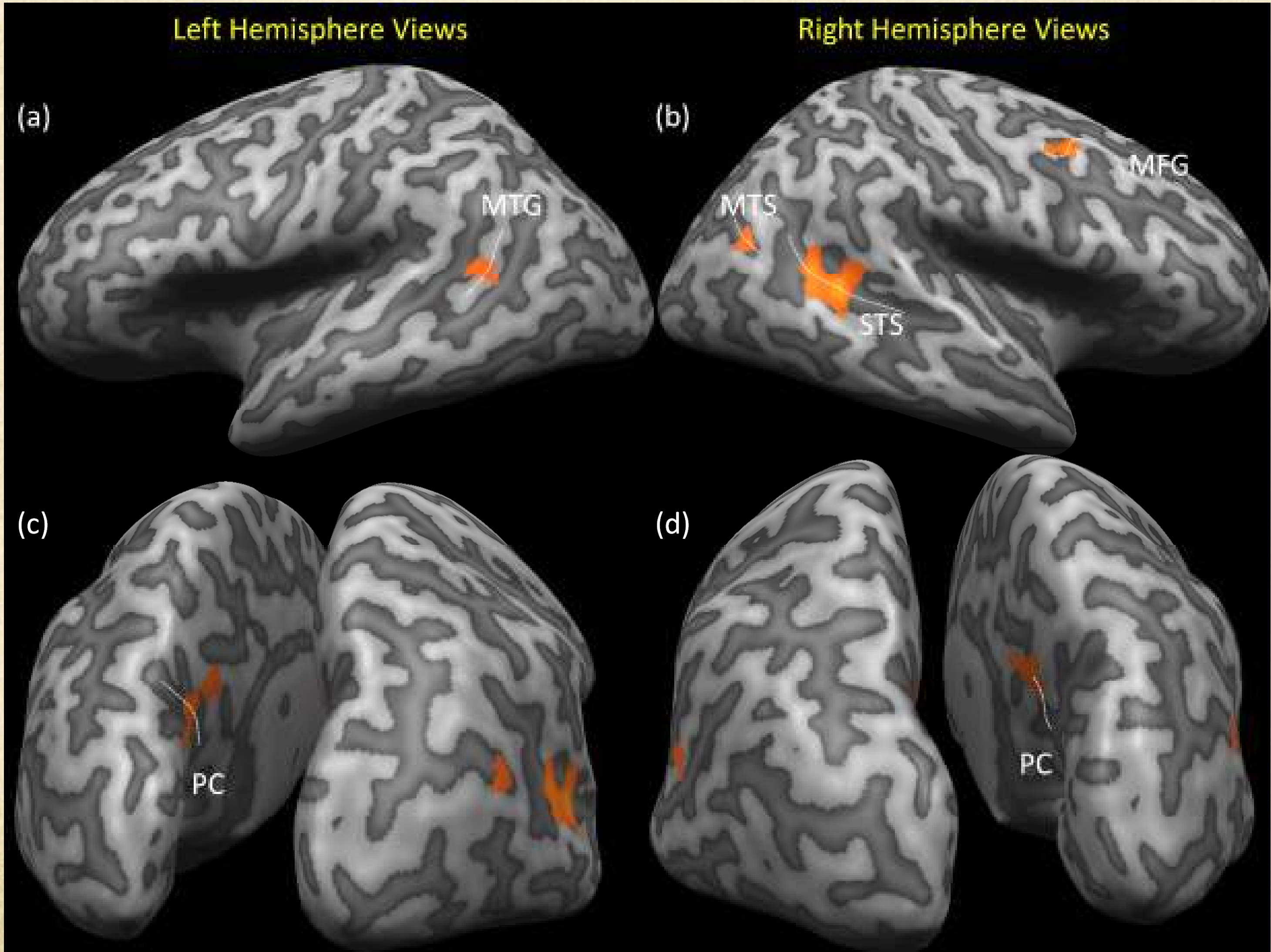
Effects of Active Music Therapy on the Normal Brain: fMRI Based Evidence

Brain Imaging Behav, 2016;10(1):182-6

ABSTRACT

The aim of this study was to investigate the neurophysiological bases of Active Music Therapy (AMT) and its effects on the normal brain. Twelve right-handed, healthy, non-musician volunteers were recruited. The subjects underwent 2 AMT sessions based on the free sonorous-music improvisation using rhythmic and melodic instruments. After sessions each subject underwent 2 fMRI scans acquisition during the listening to a Syntonic (SP) and A-Syntonic (AP) Production from the AMT sessions. A 3T Discovery MR750 scanner with a 16-channel phased array head coil was used and the image analysis was conducted with Brain Voyager QX 2.8. The listening to SP vs AP excerpts mainly activated: (1) the right middle temporal gyrus and right superior temporal sulcus, (2) the right middle frontal gyrus and in particular the right precentral gyrus, (3) the bilateral precuneus, (4) the left superior temporal sulcus and (5) the left middle temporal gyrus. These results are consistent with the psychological bases of AMT approach an with the activation of those brain's areas involved in memory and autobiographical processes but also in personal or interpersonal significant experiences. Further studies are required to confirm these findings and to explain possible effects of AMT in clinical settings.

