

Music therapy research:

A review of references in the medical literature



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Music therapy is widely reported in the medical literature. There has been substantial progress in the establishment of research strategies for supporting clinical practice.

Introduction

Music therapy has risen to the challenge of research in recent years. Not only is there a tradition of quantitative research but qualitative research approaches have been also incorporated within the discipline as is necessary for an clinical approach that involves science and art (Aldridge 1996a; Dileo 1999; Pratt and Erdonmez-Grocke 1999; Pratt and Spintge 1996; Wigram, Saperston, and West 1995b).

[See also music therapy world.net](http://www.musictherapyworld.net)

Hospital based overviews

After the second world war music therapy was intensively developed in American hospitals. Since then some hospitals, particularly in mainland Europe, have incorporated music therapy within their practice carrying on a tradition of European hospital based research and practice.

The nursing profession has seen the value of music therapy, particularly in the United States of America, and championed its use as an important nursing intervention even when music therapists are not available. Indeed, it is a clinical nurse specialist has made an overview of

fourteen articles on audioanalgesia (Bechler-Karsch 1993). She reports a confusing picture of changes related to heart rate but a clearer picture emerges on physiological parameters related to pain and anxiety and she concludes that music has no adverse effects on ill patients when used as an adjunctive non-invasive therapy.

Standley (Standley 1995; Standley 1986) has consistently reviewed the literature relating to music therapy applications in medical settings made a meta-analysis of the current findings from 55 studies utilizing 129 dependent variables (Standley 1995). Standley concludes (1995 p4) that the average therapeutic effect of music in medical treatment is almost one standard deviation greater than without music (.88). From these results she generalizes that women react more favorably to music than men, as do children compared with adults. While music is less effective for severe pain it is indicated for chronic pain. Live music administered by a music therapist has a greater effect than recorded music and the effect sizes vary according to the dependent measure being used, physiological measures being stronger than subjective assessment.

During the last 1990's there has been a collection of writings related to the clinical application of music therapy, often from symposia (Pratt and Erdonmez-Grocke 1999; Pratt and Spintge 1996), and the development of research strategies suitable to clinical application (Aldridge 1996a; Wheeler 1995).

Psychiatry and Psychotherapy

The published work covering psychiatry has its basis in hospital treatment (Wigram, Saperston, and West 1995a).

In a study of chronic psychiatric patients who exhibited disruptive and violent behavior at meal times, the playing of taped music as a background stimulus with the intention of providing a relaxed atmosphere reduced that disruptive behavior (Courtright, Johnson, Baumgartner et al. 1990). Meschede and colleagues (Meschede, Bender, and Pfeiffer 1983) observed the behavior of a group of chronic psychiatric patients over eight weeks of active music making sessions and discovered that the subjective feelings of the patients had no correlation with the observations of the group leaders about the outward expression of those feelings.

Continental Europe has encouraged the use of music particularly in terms of individual and group psychotherapy for the encouragement of awakening the emotions of the patient, and in helping them cope with unconscious intrapsychic conflicts. This situation is not surprising given that the roots of psychoanalysis are middle European. Group psychotherapy has been used on an inpatient and outpatient basis.

Schizophrenia

Schizophrenia has been the subject of varying studies in applied music therapy (Aigen 1990; Glicksohn and Cohen 2000; Hadsell 1974; Pavlicevic and Trevarthen 1989; Pavlicevic, Trevarthen, and Duncan 1994; Tang, Yao, and Zheng 1994).

Within recent years researchers have attempted to understand the musical production of schizophrenic patients (Steinberg and Raith 1985a; Steinberg and Raith 1985b; Steinberg, Raith, Rossnagl et al. 1985) in terms of emotional response. The underlying reasoning in this work is (i) that to produce music depends upon the mastery of underlying feelings, and (ii) in psychiatric patient's musical expression is negatively influenced by the disease. Steinberg and colleagues found that in the musical playing of endogenous-depressive patients there were weakened motoric qualities influencing stability and rhythmicity, while manic patients also exhibited difficulties in ending a phrase with falling intensity. Tempo appeared uninfluenced by depression, but was susceptible to the influence of medication. Schizophrenic patients exhibited changes in the dimensions of musical logic and order.

More recently Pavlicevic and Trevarthen (Pavlicevic and Trevarthen 1989) have compared the musical playing of 15 schizophrenic patients, 15 depressed patients and 15 clinically normal controls. Significant differences in musical interaction between therapist and patient were found between the groups on a self-developed scale to test musical interaction. This musical interaction scale was developed to assess the emotional contact between therapist

and partner according to musical criteria based upon six levels of interaction ranging from no contact (Level 1) to established mutual contact (Level 6). A critical element of the musical contact is the establishment of a common musical pulse that is defined as a series of regular beats.

In the above study, schizophrenic patients appeared musically unresponsive and idiosyncratic in their playing which correlates with other studies of schizophrenia (Fraser, King, Thomas et al. 1986; Lindsay 1993). The depressed patients appeared to make fewer initiatives in the music although it was possible for the therapist to make contact with them. Controls were able to enter into a musical partnership with the therapist and take musical initiatives. The lack of reciprocity from the schizophrenic patients seemed to be the factor that prevented contact and thereby disturbed communication. However, this finding with individual patients is in contrast to the previously mentioned group studies that refer to 'open' communication within the group. The strength of the Pavlicevic paper is that it is firmly grounded in empirical data and, unlike many of the group therapy papers, gives clear evidence of how conclusions are reached.

The peculiarities of language which accompany some forms of the schizophrenia has led to the inevitable link between speech disorders and musical components of language and the processing of language and musical information. Fraser's study (Fraser et al. 1986) suggested that the speech of schizophrenics had fewer well formed sentences, often contained errors with many false starts and was simpler than the speech of

controls which was fluent, error free and complex. Lindsay (Lindsay 1980) argues that social behavior is dependent upon social language skills of communication. Withdrawn patients speak with less spontaneous speech utterances, and their speech is improved by matching their utterances and building up dialogues from simple interactions to complex sequences; which is a feature of dialogic playing in improvised music therapy.

Adolescent psychiatry

Group music therapy is the principle music therapy approach to the treatment of adolescent problems. Friedman (Friedman and Glickman 1986) recommends the use of creative therapies in general for the treatment of drug abuse in adolescents as it encourages spontaneous activity, motivates the client's response and fosters a culture of free expression.

Phillips (Phillips 1988), as psychotherapist and jazz fan, provides an overview of improvisation in psychotherapy and the way in which it relates to adolescent patients. He identifies four important qualities as bases which enable the therapist to improvise in clinical practice: (i) to have access to his or her past; (ii) to be able to focus attention solely on the present; (iii) to be comfortable enough to give up control over the outcome of the task to experiment during the session, and (iv) recognize the significance of accidental expression (p184). He relates this ability to improvise to the therapeutic task of treating adolescents who call upon a wide range of responses which relate to the past experience of the therapist

and which may require quite novel solutions.

Culture

Most of the references to the use of music therapy in medicine are predominantly Western, although the use of music as a therapeutic medium is found in most cultures. Two papers (Benjamin 1983; Devisch and Vervaeck 1986) describe the use of music in African hospitals, both locating the use of music within a cultural context, and combining this music with drama and dance. As in other group therapy methods, music is used as a vehicle to reach those who are isolated and withdrawn and reintegrate them into social relationships.