3D brain representation of the activation clusters overlaid onto the inflated cortical surfaces of the Talairach-normalized Colin27 template. Left lateral (a), right lateral (b), left medial (c) and right medial (d) views for the two hemispheres (left: a-c, right:b-d) are shown with dotted lines indicating the involved sulci and gyri (MTG/MTS: Middle Temporal Gyrus/Sulcus, MFG: Middle Frontal Gyrus, STS: Superior Temporal Sulcus, PC: Precuneus).



Dr. Alfredo Raglio, PhD

Discussione

- Attivazione delle **Corteccia Prefrontale Mediale**:

1.creatività, libera espressione ➔ improvvisazione 2.espressione di sé, situazioni autobiografiche significative ➔ ricordo e dimensione emotivo-interpersonale della seduta

- Attivazione del **Precuneo:**

Compiti visuo-spaziali, memoria episodica, componente elaborativa, ToM, social cognition, attribuzione di stati emotivi, eventi autobiografici ➔ricordo e dimensione emotivo-interpersonale della seduta

Influenza della musica sui circuiti neurochimici (Chanda & Levitin, 2013):

- ricompensa, motivazione e piacere (dopamina, oppioidi...)
- stress e arousal (cortisolo, corticotropina, adrenocorticotropina...)
- sistema immunitario (serotonina, proopiomelanocortina, alfa-melanociti, beta-endorfine...)
- comportamento sociale (ossitocina)

Influenza della musica sui parametri fisiologici:

- Frequenza cardiaca
- Respirazione
- Pressione arteriosa
- Onde cerebrali
- Risposta galvanica della pelle
- …

Kumar et al., 1999; Suzuki et al., 2004; 2005; Takahashi et al., 2006; Boso et al., 2006; Okada et al., 2009; Raglio et al., 2010; Loomba et al., 2012…

Basi psicologiche della musicoterapia…

(Stern, 1975;1985;2004;2010; Benenzon, 1984; Tronick, 1989; Trevarthen & Aitken, 2001; Wigram, 2004; Hillecke et Al., 2005; Kim et Al., 2009; Raglio & Oasi, 2009; 2016; Koelsch, 2009; 2010)

- Il suono è il primo organizzatore e regolatore della comunicazione e delle emozioni (relazione madre-neonato)
- L’interazione sonoro-musicale facilita il processo di espressione, organizzazione, modulazione e (co-)regolazione della relazione
- L’elemento sonoro-musicale riflette gli elementi dinamici e cinetici dell’esperienza emotiva
- La comunicazione non verbale e sonoro-musicale promuove e facilita i momenti di incontro e la relazione empatica

DEMENZE

Sihvonen et al., 2017 Lancet Neurol

		Studies (n)	Partici-pants (n)	Music therapist involved	Blinding	Primary outcome	Overall duration of intervention	Main results
	(Continued from previous page)							
	Dementia							
Sanchez et al., 2016	Multisensory stimulation vs music listening	1	18	No	No	Neuropsychiatric symptoms and cognition	16 h in 16 weeks	Multisensory stimulation showed positive effects on anxiety symptoms and dementia severity that were not observed in the music listening group.
Sarkamo al., 2016; 2015; 2014	Music listening vs singing vs standard care	3	83	Yes	Single	Emotional parameters; clinical, demographic, and musical background factors influencing the cognitive and emotional efficacy of caregiver-implemented musical activities; quality of life, mood, and cognition	15 h in 10 weeks	Both music listening and singing groups improved in behavioural disturbances (p=0·04, d=0·42) and physical signs (p=0·008, d=0·52) more than the control group. Effects not present 6 months after the intervention; singing was beneficial, especially in improving working memory in people with mild dementia and in maintaining executive function and orientation in young people with dementia. Music listening was beneficial in supporting general cognition, working memory, and quality of life, especially in people with moderate dementia not caused by Alzheimer's disease who were in institutional care. Both music interventions alleviated depression, especially in people with mild dementia and Alzheimer's disease. The musical background of people with dementia did not influence the efficacy of the music interventions; music listening improved the patients' mood (p=0·001, d=0·80), orientation (p=0·005, d=0·71), episodic memory (p=0·036, d=0·54), attention and executive functions (p=0·039, d=0·48), overall cognitive performance (p=0·041, d=0·47), and the quality of life (p<0·001, d=0·99). Singing resulted in additional improvement in short-term memory and working memory (p=0·006, d=0·75), and improved caregiver wellbeing (p=0·026, d=0·85).
Raglio et al., 2015	Music therapy and music listening vs standard care	1	98	Yes	Single	Behavioural and psychological symptoms of dementia	10 h in 10 weeks	No significant differences between the groups.
Hsu et al., 2015	Music listening, singing, improvising, and talking vs standard care	1	13	Yes	No	Neuropsychiatric symptoms, well-being, and carer–resident interaction	11 h in 22 weeks	Music group showed improvement in symptoms (p=0·002, d=2·32) and in levels of wellbeing (p=0·001, d=3·85). Staff in the intervention group reported enhanced caregiving techniques as a result of the programme.
Chu et al., 2014	Group music therapy vs standard care	1	100	Yes	Single	Mood and cognition	6 h in 6 weeks	Group music therapy decreased depression (p=0·001, d=0·21) and delayed the deterioration of cognitive functions, especially recall (p=0·004, d=0·72). The effects were present 1 month after cessation of the intervention.
Vink et al., 2014; 2013 Raglio et al., 2008	Music therapy (listening and singing) vs other activities	3	76; 77; 59	Yes	Single	Neuropsychiatric symptoms; agitation; behavioural and psychological symptoms	21 h in 16 weeks; 15 h in 16 weeks	Neuropsychiatric symptoms decreased significantly in the music therapy group (p=0·01); there were no significant differences between the groups; music therapy improved behavioural symptoms (p<0·0001, d=1·04), functional ability (p=0·0001, d=0·79), and empathetic behaviour (p<0·0001, d=0·61) compared with the control treatment.
Narme et al., 2014	Music therapy (listening, playing and singing) vs cooking	1	37	–	Single	Patients' mood, cognition, behavioural disturbances, and stress experienced by their nurses	8 h in 4 weeks	There were no significant differences between the groups.
Ceccato et al., 2012; Raglio et al., 2010	Music therapy vs standard care	2	50; 50	Yes	Single	Cognition and anxiety; behavioural disturbances	18 h in 12 weeks; 6 h in 4 weeks	The music group improved performance in attention (p=0·001, d=0·76) and verbal episodic memory tasks (immediate p=0·001, d=0·76; delayed p=0·001, d=0·73), but not in anxiety; music reduced the behavioural disturbances showed by significant group difference (p<0·05, d=0·63).
Sung et al., 2012	Favourite music vs standard care	1	52	No	No	Anxiety	6 h in 6 weeks	Anxiety decreased in the music group (p=0·004, d=0·06).
Lin et al., 2011	Music therapy (playing and listening) vs standard care	1	100	Yes	No	Agitation	6 h in 6 weeks	There was no significant differences between the groups.
Cooke et al., 2010	Music therapy (listening and playing) vs reading	1	47	Yes	Single	Mood and quality of life	32 h in 16 weeks	There were no significant differences between the groups.
Guetinet al., 2010	Music therapy vs resting and reading	1	30	Yes	Single	Anxiety and mood	5 h in 16 weeks	Music therapy decreased anxiety (p<0·001, d=2·42) and depression (p=0·007, d=1·05). These effects persisted up to 2 months after stopping the intervention.

(Table continues on next page)

BPSD (depressione), aspetti cognitivi (working memory, funzioni esecutive, orientamento, attenzione), QoL

Cochrane Database of Systematic Reviews 2017, Issue 5. Art. No.: CD003477.

Cochrane Library

Cochrane Database of Systematic Reviews

Music-based therapeutic interventions for people with dementia (Review)

van der Steen JT, van Soest-Poortvliet MC, van der Wouden JC, Bruinsma MS, Scholten RJPM, Vink AC

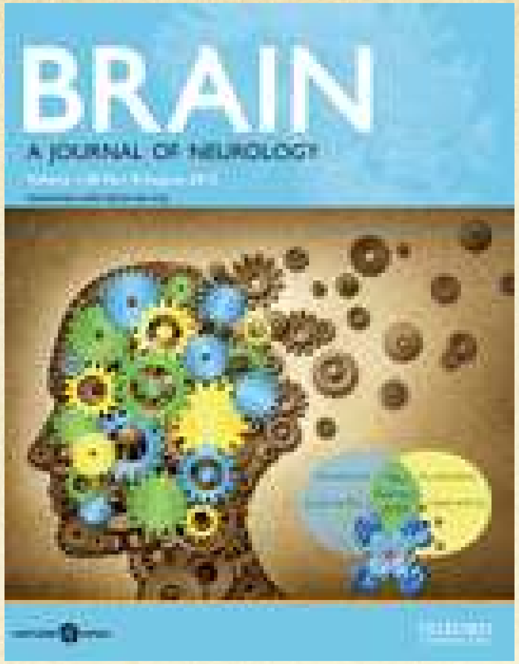
Sixteen studies with a total of 620 participants contributed data to meta-analyses.

Authors' conclusions

Providing people with dementia with at least five sessions of a music-based therapeutic intervention probably reduces depressive symptoms but has little or no effect on agitation or aggression. There may also be little or no effect on emotional well-being or quality of life, overall behavioural problems and cognition. We are uncertain about effects on anxiety or social behaviour, and about any long-term effects. Future studies should employ larger sample sizes, and include all important outcomes, in particular 'positive' outcomes such as emotional well-being and social outcomes. Future studies should also examine the duration of effects in relation to the overall duration of treatment and the number of sessions.