In South Africa (Benjamin 1983) the group consists of about 100 female patients sitting in a circle directed by a doctor. Music, through increasing tempo in singing and dancing, is used as an activator for the psychodrama techniques of Moreno (Moreno 1946).

A Tunisian approach is far more radical in terms of psychiatry. Through 'art group therapy' (Devisch and Vervaeck 1986) utilizing dance, painting, therapy using clay, role play and singing, patients are encouraged to integrate personal experiences and emotions within a social context of relationships. The explanatory principle behind this work is that of 'the door' whereby fixed barriers between experiences are broken down, but the concept of threshold between experiences remains. In support of this integration family members of patients can be included in the singing and dancing to facilitate the patient returning to a family or wider social environment. For the

individual patient it is argued that individual expression, when given the form of a work of art (to include singing and dancing), allows the person to experience themselves as something orderly and subjective; and, like a door, be able to be opened or closed to others and participate in interaction. This ability to discriminate between activities is called by the authors (who are social anthropologists), "the liminal or threshold function of the body and the door" (p543). Such an approach attempts to establish a meaningful relationship between the inner rhythms of the body, outer rhythms of personal interaction and broader patterns of cultural activity.

The Arab tradition, which regards the body as the meeting place of psyche and soma, and locates psychiatric illness within social relationships, gives cultural support to the ideas practiced in such an institution. Culture is a source of meaning that does not only act through cognition, but also through personal interaction. The way in which people greet each other, listen to each other, and play with each other structures the meaning of that interaction and has a direct experience on the body. Similarly bodily experiences shape social contact. The act of kissing as a greeting, for example, has an external effect on relationship and an internal effect on the emotional experiences of the body. This symbolic reality is not restricted solely to cognitive activity. We can further infer that the playing of music, and encouraging a person to express themselves in an articulate form within a relationship, promotes experiences that integrate the person inwardly within themselves

and outwardly with others independent from cognition.

Rehabilitation

Strategies for rehabilitating psychiatric patients using group and family approaches are not solely confined to African traditions (Barker and Brunk 1991; Glassman 1991; Longhofer and Floersch 1993) and music therapy has a broad base within the tradition of psychiatric and general rehabilitation (Aldridge 1993b; Pavlicevic et al. 1994; Pratt and Spintge 1996; Purdie and Baldwin 1995; Purdie, Hamilton, and Baldwin 1997).

Haag (Haag and Lucius 1984) discusses theories including psychosocial factors involved in the development of, and in coping with, disability. Psychological intervention approaches are set out, focussing on their particular relevance to rehabilitation. Music therapy is also recommended for the rehabilitation of patients who have difficulty in expressing their feelings and communicating with other.

Psychosomatics

Where both physical and mental processes overlap within medicine, i.e. the field of psychosomatics, then individual and group music therapy appears to play an important role.

Multiple sclerosis is a chronic neurological disease of unknown origin that can result in severe neuro-psychological symptoms. Symptom-orientated medication or physiotherapy does not easily relieve difficulties of anxiety, resignation, isolation and failing self-esteem seen in this disease. Lengdobler and Kiessling (Lengdobler and Kiessling 1989) set out to treat in a clinic, over a two-year period, 225 patients with

multiple sclerosis with group music therapy. Each treatment period lasted for 4 to 6 weeks. A further part of their work was to discover the musical parameters of the playing of such patients using methods which were based on active improvisation; group instrumental playing, singing, listening and free-painting to music. Unfortunately the size of the groups is not recorded, patient attendance at the groups was uncontrolled and the reports made by the patients were unstructured. Those reports were vague and have promoted clinicians to pursue more rigorous research (Magee 1998; O'Callaghan 1996; O'Callaghan and Turnbull 1987).

Elderly

The psychosocial rehabilitation of older persons is one of the main problems in health policy. About one quarter of the over 65-year-olds face psychic problems without receiving adequate treatment and rehabilitative care. Substantial deficits exist above all in the outpatient and non-residential service sector, and the development of ambulatory, community-based services as well as intensive support for existing self-help efforts are necessary. Music therapy has been suggested as a valuable part of a combined treatment policy for the elderly (Aldridge 2000).

Music and dementia in the elderly

The responsiveness of patients with Alzheimer's disease to music is a remarkable phenomenon (Aldridge 1993a; Aldridge 1994; Aldridge 1995; Aldridge and Brandt 1991). While language deterioration is a feature of cognitive deficit, musical abilities appear to be preserved. Beatty

(Beatty, Zavadil, and Baily 1988) describes a woman who had severe impairments in terms of aphasia, memory dysfunction and apraxia yet was able to sight read an unfamiliar song and perform on the xylophone which to her was an unconventional instrument. In a doctoral thesis Foster (Foster 1998) demonstrated an improvement in autobiographical memory in dementia sufferers compared to normal controls with an auditory background condition of music. He suggests that it is the arousal due to experiencing music that facilitates improved cognition and that the patient is dependent upon environmental cues.

Certainly the anecdotal evidence suggests that quality of life of Alzheimer's patients is significantly improved with music therapy, accompanied by the overall social benefits of acceptance and sense of belonging gained by communicating with others. Prinsley (Prinsley 1986) recommends music therapy for geriatric care in that it reduces the individual prescription of tranquilizing medication, reduces the use of hypnotic on the hospital ward and helps overall rehabilitation. Music therapy is based on treatment objectives; the social goals of interaction co-operation; psychological goals of mood improvement and self-expression; intellectual goals of the stimulation of speech and organization of mental processes; and the physical goals of sensory stimulation and motor integration. Such approaches also emphasize the benefit of music programs for the professional carers and families of elderly patients.

There has been recent research related music and its influence upon

patients suffering with various forms of dementia and particularly the influence of music therapy in the treatment of Alzheimer's disease (Aldridge 2000).

Research approaches to new treatments

Until recently, psychotherapy and counseling techniques had rarely been used with people with dementia. However, the change in emphasis within dementia care towards a person-centered approach, and often non-pharmacological approach, has meant that there is a growing clinical interest in their use (Beck 1998; Bender and Cheston 1997; Bonder 1994; Cheston 1998; Johnson, Lahey, and Shore 1992; Richarz 1997). This has also meant an increase in studies using creative arts therapies (Kamar 1997; Mango 1992) and overviews of music therapy as a treatment approach to Alzheimer's disease have already been written (Aldridge 2000; Brotons, Koger, and PickettCooper 1997; Brotons and Pickettcooper 1996; Smeijsters 1997). What music therapy offers is an improvement in communication skills for sufferer and spousal caregiver, and possibilities for managing the disruption and agitation ensuing in the later stages of disease.

Individuals with Alzheimer disease often experience depression, anger, and other psychological symptoms. Various forms of psychotherapy have been attempted with these individuals, including insight-oriented therapy and less verbal therapies such as music therapy and art therapy. Although there are few data-based outcome studies that support the effectiveness of these interventions, case studies and descriptive information suggest that

they can be helpful in alleviating negative emotions and minimizing problematic behaviors (Bonder 1994).

Although there is a developing clinical literature on intervention techniques drawn from all the main psychotherapeutic approaches, there has been little research into the effectiveness of this work and such research as does exist often uses methodologies that are inappropriate for such an early stage of clinical development. While some authors (Cheston 1998) argue that clinical research should adopt case study or single-case designs, some researchers are also planning group designs for evaluating new clinical developments. My argument is for a broad spectrum of research designs that will satisfy differing needs. We know from experience that music therapy brings benefits to sufferers and the challenge is to convert this knowledge into evidential studies.