Music activities (singing and listening to familiar songs, vocal exercises, rhythmic movements and reminiscence and discussions) conducted by caregivers in everyday care can have long-term cognitive, emotional, and social benefits in mild/moderate dementia (mainly in mood, orientation, and remote episodic memory but also in attention and executive functions). Moreover singing can enhance short-term and working memory and caregiver wellbeing, whereas music listening has a positive effect on the quality of life **(Särkämö et al., Gerontologist, 2014)**

Despite a general cognitive decline, musical ability, perception, sensitivity and memory seem to persist over time, also in several stages of dementia (Crystal et al., 1989; Cowles et al., 2003; Cuddy et al., 2005; Fornazzari et al., 2006; Vanstone et al., 2009; Groussard et al., 2013)



Jacobsen et al., Brain 2015; 138:2438-50

- **La M. familiare attiva il cingolato anteriore e la corteccia prefrontale mediale in soggetti sani ➡ Rapporto tra queste aree e memoria**

- **Nell'AD la corteccia prefrontale mediale degenera più lentamente rispetto ad altre aree corticali e le regioni che codificano la memoria musicale mostrano una minina atrofia e diminuzione del metabolismo del glucosio rispetto ai depositi di β-amiloide**

⬇

Questo spiega in parte perché le persone con AD riconoscono e rispondono emotivamente ai brani musicali familiari, anche nelle fasi più avanzate della demenza

Raglio & Gianelli

Music therapy for individuals with dementia: areas of intervention and research perspectives

2009;6(3): 293-301

THE THERAPEUTIC PERSPECTIVES OF MUSIC THERAPY IN THE DEMENTIAS.

With reference to the above illustrated concepts, we believe that in dementia – as in other pathologies characterized by the impairment of those communicative functions which are most recent in human ontogenetic evolution - one may hypothesize the possibility of re-activating and broadening those archaic expressive and relational abilities which persist along the whole life-span of each human being, as forms of interpersonal experience, alternative to the verbal one. It is within this context that we envisage the possibility of music therapy building a communicative bridge for people with dementia. Music therapy being a pre-verbal, non-verbal communication technique - subsisting without need either for symbolic representations of reality, abstractive abilities or culture-bound learning processes - we believe that relational and expressive modalities, archaic in origin and nature and therefore more likely to be still present in persons with cognitive impairment, can be activated by means of its potential. Music therapy can promote the preservation of recognition of the external environment, of a sense of identity, of personhood even, in individuals with dementia.

Anche l'ascolto musicale può essere terapeutico...

… L'approccio musicoterapeutico attivo nelle demenze...

La ricerca presso Fondazione Sospiro (CR): musicoterapia e demenze

Dr. Alfredo Raglio, PhD

Raglio A, Bellandi D, Baiardi P, Gianotti M, Ubezio MC, Zanacchi E, Granieri E, Imbriani M, Stramba-Badiale M.

Active Music Therapy and Individualized Listening to Music: A Multicentric Randomized Controlled Trial in The Field of Dementia

J Am Geriatr Soc. 2015; 63(8):1534-9

Raglio A, Bellandi D, Baiardi P, Gianotti M, Ubezio MC, Granieri E.

Listening to Music and Active Music Therapy in Behavioral Disturbances in Dementia: a Crossover Study.

J Am Geriatr Soc. 2013;61(4):645-7

Raglio A, Bellandi D, Baiardi P, Gianotti M, Ubezio MC, Granieri E.

Music therapy in frontal temporal dementia: a case report

J Am Geriatr Soc. 2012;60(8):1578-9.

Maturitas 72 (2012) 305–310

Contents lists available at SciVerse ScienceDirect

Maturitas

journal homepage: www.elsevier.com/locate/maturitas

Review

Music, music therapy and dementia: A review of literature and the recommendations of the Italian Psychogeriatric Association

A. Raglio[a,b,*], G. Bellelli[c,d], P. Mazzola[c], D. Bellandi[a], A.R. Giovagnoli[e], E. Farina[f], M. Stramba-Badiale[g], S. Gentile[h], M.V. Gianelli[i], M.C. Ubezio[a], O. Zanetti[l], M. Trabucchi[m,d]

[a] Sospiro Foundation, Sospiro (Cr), Italy
[b] Maugeri Foundation I.R.C.C.S., Pavia, Italy
[c] Milano-Bicocca University, Monza, Italy
[d] Geriatric Research Group, Brescia, Italy
[e] I.R.R.C.S. Neurological Institute Carlo Besta, Milan, Italy
[f] I.R.C.C.S. Don Gnocchi Foundation, Milan, Italy
[g] I.R.C.C.S. Istituto Auxologico Italiano, Milan, Italy
[h] Alzheimer's Evaluation Unit, Ancelle della Carità Hospital, Cremona, Italy
[i] University of Genoa, Genoa, Italy
[l] I.R.C.C.S. S. Giovanni di Dio Fatebenefratelli, Brescia, Italy
[m] Tor Vergata University, Rome, Italy

ARTICLE INFO

Article history:
Received 24 May 2012
Accepted 31 May 2012

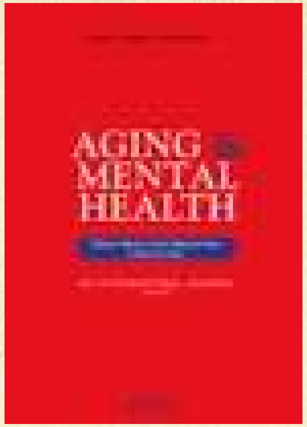
Keywords:
Music therapy
Music
Dementia
Scientific perspectives
Recommendations

ABSTRACT

This study reviews the most recent (from 2000 to 2011) Clinical Controlled Trials (CCT) and Randomized Controlled Trials (RCT) concerning the use of music and music-therapy (MT) in the context of dementia and related issues.