Annenmiek Vink, (Aldridge 2000), focuses on the treatment of agitation in Alzheimer's disease using music therapy and her current work is in the administration of a controlled study in Holland. The success of such a venture may have a profound effect upon the political acceptance of music therapy as a non-pharmacological treatment modality should the results be of significance. I am tentative about suggesting how strong the impact of such research trials will be as there is never any guarantee that such studies will be heeded. More importantly, if such a study discovers that a control musical condition is almost as effective as music therapy then there may be support for using "music" in treatment settings but not necessarily music therapists. Given that music therapists are a professional groups with their

own pay scales then while the argument for using musical initiative may be strong, the argument for employing music specialists may be weak. Research, and its results, are rarely neutral in their effect.

However, a qualitative understanding of how musical playing changes also offers profound insights into the relief of suffering. We simply cannot restrain our endeavors to one particular form of understanding. Differing research approaches will inform one another and the challenge is for us to co-ordinate our approaches such that the knowledge gained is pooled and shared. It is to such an end that this book is aimed.

The patient and his caregivers in dementia care

The absence of definitive treatments for Alzheimer's disease and related dementias, researchers in a variety of disciplines are developing psychosocial and behavioral intervention strategies to help patients and caregivers better manage and cope with the troublesome symptoms common in these conditions. These strategies include cognitive interventions, functional performance interventions, environmental interventions, integration of self-interventions, and pleasure-inducing interventions. Although we have seen that more research is needed to further develop these strategies and establish their best use, psychosocial and behavioral interventions hold great promise for improving the quality of life and well-being of dementia patients and their family caregivers (Beck 1998).

We know that people who are suffering do not suffer alone (Aldridge 1998; Aldridge 1999). It is in a primary

care setting where dementia is recognised, and early recognition is important for initiating treatment interventions before a person becomes permanently or semi-permanently institutionalized and to minimize disability (Larson 1998).

Recent research on care-giver stress focuses extensively on its predictors and health consequences, especially for family members of persons with dementia, Gwyther and Strulowitz (Gwyther and Strulowitz 1998) suggest four areas of care-giver stress research: caregiver health outcomes, differential impacts of social support, care giving for family members with dementia, and balancing work and care-giving responsibilities.

In a study by Harris (Harris 1998), in-depth interviews with 30 sons actively involved in caring for a parent with dementia elicit the understanding of a sons' caregiving experiences. Common themes that emerge from such narratives are a sense of duty, acceptance of the situation and having to take charge as well as issues regarding loss, a change in relationships with other brothers and sisters, the reversal of role from based on having to take charge and the necessity to develop coping strategies.

In another study of the psychological well-being of caregivers of demented elderly people (Pot, Deeg, and VanDyck 1997), three groups of caregivers were identified; those providing care for two years after baseline; those whose care-recipient died within the first year after baseline, and those whose care-recipient was institutionalized within the first year. All groups of caregivers showed a great amount of

psychological distress compared to a general population sample, with an overall deterioration of psychological well-being. As the elderly patient declined, and the caregiving at home continued, then psychological distress increased. For caregivers whose demented care-recipient had died or was institutionalized in the first year after baseline then there was no deterioration. There is, then, a high level of psychological distress and deterioration in psychological well-being among informal caregivers of dementia patients and we may have to reconsider the personal and social costs of demented older people live on their own as long as possible if we are not able to release adequate resources to support the caregivers.

Part of this support will include sharing information and developing methods of counseling appropriate to caregivers. Increasing public awareness, coupled with the wider availability of drug therapies for some dementing conditions, means that carers are often informed of the diagnosis of dementia. However it is unclear how much sufferers themselves are told about their diagnoses. In a study of how sufferers of dementia were given diagnostic information of 71 carers recruited through old age psychiatry services in East Anglia, half of the sufferers had learned their diagnosis, more from their carers than their doctors (Heal and Husband 1998). The age of the sufferer was found to be related to whether or not doctors told them their diagnosis, which supports a suspicion that there is a prejudice amongst doctors regarding the elderly and about what they can understand. Only 21% of carers were given an opportunity to discuss the issues

involved and younger carers were significantly more likely to feel that such an opportunity would have been useful. Most of the carers who had informed the sufferer said that the sufferer had wanted to know, or needed a meaningful explanation for their difficulties, rather than giving more practical legal or financial reasons. Carers who had not disclosed feared that diagnostic information would cause too much distress, or that the sufferers' cognitive impairments were too great an obstacle.

Emotional context and ability

As the course of degenerative disease progresses there is a decline in the ability to comprehend and express emotion that is linked with mental impairment (Benke, Bosch, and Andree 1998). The creative arts therapies have based some of their interventions on the possibility for promoting emotional expression and retaining expressive abilities.

Depression

Depression is a common disorder in the elderly (Forsell, Jorm, and Winblad 1998). The rate of treatment of depression in the very elderly is low, exaggerated amongst dementia sufferers, and the course is chronic or relapsing in almost half of the cases. The interface between depression and dementia is complex and has been studied primarily in Alzheimer's disease (Aldridge 1993b) where depressive depression may be a risk factor for the expression of Alzheimer's disease in later life (Raskind 1998). A contributory factor to this depression is the patients' perceptions of their own deficits, although these may be ill-founded (Tierney, Szalai, Snow et al. 1996). Emotional context is an important factor and this will be linked to the

way in which the patient sees his or her current life situation and an understanding of what life holds in the near-future.

Hearing impairment

If depression is a confounding factor in recognizing cognitive degeneration, then hearing impairment is another contributory factor. Central auditory test abnormalities may predict the onset of clinical dementia or cognitive decline. Hearing loss significantly lowered performance on the verbal parts of the Mini-Mental State Examination, a standard test for the presence of dementia (Gates, Cobb, Linn et al. 1996). Central auditory dysfunction precedes senile dementia in a significant number of cases and may be an early marker for senile dementia. Gates et al. recommend that hearing tests should be included in the evaluation of persons older than 60 years and in those suspected of having cognitive dysfunction. If this is so then we may have to include this consideration in designs of research studies of music therapy as maybe the patients themselves are not actually hearing what is being played but responding to social contact and gesture. However, encouraging musical participation may foster residual hearing abilities and those abilities that the tests cannot measure. Returning to the developmentally-challenged children, where hearing disability was ever present, it was the joint attention involved in making music that brought about an improvement in listening that appeared as an improvement in hearing. This is perhaps a feature of active music therapy that needs to be further investigated.

What happens in treating dementia patients with music therapy
Most music therapists have concentrated on the pragmatic effects of music therapy. As we will see, both practitioners and researchers alike are concerned with demonstrating the benefits of music therapy for dementia sufferers. However, how music therapy actually achieves its effects is relatively unresearched.

My hypothesis is that music offers an alternative form for structuring time that fails in working memory. Just as developmentally delayed children achieve a working memory that enhances their cognitive ability, then the reverse process occurs in dementia sufferers.

While several components of working memory may be affected, not all aspects of the central executive mechanism are necessarily influenced (Collette, VanderLinden, Bechet et al. 1998). White and Murphy (White and Murphy 1998) suggest that tone perception remains intact, but there is a progressive decline in working memory for auditory non-verbal information with advancing Alzheimer's disease. A similar decline was also noted on a task assessing working memory for auditory presented verbal information. This ties in with what we know about hearing impairment and again encourages a test of hearing capabilities before music therapy is used as a treatment modality but also suggests that music therapy may promote improved hearing.

Temporal coherence

I argue earlier that music therapy is indicated because it offers an external sense of temporal coherence that is failing in the patient. Ellis (Ellis 1996) reports on the linguistic features and

patterns of coherence in the discourse of mild and advanced Alzheimer's patients. As the disease progresses, the discourse of Alzheimer's patients becomes pre-grammatical in that it is vocabulary driven and reliant on meaning-based features of discourse rather than grammatically based features. Temporal coherence fails. Knott, Patterson, and Hodges (Knott, Patterson, and Hodges 1997), considering the short-term memory performance of patients with semantic dementia, suggest that impaired semantic processing reduces the "glue" or "binding" that helps to maintain a structured sequence of phonemes in short-term memory. We may speculate that this temporal coherence, the metaphoric glue or binding, is replaced by musical form. As we know, some songs stick to our memories.

Not loss of semantic memory

Repetition ability depends in part on semantic memory remaining intact. If the conceptual contents of semantic memory are lost as a function of Alzheimer's disease, meaningfulness of stimuli should have progressively less effect on the ability to repeat as the disease worsens. A study by Bayles et al (Bayles, Tomoeda, and Rein 1996) was designed to evaluate the effects of meaningfulness and length of phrasal stimuli on repetition ability in mild and moderate of Alzheimer's disease patients and normal elderly subjects. Fifty-seven Alzheimer's disease patients and 52 normal subjects were given six- and nine-syllable phrases that were meaningful, improbable in meaning, or meaningless. Cross-sectional and longitudinal data analyses were conducted and results failed to confirm a performance pattern

consistent with a semantic memory loss theory.

Several lines of evidence suggest that in Alzheimer's disease there is a progressive degradation of the hierarchical organization of semantic memory. When clustering and switching on phonemic and semantic fluency tasks were correlated with the numbers of correct words generated on both fluency tests, but the contribution of clustering was greater on the semantic task. Patients with Alzheimer's disease generated fewer correct words and made fewer switches than controls on both fluency tests. The average size of their semantic clusters was smaller and the contribution of clustering to word generation was less than for controls. Severity of dementia was correlated with the numbers of correct words and switches, but not with cluster size. The structure of semantic memory in Alzheimer's disease is probably degraded but there is no evidence that this process is progressive. Instead, progressive worsening of verbal fluency in Alzheimer's disease seems to be associated with the deterioration of mechanisms that govern initiation of search for appropriate subcategories (Beatty, Testa, English et al. 1997). This pattern can be interpreted as reflecting significantly impaired procedural routines in Alzheimer's disease, with relative sparing of the structure of semantic memory (Chenery 1996).

No loss of source memory

A source memory task, using everyday objects in actions performed by either the participant or the experimenter, was given to probable Alzheimer's disease and elderly normal individuals. When the overall recognition performance of the two groups was

made equivalent by increasing the test delay intervals for the control group, both groups of participants showed similar patterns of correct and incorrect responses. Moreover, both groups showed evidence of a generation effect and of an advantage for items repeated at study. The findings of this study suggest that, for a given level of event memory, memory for the source of the events is comparable between elderly normal and individuals with Alzheimer's disease (Brustrom and Ober 1996).

Contextual cues

Two experiments examined whether impairments in recognition memory in early stage Alzheimer's disease were due to deficits in encoding contextual information (Rickert, Duke, Putzke et al. 1998). Normal elderly and patients diagnosed with mild stage Alzheimer's disease learned one of two tasks. In an initial experiment, correct recognition memory required participants to remember not only what items they had experienced on a given trial but also when they had experienced them. A second experiment required that participants remembered only what they had seen, not when they had seen it. Large recognition memory differences were found between the Alzheimer's disease and the normal elderly groups in the experiment where time tagging was crucial for successful performance. In the second experiment where the only requisite for successful recognition was remembering what one had experienced, memory of the temporal record was not necessary for successful performance. In this instance, recognition memory for the both groups was identical. Memory deficits found in early stage Alzheimer's disease may be partly due

to impaired processing of contextual cues that provide crucial information about when events occur.

Foster (Foster 1998) carried out a series of studies of background auditory conditions that provided such a context, and their influence upon autobiographical memory. While the use of background music has no effect on word-list recall in the normal elderly, there is a constant beneficial effect of music for autobiographical memory for patients with Alzheimer's disease. This music did not have to be familiar to the sufferer, nor did it reduce anxiety. The effect of music is stronger in cognitively impaired participants thus promoting another reason for using music-based interventions in treatment initiatives. Foster, like Aldridge (Aldridge 1993c), argues for the use of music in assessment procedures.

As part of a program of studies investigating memory for everyday tasks, Rusted et al (Rusted, Marsh, Bledski et al. 1997) examined the potential of auditory and olfactory sensory cues to improve free recall of an action event (cooking an omelet) by individuals with dementia of the Alzheimer's type. Both healthy elderly and volunteers with Alzheimer's disease recalled more of the individual actions which comprised the event when they listened, prior to recall, to a tape of sounds associated with the event. Olfactory cues that accompanied auditory cues did not produce additional benefits over auditory cues alone. The pattern of recall suggests that the auditory cues improved recall of the whole event, and were not merely increasing recall of the specific actions associated with the sound cues. Individuals with Alzheimer's disease continue to

encode experiences using a combination of senses, and that they can subsequently use this sensory information to aid memory. These findings have practical implications for accessing residual memory for a wide range of therapeutic activities using the creative arts that emphasize sensory abilities.

Functional plasticity

Conscious recall of past events that have specific temporal and spatial contexts, termed episodic memory, is mediated by a system of interrelated brain regions. In Alzheimer's disease this system breaks down, resulting in an inability to recall events from the immediate past. Using brain scanning techniques of cerebral blood flow, Becker, Mintun, Aleva et al. (Becker, Mintun, Aleva et al. 1996)

demonstrate that Alzheimer's disease patients show a greater activation of regions of the cerebral cortex normally involved in auditory-verbal memory, as well as activation of cortical areas not activated by normal elderly subjects. These results provide clear evidence of functional plasticity in the brain of sufferers, even if those changes do not result in normal memory function, and provide insights into the mechanisms by which the brain attempts to compensate for neurodegeneration. Similarly, it has been demonstrated that Alzheimer's disease can effectively learn and retain a motor skill for at least 1 month (Dick, Nielson, Beth et al. 1995)

Both anterograde and retrograde procedural memory appear to be spared in Alzheimer's disease (Crystal, Grober, and Masur 1989). An 82 year old musician with Alzheimer's disease showed a preserved ability to play previously learned piano compositions from memory while

being unable to identify the composer or titles of each work. He also showed a preserved ability to learn the new skill of mirror reading while being unable to recall or recognize new information.

Communication

Characteristic features of communication breakdown and repair among individuals with dementia of the Alzheimer's type and their caregivers have been described recently (Orange, VanGennep, Miller et al. 1998). The nature of communication breakdown, how it is signaled, how it is repaired, and the outcome of the repair process appear to be disease stage-dependent. Couples in the early and middle stage of the disease achieve success in resolving communication breakdowns despite declining cognitive, linguistic and conversation abilities of the individuals with the disease. This has important implications for understanding the influence of the progression of Alzheimer's disease on conversational performance and for advancing the development of communication enhancement education and training programs for spousal caregivers of individuals with Alzheimer's disease.