Studies which explored the efficacy of music and MT on behavioral and psychological symptoms of dementia (BPSD) are prevalent, while those aiming at assessing a potential effect of these approaches on cognitive and physiological aspects are scant. Although with some limitations, the results of these studies are consistent with the efficacy of MT approach on BPSD. In this context, the ability of the music therapist to directly interact with the patients appears to be crucial for the success of the intervention.

This review was endorsed by the Italian Psychogeriatric Association (AIP) and represents its view about the criteria to select appropriate music and MT approaches in the field of dementia. Accordingly, we have developed a list of recommendations to facilitate the current use of these techniques in the context of non-pharmacological treatments for patients with dementia.



Efficacy of music therapy treatment based on cycles of sessions: a randomized controlled trial.

aglio A, Bellelli G, Traficante D, Gianotti M, Ubezio MC, Gentile S, Villani D, Trabucchi

Aging and Mental Health, 2010, 14, 900-904

Dr. Alfredo Raglio, PhD

ORIGINAL ARTICLE

Efficacy of Music Therapy in the Treatment of Behavioral and Psychiatric Symptoms of Dementia

Alfredo Raglio, MT,† Giuseppe Bellelli, MD,‡ Daniela Traficante, PsyD, PhD,§ Marta Gianotti, MT,* Maria Chiara Ubezio, MD,* Daniele Villani, MD,* and Marco Trabucchi, MD‖¶*

Background: Music therapy (MT) has been proposed as valid approach for behavioral and psychologic symptoms (BPSD) of dementia. However, studies demonstrating the effectiveness of this approach are lacking.

Objective: To assess MT effectiveness in reducing BPSD in subjects with dementia.

Method: Fifty-nine persons with dementia were enrolled in this study. All of them underwent a multidimensional assessment including Mini Mental State Examination, Barthel Index and Neuropsychiatry Inventory at enrolment and after 8, 16, and 20 weeks. Subjects were randomly assigned to experimental (n = 30) or control (n = 29) group. The MT sessions were evaluated with standardized criteria. The experimental group received 30 MT sessions (16 wk of treatment), whereas the control group received educational support or entertainment activities.

Results: NPI total score significantly decreased in the experimental group at 8th, 16th, and 20th weeks (interaction time × group: $F_{3,\,165} = 5.06$, $P = 0.002$). Specific BPSD (ie, delusions, agitation, anxiety, apathy, irritability, aberrant motor activity, and night-time disturbances) significantly improved. The empathetic relationship and the patients' active participation in the MT approach, also improved in the experimental group.

Conclusions: The study shows that MT is effective to reduce BPSD in patients with moderate-severe dementia.

Key Words: dementia, behavioral disorders, music therapy

(*Alzheimer Dis Assoc Disord* 2008;22:158–162)

phases.[1] BPSD are usually treated with a pharmacologic approach, including the use of neuroleptics, sedatives, and antidepressants.[1] However, pharmacologic approaches are not easy to manage and are often burdened by several side effects and complications.[2,3] In a recent study on 421 patients with Alzheimer disease, 24% of patients treated with olanzapine, 16% with quetiapine, and 18% with risperidone, discontinued their assigned treatment at 36 weeks due to intolerability.[4] A recent review by the Cochrane Database claims that the atypical antipsychotics, although useful in reducing BPSD, are associated with serious adverse cerebrovascular events and extrapyramidal symptoms.[5] Because of these difficulties, recent guidelines from national and international associations recommend that the pharmacologic approach should not be the first-line treatment.[3,6]

Nonpharmacologic approaches are longtime known to be useful in the treatment of BPSD. In a multicenter study on 55 patients with moderate to severe dementia,[7] it has been shown that agitation and irritability significantly decreased with environmental adaptations and individually designed care planning. In this study, BPSD decreased at 6 months without using neuroleptics and/or physical restraints.[7]

Music therapy (MT) is a promising nonpharmacologic approach for BPSD. It is based on the systematic use of musical instruments to improve communication between music therapist and patients. MT is now used with increasing frequency, especially for the treatment of some BPSD, namely agitation and aggressiveness.[8–15] Despite these premises, studies demonstrating MT effec-

Raglio et al., 2008
Alzheimer Dis Assoc Disord

Table 1 Main characteristics of interventions in the global music approach in dementia (GMA-D)

Type of intervention	Professionals/caregivers	Content	Setting/context	Stage of disease	Duration and frequency of interventions	Aims
Active music therapy – psychological approach (AMT-PA) (individual or small group sessions, two to three PWD)	Trained music therapist	Musical improvisation and/or structured music	Therapeutic setting/ music therapy room	Mild to severe dementia (CDR 1–4)	Twice a week for at least 15 sessions, 30 min/session	Reduction of BPSD and related complications, emotional and behavioral regulation, increase of communication/relationship
Active music therapy – rehabilitative approach (AMT-RA) (individual or small group sessions, two to three PWD)	Trained music therapist	Music exercises	Therapeutic setting/ music therapy room	Mild to moderate dementia (CDR 1–2)	Two–three times a week for at least 15 sessions, 30 min/session (cycles of sessions)	Improvement of cognitive functions (specifically memory, attention, language, executive functions) and motor and sensory functions
Active music therapy with family caregivers (AMT-FC) (couple PWD–family caregiver and music therapist)	Trained music therapist	Musical improvisation and/or structured music	Therapeutic setting/ music therapy room	Moderate to severe dementia (CDR 2–4)	Twice a week for at least 12 sessions, 30 min/session (cycles of sessions)	Reduction of stress and anxiety condition in family caregivers; reduction of BPSD in PWD; improvement of communication and quality of life in PWD and family caregivers
Music-based interventions (MBI) (middle group sessions, six to eight PWD)	Musician or worker with musical expertise	Structured musical initiatives: rhythmic use of instruments, singing, movement associated to music, and listening to music (classical music, soothing music, evocative music)	Spacious room	Mild to moderate dementia (CDR 1–2)	Weekly/biweekly, cycles of sessions (eight to ten), 45–60 min/session	Well-being, improvement of mood and motivation, promotion of socialization, global motor and cognitive stimulation
Caregiver singing (CS) (individual sessions)	Caregivers formal or informal	Caregiver singing (familiar songs or improvised melodies to or together with PWD)	Personal care (ie, toilet, bathing, dressing, assisted deambulation)	Moderate to severe dementia (CDR 2–4)	Daily	Improvement of communication and relationship; reduction of BPSD during daily activities; improvement of mood; promotion of positive emotional context
Individualized listening to music (ILM) (individual sessions)	Music therapist (music selection), caregivers (music administration)	Listening to preferred music	Comfortable room	Mild to severe dementia (CDR 1–4)	Daily, 30 min/session, 4 weeks or more	BPSD reduction; cognitive stimulation
Background music (BM) (group sessions)	Music therapist (music selection), caregivers (music administration)	Listening to music (different kind of music, mainly without text)	Living spaces	Mild to severe dementia (CDR 1–4)	Daily	Activation or relaxation, increase of well-being; improvement of person's adaptation to the environment

Abbreviations: PWD, persons with dementia; CDR, clinical dementia rating; BPSD, behavioral and psychological symptoms of dementia.

		Studies (n)	Partici-pants (n)	Music therapist involved	Blinding	Primary outcome	Overall duration of intervention	Main results
	Stroke							
Van Vugt et al.,2016	MST vs MST with delayed sound	1	84	No	Single	Hand movement	5 h in 4 weeks	No significant difference between the groups.
Scholz et al., 2016	Sonificated movement vs movement without sound	1	25	No	No	Gross motor function	10 days	Sonification therapy reduced joint pain (p=0·05, d=1·96) and improved movement smoothness (p=0·04, d=1·16).
Raglio et al., 2016	Singing, playing instruments, improvisation vs speech therapy	1	20	Yes	No	Speech parameters in people with chronic aphasia	22·5–37·5 h in 15 weeks	Music therapy improved spontaneous speech (p=0·020, d=0·35).
Tong et al., 2015	MST vs playing mute instruments	1	33	Yes	No	Upper-limb motor function	20 sessions in 4 weeks	MST improved motor functions (p=0·039).
Sarkamo et al., 2014	Favourite music vs standard care	1	49	Yes	Single	Grey matter changes associated with cognitive improvement	60 h in 8 weeks	Music listening increased grey matter volume in frontal areas, limbic areas, and right ventral striatum. Reorganisation in the frontal areas correlated with enhanced recovery of verbal memory, focused attention, and language skills, whereas the limbic area reorganisation correlated with reduced negative mood.
Van der Meulenet al., 2014	Melodic intonation therapy vs other language intervention	1	27	No	Single	Speech parameters in non-fluent aphasics	30 h in 6 weeks	Melodic intonation therapy improved daily life communication (d=0·76) and object naming (d=1·73).
Cha et al., 2014	RAS vs intensive gait training	1	20	–	No	Postural control and gait performance	15 h in 6 weeks	RAS improved balance, gait velocity, cadence, stride length, and double-support period on the affected side, and improved score on stroke-specific quality-of-life scale.
Whitall et al., 2011	Bilateral arm training with rhythmic auditory cueing vs normal exercise	1	92	No	Single	Functional reorganisation and outcome	18 h in 6 weeks	There were no significant differences between the groups.
Sarkamo et al., 2010; 2008	Favourite music and audiobook listening vs standard care	2	54	Yes	Single	Auditory sensory memory; cognitive functions and mood	60 h in 8 weeks	Listening to music and speech after neural damage can induce long-term plastic changes in early sensory processing; music listening improved verbal memory (p=0·002, d=0·88) and focused attention (p=0·012, d=0·92) compared with the audiobook and control groups. Music group also had less depression (p=0·031, d=0·77) and confusion (p=0·045, d=0·72) than the control group.
Altenmuller et al., 2009; Schneider et al., 2007	Children's music and folk songs vs conventional therapy	2	62; 40	No	No	Neuroplasticity and motor recovery; motor recovery	7·5 h in 3 weeks	MST improved motor skills showed by action research arm test score (p<0·001, d=0·32), arm paresis score (p<0·05, d=0·46), Box and Blocks test (p<0·001, d=0·43), and Nine-Hole Peg Test (p<0·05, d=0·32); music group improved in speed, precision, smoothness of movements, and motor control in everyday activities evaluated by action research arm test (p<0·001, d=0·36), arm paresis score (p<0·05, d=0·42), Box and Blocks test (p<0·001, d=0·69), and Nine-Hole Peg test (p<0·05, d=0·24).
Jeong & Kim, 2007	RAS vs referral information	1	33	No	No	Upper and lower limb mobility, mood, interpersonal relationships, and quality of life	16 h in 8 weeks	RAS improved range of ankle extension (p=0·018, d=0·61) and arm flexibility up (p=0·001, d=0·99) and down (p=0·008, d=0·62), mood (p=0·017, d=0·03), and increased frequency and quality of interpersonal relationships (p=0·003, d=0·96).
Thaut et al., 2007	RAS vs neurodevelopmental therapy	1	78	No	Single	Gait parameters	7·5 h in 3 weeks	RAS improved velocity (p=0·006, d=2·13), stride length (p<0·001, d=1·50), cadence (p=0·001, d=1·82), and symmetry (p=0·049, d=0·93).
Schauer & Mauritz, 2003	RAS vs gait training without musical feedback	1	23	No	No	Gait parameters	5 h in 3 weeks	RAS improved gait velocity (p=0·008, d=0·46), stride length (p=0·009, d=0·49), cadence (p=0·045, d=0·02), symmetry (p=0·008, d=0·55), and heel-toe distance (p=0·006, d=0·40).
Thaut et al., 1997	RAS vs physical therapy	1	20	No	Single	Gait parameters	30 h in 6 weeks	RAS improved gait velocity (d=1·45), stride length (d=0·93), symmetry (d=0·52), and cadence (d=0·44).