Music therapy will have an important role to play here as the ground of communication, as we have seen, is inherently musical. Dementia sufferers appear to be open to musical stimuli and responsive to music-making, thus implementation of musical elements in facilitating communication and expression can be enhanced as the disease progresses. If music enhances communicative abilities –indeed, is the fundamental of communication - and spousal caregivers are important in managing

the progress of the disease, then have to return to the idea that it is the caregivers who will benefit from music therapy.

Musical hallucinations

Hallucinations may occur in any of our senses, and auditory hallucinations take various forms; as voices, cries, noises, or rarely, music. However, the appearance of musical hallucinations, often in elderly patients, has generated interest in the medical literature (Berrios 1990; Brasic 1998; Mahowald, Woods, and Schenck 1998; Wengel, Burke, and Holemon 1989). When such hallucinations do occur they are described as highly organized vocal or instrumental music. In contrast, tinnitus is characterized by unformed sounds or noises that may possess musical qualities (Wengel et al. 1989).

The case histories of patients with musical hallucinations suggest an underlying psychiatric disorder (Aizenberg, Schwartz, and Modai 1986; Wengel et al. 1989); which may be exacerbated by dementing illness occurring with brain deterioration (Gilchrist and Kalucy 1983), or that patients with musical hallucinations and hearing loss become anxious and depressed (Fenton and McRae 1989). Fenton challenges the association of psychosis and previous mental illness, preferring an explanation that relies upon the degeneration of the aural end-organ whereby sensory input, which suppresses much non-essential information, fails to inhibit information from other perception-bearing circuits. Other investigators (Gilchrist and Kalucy 1983) argue for a central brain dysfunction as evidenced by measures of brain function. In a sample of 46 subjects experiencing

musical hallucinations musical hallucinations were far more common in females; age, deafness, and brain disease affecting the non-dominant hemisphere played an important role in the development of hallucinations; and psychiatric illness and personality factors were found to be unimportant (Wengel et al. 1989).

For these patients the application of music therapy to raise the ambient noise level, to organize aural sensory input by giving it a musical sense and counter sensory deprivation, and to stimulate and motivate the patient seems a reasonable approach.

Music therapy, heart rate and respiration

The effect of music on the heart and blood pressure has been a favorite theme throughout history. In an early edition of the medical journal "Lancet" (Vincent and Thompson 1929) an attempt was made to discover the influence of listening to gramophone, and radio, music on blood pressure. The effects of music were influenced by how much the subjects appreciated music. Differing groups of musical competence responded in relation to volume, melody, rhythm, pitch and type of music. Interest in the music was an important factor influencing response. Melody produced the most marked effect in the musical group. Volume produced the most apparent effect in the moderately musical group. In general, listening to music was accompanied by a slight rise in blood pressure in the listener.

If music produces physiological and psychological effects, in healthy persons as listeners then it may be assumed that persons with various

diseases respond to music in specific ways. A particular hypothesis, which is yet to be substantiated empirically, is that people with known diseases respond to music in a way that is mediated by that disease. Hence, we might find that the musical parameters of improvised playing are restricted by disease. Also, in terms of music therapy, if music is known to influence a physiological parameter such as heart rate or blood pressure, then maybe music can be used therapeutically for patients who have problems with heart disease or hypertension.

Bason (Bason and Celler 1972) found that the human heart rate could be varied over a certain range by entrainment of the sinus rhythm with external auditory stimulus which presumably acted through the nervous control mechanisms, and resulted from a neural coupling into the cardiac centers of the brain. An audible click was played to the subject at a precise time in the cardiac cycle. When it came within a critical range then the heart rate could be increased or decreased up to 12% over a period of time up to 3 minutes. Fluctuations caused by breathing remained, but these tended to be less when the heart was entrained with the audible stimulus. When the click was not within the time range of the cardiac cycle then no influence could be made. Bason's paper is important for supporting the proposition often made by music therapists that meeting the tempo of the patient influences their musical playing and is the initial key to therapeutic change.

An extension of this premise, that musical rhythm is a pacemaker, was investigated by Haas and her colleagues (Haas, Distenfeld, and

Axen 1986) in terms of the effects of perceived rhythm on respiratory pattern, a pattern that serves both metabolic and behavioral functions. Metabolic respiratory pathways are located in the reticular formation of the lower pons and medulla, whereas the behavioral respiratory pathways are located mainly in the limbic forebrain structures that lead to vocalization and complex behavior. There appear to be both hypothalamic and spinal pattern generators capable of synchronizing this respiratory and locomotor activity. Therefore, Haas hypothesized that an external rhythmical musical activity, in this case listening to taped music, would have an influence on respiratory pattern while keeping metabolic changes and afferent stimuli (i.e. no gross motor movements) to a minimum.

Twenty subjects were involved in this experiment, four of whom were experienced musicians and practicing musicians, six had formal musical training but no longer played a musical instrument and the remaining ten had no musical training. Respiratory data including respiration frequency and airflow volume was collected alongside heart rate and end-tidal CO₂. Subjects listened to a metronome set at 60b.p.m. and tapped to that beat on a microphone after a baseline period. The subjects were then randomly presented with four musical excerpts and a period of silence with which they tapped along to. There were no appreciable changes in heart rate during the experiment, but there was an appreciable change in respiratory frequency and a significant decrease in the coefficient of variation for all respiratory parameters during the finger tapping. For non-musically

trained subjects there was little coordination between breathing and musical rhythm, while for trained musicians there was a coupling of breathing and rhythm. That singers have more efficient pulmonary strategies than non-trained musicians, even when talking, is supported elsewhere in the literature (Formby, Thomas, and Halsey 1989).

Auditory cues, then, appear to be important in the synchronization of respiration and other motor activity. It is this aspect of organization of behavioral events that appears to be the important aspect of music and central to music therapy (Aldridge 2000).

Coronary care

Several authors have investigated this relationship in the setting of hospital care (Aldridge 1993b; Bonny 1983; Davis-Rollans and Cunningham 1987; Elliott 1994; Fitzsimmons, Shively, and Verderber 1991; Guzzetta 1989; Philip 1989; Zimmerman, Pierson, and Marker 1988) often with the intent of reducing anxiety in chronically ill patients (Gross and Swartz 1982; Standley 1986), for treating anxiety in general (Robb 2000), or specifically in musicians (Brotsky and Sloboda 1997)

A hospital situation that is fraught with anxiety for the patient is the intensive care unit. For patients after a heart attack, where heart rhythms are potentially unstable, the setting of coronary care is itself anxiety provoking which recursively influences the physiological and psychological reactions of the patient. In these situations several authors, in varying hospital intensive care or coronary care clinics, have assessed the use of tape recorded music delivered through headphones as an

anxiolytic with the intention of reducing stress (Updike 1990). Bonny (Bonny 1983) has suggested a series of musical selections for tape recordings which can be chosen for their sedative effects and according to other mood criteria, associative imagery and relaxation potential (Bonny 1978); none of which have been empirically confirmed; although Updike (Updike 1990), in an observational study, confirms Bonny's impression that there is a decreased systolic blood pressure, and a beneficial mood change from anxiety to relaxed calm, when sedative music is played.

Rider (Rider 1985a; Rider 1985b) proposed that disease related stress was caused by the desynchronization of circadian oscillators and that listening to sedative music, with a guided imagery induction, would promote the entrainment of circadian rhythms as expressed in temperature and corticosteroid levels of nursing staff. This study found no conclusive results, mainly because there was no control group and the study design was confused highlighting the essential difference between music when applied as a music therapy discipline, and music as an adjunct to psychotherapy or biofeedback.