(Table continues on next page)

STROKE

Sihvonen et al., 2017 Lancet Neurol

Movimento, linguaggio, memoria, attenzione, mood, cambiamenti morfologici

PD, SM ed epilessia

Sihvonen et al., 2017 Lancet Neurol

Pohl et al., 2013

De Bruin et al., 2010

Hackney & Earhart, 2009

Hackney & Earhart, 2009

Hackney et al, 2007

Gatti et al, 2015

Conklyn et al, 2010

Bodner et al, 2012

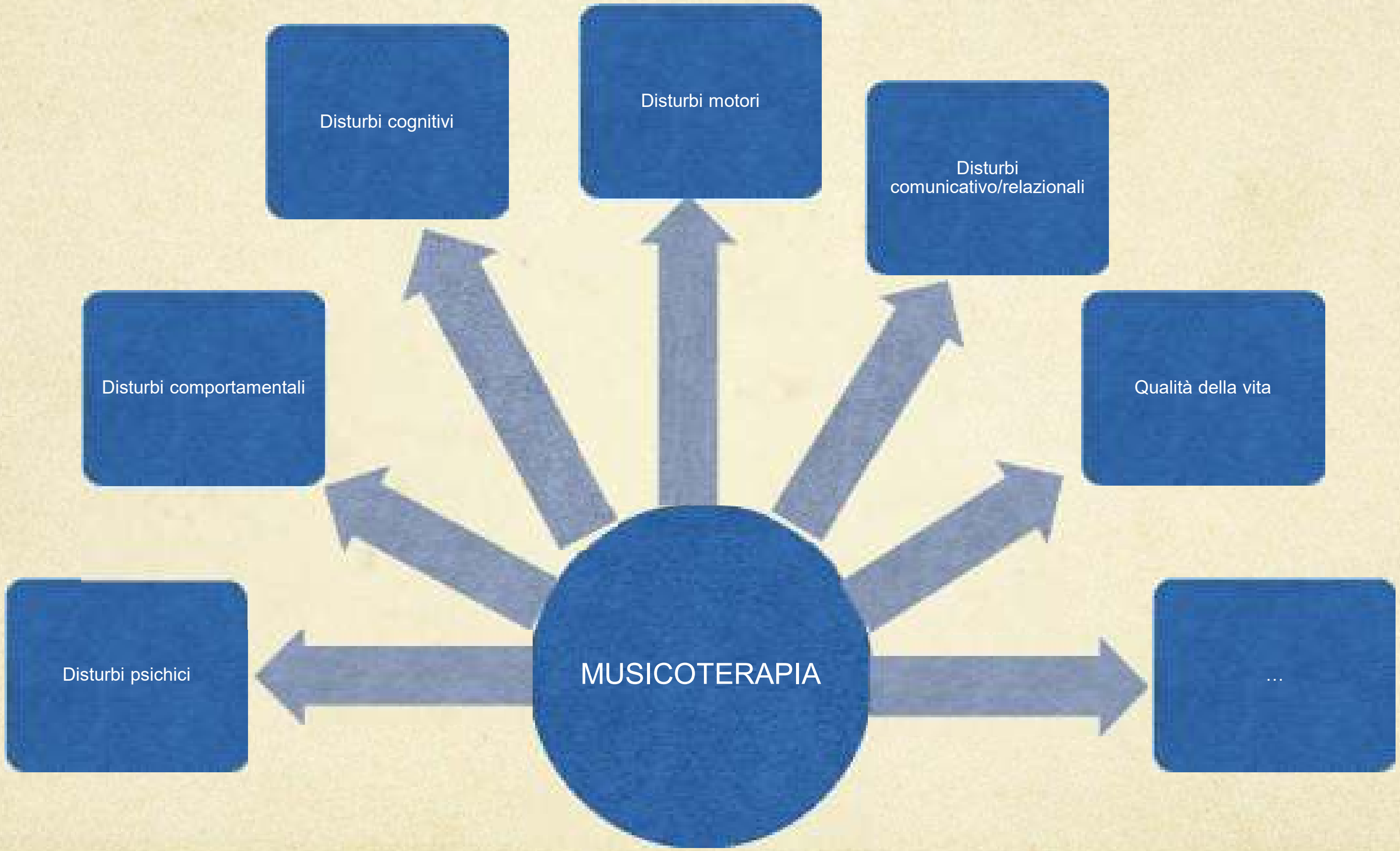
	Studies (n)	Partici-pants (n)	Music therapist involved	Blinding	Primary outcome	Overall duration of intervention	Main results
(Continued from previous page)							
Parkinson's disease							
Music listening, rhythmic clapping, or stomping vs standard care[57]	1	18	Yes	Single	Motor performance, cognition, and quality of life	12 h in 6 weeks	Music therapy improved mobility (p=0·006), UPDRS III (p=0·003), text recall (p=0·036), item naming (p=0·033), performance in Stroop test (p=0·007), and quality of life (p=0·031).
Favourite music synchronised to gait vs regular activities[58]	1	22	No	Single	Walking parameters	19·5 h in 13 weeks	Walking to music improved velocity (p=0·002, d=2·64), stride time (p=0·019, d=1·76), cadence (p=0·007, d=2·16), and UPDRS III (p=0·002, d=0·50).
Tango, waltz, or foxtrot dancing vs standard care[59]	1	48	No	Single	Functional motor control	20 h in 13 weeks	Tango group improved in balance (p=0·001, d=2·98), 6-min walking (p=0·001, d=2·50), and backward stride length (p=0·001, d=2·19); waltz or foxtrot group improved in balance (p=0·001, d=3·17), 6-min walking (p=0·001, d=2·24), and backward stride length (p=0·018, d=1·96).
Tango and waltz or foxtrot vs Tai Chi or standard care[60]	1	61	No	No	Health-related quality of life	20 h in 13 weeks	Tango improved mobility (p=0·03, d=2·50), social support (p=0·05, d=2·97), and quality of life (p<0·01, d=2·09).