Davis-Rollans (Davis-Rollans and Cunningham 1987) describes the use of a 37-minute tape recording of selected classical music * on the heart rate and rhythm of coronary care unit patients. Twelve of the patients had had heart attacks and another twelve had a chronic heart condition. Patients were exposed to two randomly varied

42-minute periods of continuous monitoring; one period with music delivered through headphones, the other control period was without music and contained background noise of the unit as heard through silent headphones. Eight patients reported a significant change to a happier emotional state after listening to the music (a result replicated by Updike (Updike 1990)), although there were no significant changes in specific physiological variables during the music periods. A change in mood, however, which relieves depression is believed to be beneficial to the overall status of coronary care patients (Cassem and Hackett 1971).

Bolwerk (Bolwerk 1990) set out to relieve the state anxiety of patients in a myocardial infarction ward using recorded classical music **. Forty adults were randomly assigned to two equal groups; one of which listened to relaxing music during the first four days of hospitalization, the other received no music. There was no controlled "silent condition". While there was a significant reduction in state anxiety in the treatment group, state anxiety was also reduced in the control group. The reasons for this overall reduction in anxiety may have been that after four days the situation had become less acute, the situation was not so strange for the patient, and by then a diagnosis had been confirmed.

State anxiety is an individual's anxiety at a particular state in time, as opposed to trait anxiety that is an overall prevailing condition of anxiety unbounded by time and determined by personality. The relationship

* Beethoven *Symphony Nr.6* (first movement); Mozart, *Eine kleine Nachtmusik* (first and fourth movements) and Smetana, *The Moldau*.

** Bach, *Largo*; Beethoven, *Largo*; Debussy, *Prelude to the Afternoon of a Faun*.

between stress and anxiety is that stimulus conditions, or stressors, produce anxiety reactions; i.e. the state of anxiety. Anxiety as a state is characterized by subjective feelings of tension, worry and nervousness which are accompanied by physiological changes of heart rate, blood pressure, myocardial oxygen consumption, lethal cardiac dysrhythmias and reductions in peripheral and renal perfusion. Admission to the coronary care unit is itself a stressor, and the environment produces further stress, therefore the importance for managing state anxiety.

The purpose of a study by Guzzetta (Guzzetta 1989) was to determine whether relaxation and music therapy were effective in reducing stress in patients admitted to a coronary care unit with the presumptive diagnosis of acute myocardial infarction. In this experimental study, 80 patients were randomly assigned to a relaxation, music therapy, or control group. The relaxation and music therapy groups participated in three sessions over a two-day period. Music therapy was comprised of a relaxation induction and listening to a 20 minute musical cassette tape selected from three alternative musical styles; soothing classical music, soothing popular music and non-traditional music (defined as "compositions having no vocalization or meter, periods of silence and an asymmetric rhythm" (p611). Stress was evaluated by apical heart rates, peripheral temperatures, cardiac complications, and qualitative patient evaluative data. Data analysis revealed that lowering apical heart rates and raising peripheral temperatures were more successful in the relaxation and music therapy

groups than in the control group. The incidence of cardiac complications was found to be lower in the intervention groups, and most intervention subjects believed that such therapy was helpful. Both relaxation and music therapy were found to be effective modalities of reducing stress in these patients, and music listening was more effective than relaxation alone. Furthermore, apical heart rates were lowered in response to music over a series of sessions thus supporting the argument that the assessment of music therapy on physiological parameters is dependent upon adaptation over time. Further research strategies may wish to make longitudinal studies of the influence of music on physiological parameters.

This positive finding above was in contrast to Zimmerman (Zimmerman et al. 1988) who failed to find an influence of music on heart rate, peripheral temperature, blood pressure or anxiety score. However, Zimmerman's study only allowed for one intervention of music. In this experimental study the authors examined the effects of listening to relaxation-type music on self-reported anxiety and on selected physiologic indices of relaxation in patients with suspected myocardial infarction. Seventy-five patients were randomly assigned to one of two experimental groups, one listening to taped music and the other to "white noise" °

° "White noise" or "synthetic silence" is an attempt to block out environmental noise. In this case it was a tape recording of sea sounds, which themselves were rhythmic

Philip, YT (1989) Effects of music on patient anxiety in coronary care units [letter]. *J*, 3, 322.

Zimmerman, L (1989) Reply to a letter asking what "white noise" was. *J*, 3, 322..

through headphones, or to a control group. The Spielberger State Anxiety Inventory (Spielberger 1983) was administered before and after each testing session, and blood pressure, heart rate, and digital skin temperature were measured at baseline and at 10-minute intervals for the 30-minute session. There was no significant difference among the three groups for state anxiety scores or physiologic parameters. Because no differences were found, analyses were conducted of the groups combined. Significant improvement in all of the physiologic parameters was found to have occurred. This finding reinforces the benefit of rest and careful monitoring of patients in the coronary care unit, but adds little to the understanding of music interventions. Time to listen, separated from the surrounding influence of the hospital unit by the use of headphones, may itself be an important intervention. Although Rider (Rider 1985a) did not reach this preceding conclusion; he found that perceived pain was reduced in a hospital situation in response to classical music delivered through headphones, it could be concluded from his work that isolation from environmental sounds, canceling out external noise, has a positive benefit for the patient regardless of inner content, i.e. music, relaxation induction or silence.

Given that Bason's study (Bason and Celler 1972) could influence heart rate by matching the heart rate of the patient, then we must conclude that studies of the influence of music on heart rate must match the music to the individual patient. This also makes psychological sense as different people have varied reactions to the

same music. Furthermore, improvised music playing which takes meeting the tempo of the patient as one of its main principles may have an impact other than the passive listening to music. In addition, the work of Haas (Haas et al. 1986) mentioned above showed that listening, coupled with tapping, synchronizes respiration pattern with musical rhythm, further emphasizing that active music playing can be used to influence physiological parameters and that this synchronization can be learned. Thaut (Thaut 1985) also found that children with gross motor dysfunction performed significantly better motor rhythm accuracy when aided by auditory rhythm and rhythmic speech.

Gustorff has successfully used music therapy in the treatment of coma patients in the context of intensive care (Aldridge, Gustorff, and Hannich 1990). This work has also been extended to persistent vegetative state where patients, seemingly unaware of their environment, begin to respond to the human singing voice (Aldridge 1991; Ansdell 1995; Gustorff 1990).

Anesthesia

The ability of music to induce calm and well-being has been used in general anesthesia. Patients express their pleasure at awakening to music in the operating suite (Bonny and McCarron 1984) where music was played openly at first, and then through earphones during the operation. In a study by Lehmann (Lehmann, Horrichs, and Hoeckle 1985) patients undergoing elective orthopedic or lower abdominal surgery were given either placebo infusion (0.9% NaCl) instead of tramadol in a randomized and double-

blind manner in order to evaluate tramadol efficacy as one component of balanced anesthesia. Post-operative analgesic requirement and awareness of intra-operative events (tape recorder music offered via earphones) were further used to assess tramadol effects. Although anesthesia proved to be quite comparable in both groups striking differences between the two groups were shown with respect to intra-operative awareness: while patients receiving placebo proved to be amnesic, 65% of tramadol patients were aware of intra-operative music. The ability to hear music during an operation is also reported by Bonny (Bonny and McCarron 1984).

Cancer therapy, pain management and hospice care

Cancer and chronic pain care require complex co-ordinated resources that are medical, psychological, social and communal. Hospice care in the United States and England has attempted to meet this need for palliative and supportive services that provide physical, psychological and spiritual care for dying persons and their families. Such a service is based upon an interdisciplinary team of health care professionals and volunteers, which often involves outpatient and inpatient care.

In the Supportive Care Program of the Pain Service to the Neurology Department of Sloan -Kettering Cancer Center, New York, a music therapist is part of that supportive team along with a psychiatrist, nurse-clinician, neuro-oncologist, chaplain and social worker (Bailey 1984; Coyle 1987). Music therapy is used to promote relaxation, to reduce anxiety,

to supplement other pain control methods and to enhance communication between patient and family (Bailey 1983; Bailey 1984). As depression is a common feature of the patients dealt within this program, then music therapy is hypothetically an influence on this parameter and in enhancing quality of life. Although quality of life has assumed a position of importance in cancer care in recent years and music therapy, along with other art therapies, is thought to be important, the evidence for this belief is largely anecdotal and unstructured. Bailey (Bailey 1983) discovered a significant improvement in mood for the better when playing live music to cancer patients as opposed to playing taped music which she attributes to the human element being involved. Gudrun Aldridge (Aldridge 1996b), in a single case study, emphasizes the benefits of expression facilitated by playing music for the post-operative care of a woman after mastectomy.

A better researched phenomenon is the use of music in the control of chronic cancer pain, although such studies abdicate the human element of live performance in favor of tape recorded interventions. .

In addition to reducing pain, particularly in pain clinics, music as relaxation and distraction has been tried during chemotherapy to bring overall relief (Kerkvliet 1990), and to reduce nausea and vomiting (Frank 1985). Using taped music and guided imagery in combination with pharmacological antiemetics, Frank (Frank 1985) found that state anxiety was significantly reduced resulting in a perceived degree of reduced vomiting, although the nausea remained the same. As this study was not controlled the reduced anxiety

may have been a result of the natural fall in anxiety levels when chemotherapy treatment ended. However, the study consisted of patients who had previously experienced chemotherapy and were conditioned to experience nausea or vomiting in conjunction with it. That the subjects of the study felt relief was seen as an encouraging sign in the use of music therapy as a treatment modality.

There is a rapidly developing literature related to working with children with cancer (Aldridge 1999; Fagen 1982; Standley and Hanser 1995) that also focuses on specific issues like the management of pediatric pain (Frager 1997; Loewy 1997), hospitalization (Froehlich 1996) special needs groups (McCauley 1996) and the use of songs (Aasgaard 1994; O'Callaghan 1996).

Some music therapists work in situations with adult patients (Bunt 1995), or clients, who are living with challenge of the Human Immune- deficiency Virus (Aldridge 1993a; Aldridge 1999; Aldridge 1995; Aldridge and Aldridge 1999; Hartley 1994; Schnürer, Aldridge, Altmaier et al. 1995). There is a pioneering literature in this field of the work that has been developed by Colin Lee (Lee 1995; Lee 1996) and Ken Bruscia (Bruscia 1991; Bruscia 1995) and these two chapters demonstrate how other therapists have also been advancing the use of music therapy to meet this challenge.

Neurological problems

In many cases neurological diseases become traumatic because of their abrupt appearance resulting in physical and/or mental impairment (Jochims 1990). Music appears to be a key in the recovery of former capabilities in the light of what at first

can seem like hopeless neurological devastation (Aldridge 1991a; Jones 1990; Magee 1995a; Magee 1995b; Sacks 1986).

For some patients with brain damage following head trauma, the problem may be temporary resulting in the loss of speech (aphasia). Music therapy can play a valuable role in the aphasia rehabilitation (Lucia 1987). Melodic Intonation Therapy (Naeser and Helm-Estabrooks 1985; O'Boyle and Sanford 1988) has been developed to fulfil such a rehabilitative role and involves embedding short propositional phrases into simple, often repeated, melody patterns accompanied by finger tapping. The inflection patterns, of pitch changes and rhythms of speech, are selected to parallel the natural speech prosody of the sentence. The singing of previously familiar songs is also encouraged as it encourages articulation, fluency and the shaping procedures of language which are akin to musical phrasing. In addition the stimulation of singing within a context of communication motivates the patient to communicate and, it is hypothesized, promotes the activation of intentional verbal behavior. In infants the ability to reciprocate or compensate a partner's communicative response is an important element of communicative competence (Murray and Trevarthen 1986; Street and Cappella 1989) and vital in speech acquisition (Glenn and Cunningham 1984). Music therapy strategies in adults may be used in a similar way with the expectation that they will stimulate those brain functions that support, precede and extend functional speech recovery. Functions, which are essentially

musical and rely upon brain plasticity. Combined with the ability to enhance word retrieval, music can also be used to improve breath capacity, encourage respiration-phonation patterns, correct articulation errors caused by inappropriate rhythm or speed and prepare the patient for articulatory movements. In this sense music offers a sense of time which is not chronological, which is fugitive to measurement and vital for the coordination of human communication (Aldridge 1996a).

Evidence of the global strategy of music processing in the brain is found in the clinical literature. In two cases of aphasia (Morgan and Tilluckdharry 1982) singing was seen as a welcome release from the helplessness of being a patient. The author hypothesized that singing was a means to communicate thoughts externally. Although the 'newer aspect' of speech was lost, the older function of music was retained possibly because music is a function distributed over both hemispheres. Berman (Berman 1981) suggests that recovery from aphasia is not a matter of new learning by the non-dominant hemisphere but a taking over of responsibility for language by that hemisphere. The non-dominant hemisphere may be a reserve of functions in case of regional failure indicating an overall brain plasticity, and language functions may shift with multilinguals as compared with monolinguals, or as a result of learning and cultural exposure where music and language share common properties (Tsunoda 1983).

That singing is an activity correlated with certain creative productive aspects of language is shown in the case of a 2-year-old boy

of above-average intelligence who experienced seizures, manifested by tic-like turning movements of the head, which were induced consistently by his own singing, but not by listening to or imagining music. His seizures were also induced by his recitation and by his use of silly or witty language such as punning. Seizure activity on an EEG was present in both temporo-central regions, especially on the right side, and was correlated with clinical attacks (Herskowitz, Rosman, and Geschwind 1984).

Aphasia is also found in elderly stroke patients and music therapy, as reported in case studies, has been used effectively in combination with speech therapy.

Gustorff (Aldridge, Gustorff, and Hannich 1990; Gustorff and Hannich 2000) has successfully applied creative music therapy to coma patients who were otherwise unresponsive. Matching her singing with the breathing patterns of the patient she has stimulated changes in consciousness which are both measurable on a coma rating scale and apparent to the eye of the clinician.

Mental handicapped adults

Music appears to be an effective way of engaging profoundly mentally handicapped adults in activity (Wigram 1988). The functional properties of music have implications for the treatment of the mentally handicapped in that; (i) exposure to sound arouses sensory processes, (ii) a musical event is an organized temporal auditory structure with a beginning and an end, (iii) music facilitates memory recall and expectation ("the signature tune effect"); and, (iv) a sequence of

musical themes can enhance memory recall and the organization of a sequence of cognitive activities (Knill 1983).