Tango vs physical exercise[61]	1	19	No	Single	Functional mobility	20 h in 13 weeks	Tango group improved balance (p=0·01, d=2·18).
Multiple sclerosis							
Keyboard playing vs mute keyboard playing[62]	1	19	No	No	Hand function	7·5 h in 2 weeks	The music group improved in the functional use of the hand significantly more showed by time × group interaction (p=0·003, d=0·60).
RAS vs standard care[63]	1	10	Yes	No	Gait parameters	2 weeks	RAS significantly decreased double-support time (left: p=0·018, d=1·61; right: p=0·025, d=1·46).
Epilepsy							
Nightly exposure of Mozart Sonata K. 448 vs no intervention[64]	1	73	No	Single	Seizure occurrence	Every night for 1 year	Seizure frequency in the music group decreased significantly during the treatment phase (17%, p=0·014) and 1 year after treatment (16%, p=0·027).

Effect size (Cohen's *d*) was the mean change in outcome before and after treatment in the treatment group minus the mean pre-post change in the control group, divided by the pooled pre-test SD.[65] Effect size was defined as small (d≥0·2), medium (d≥0·5), and large (d≥0·8). d=Cohen's d. MST=music-supported therapy. RAS=rhythmic auditory stimulation. UPDRS III=Unified Parkinson's Disease Rating Scale part III.

Table: Randomised controlled trials assessing various music-based interventions in patients with stroke, dementia, Parkinson's disease, multiple sclerosis, or epilepsy

Parkinson: performance motoria (cammino), aspetti cognitivi, QoL
Sclerosi Multipla: performance motoria (mano, cammino)
Epilessia: frequenza delle crisi

L'efficacia della musicoterapia in ambito psicogeriatrico…



Dr. Alfredo Raglio, PhD

AGENDA DEL FUTURO

POPOLAZIONE MALATA

MUSICA NEI LUOGHI DI CURA IN TUTTE LE SUE FORME

MALATI NELLE SALE DA

POPOLAZIONE SANA

PROMUOVERE LA MUSICA IN TUTTE LE SUE FORME COME MEZZO DI PREVENZIONE

Grazie per l'attenzione!

alfredo.raglio@unipv.it
alfredo.raglio@icsmaugeri.it
www.alfredoraglio.it