For a group of profoundly mentally handicapped adults, music therapy was used to encourage those adults to attempt movements and actions, and achieve non-musical aims within the music therapy sessions (Oldfield and Adams 1990). Music therapy was compared with play activity using two groups of subjects. Each group received either music therapy or play activity for six months, at which time the groups were reversed to receive the comparison treatment. As the handicaps were so profound and varied between individuals then a separate behavioral index was formulated for each subject. It was hypothesized that each objective would be achieved to a greater extent in the music therapy group than in play activity. While the study was restricted in terms of numbers, and the behavioral indexes were varied, there was a significant difference in the performance in music therapy than in play therapy. This improved performance was not attributable to greater attention in the music therapy group. The type of input was noticeably different in the two groups; in the music therapy group improvisations were based on the subjects own musical productions. However, for one subject there was greater improvement in the play activity which came before the music therapy treatment.

Children

Much of modern music therapy was developed in working with children and the diversity and richness of this work is reflected in the literature.

Stern (Stern 1989) emphasizes the importance of the creative arts in general to child development as they involve the child's natural curiosity. However, she also proposes that in terms of child development then therapies must involve the family of the child particularly in the case of child disability. For children with multiple disabilities there is need for stimulation and this can be achieved using music which also provides a sense of fun and enjoyment. Stern's approach suggests that songs stimulate a bond between therapist and patient, and that for one particular disabled patient "The music entered Susan's frame of reference" (p649). An alternative explanation could be that music *was* Susan's frame of reference by which she co-ordinated her own activities and those activities with another person. It may well be that families of handicapped children need to learn the rudiments of music therapy, as organized rhythmic communication, such that they can provide a structure for their mutual communications (Aldridge 1989). In this sense it make sense for therapists to work with both parents and children.

Songs, both composed and improvised provide the vehicle for working with hospitalized children (Aasgaard 1999; Dunn 1999).

Songs were also used in the preoperative preparation of children in an attempt to relieve fear and anxiety by transmitting surgery-related information. To ascertain the efficacy of using information alone, or information with songs, three groups of children were prepared on the day before surgery; one group with information alone, one group with information followed by specially

prepared songs which were based on that information; and a third group which also had information followed by songs with an additional session of songs immediately in the preoperative phase on the day of the operation. The group receiving music therapy on the morning prior to the induction of pre-operative medication exhibited significantly less anxiety based on a number of observed variables. Lessons to be learned from this research may be that although information is made available it does not mean to say that the child will be able to use this information when it is needed, no amount of information will make a procedure less painful, and a cognitive understanding of pain made during a therapy session is not necessarily translated into physical or emotional relief during the context of surgical preparation. Music therapy in its immediacy may have been a critical factor in reducing anxiety, as anecdotal reports suggest, but in this study no group received music therapy alone.

In a general study of music therapy as applied to newborns and infants in hospital (Marley 1984), music appeared beneficial as a calming effect inducing sleep and relaxation. The methods ranged from simple tapping on the back to simulate a heartbeat, through rocking of children in time to played music, to receptive music therapy. It is difficult to understand the nature of this work as music therapy. The researcher reports that in 13 of the rooms the television was off and in fourteen rooms the television was on. When the television was on in most cases the sound was either too low or too loud. It must be added that the children were between the ages of 5

weeks and 36 months old. With continuous sound stimulation then little wonder the children responded to the television being switched off and guitar music being played to them.

Fagen (Fagen 1982), working with terminally ill pediatric patients, also emphasizes the psychosocial setting of the family and the hospital as important. Music therapy in this setting was used to improve the quality of life of the patients in an attempt to broaden and deepen their range of living. However neither a quality of life scale was used, nor were the criteria for assessing the quality of life in dying children made clear. This is not surprising as no quality of life scales for children with terminal illness exist at present. In her music therapy practice Fagen was eclectic borrowing from various music therapy schools but concentrating on songs to confront the issues of hospitalization and dying. These songs often had improvised lyrics according to the needs of the situation, or songs that had given meanings and were appropriate to the patient. No attempt was made to force patients to confront their own dying.

Aasgaard has pursued the theme of music therapy in pediatric oncology further. He uses songs to facilitate a return to health, where health is seen as a performed activity within ecology of care (Aasgaard 1999). These songs are no however privatized productions, but shared pieces of music that are sung by siblings, family members, and hospital staff.

Creative expression, as reported in the work with children, is generally accepted as a means of coping whereby pain and anxiety are channeled into activities (Lavigne,

Schulein, and Hahn 1986). In an attempt to encourage children to cope with the trauma of hospitalization by verbalizing their experiences, Froehlich (Froehlich 1984) compared the use of play therapy and music therapy as facilitators of verbalization. When specifically structured questions about hospitalization were asked of the children after sessions of music therapy or play therapy, music therapy elicited more 'answers' than 'no answers', and a more involved type of verbalization involving elaborated answers, than play therapy.

Autism

Music therapy allows children without language to communicate and possibly to orient themselves within time and space. It has developed a significant place in the treatment of mental handicap in children.

Children exhibiting autistic behavior appeared to prefer a musical stimulus rather than a visual stimulus when compared with normal children (Thaut 1987). Although the significance of this finding was not statistically valid; the study does report that autistic children showed more motor reactions during periods of music than normal children, and that autistic children appeared to listen to music longer than their normal peers who preferred visual displays.

In a later study comparing autistic children and their normal peers (Thaut 1988), autistic children produced spontaneous tone sequences almost as well as normal children and significantly better than a control group of mentally retarded children. Each child sat at a xylophone with two beaters, after having had a short

demonstration from the researcher, who then asked them to play spontaneously for as long as they liked until they came to a natural ending. The musical parameters, of the first sixteen tones of these improvisations, which were assessed and used as the basis for group comparisons were; rhythm (representing the imposition and adherence to temporal order); restriction (representing the use of all available tonal elements); complexity (representing the generation of recurring melodic patterns; rule adherence (representing the application of melodic patterns to the total sound sequence); and, originality (representing the production of melodic patterns that occurred only once but fulfilled criteria of melodic and rhythmic shape). Autistic children perceived and explored the xylophone as normal children did in terms of originality and restriction, but tended to play with short recurring motives rather like the mentally handicapped children. Thaut (1988) concludes, "The low performances on complexity and rule adherence of such children suggest an inability to organize and retain complex temporal sequences" (p567). This relationship between cognition and motor behavior as it is co-ordinated in rhythmical performance, as we have read above in terms of heart rate, breathing, muscle performance and speech rehabilitation, would appear to be worthy of investigation in a wide variety of patients with communication difficulties regardless of the source of those difficulties.

Music therapy has been used extensively in the treatment of developmental delay. In a crossover study (Aldridge, Gustorff, and

Neugebauer 1995), the children in the initially treated group changed more than the children on the waiting list. When those waiting-list control group children were then treated with music therapy, and the formerly treated children rested, then the newly treated children caught up in their development. Such changes were demonstrated at a level of clinical significance. There was a continuing improvement in hearing and speech, hand-eye coordination and personal-social interaction. While active listening and performing were seen to be central to the developmental process, it was the importance of hand-eye coordination skills emphasized in the active musical playing which were instrumental in encouraging cognitive change.

Conclusion

There is a broad literature covering the application of music therapy as reported in the medical press and a growing resource of valid clinical research material from which substantive conclusions can be drawn. The obscure observations in the realm of psychotherapy highlight a critical feature of music therapy research; well intentioned, and often rigorous work, is spoiled by a lack of research methodology. This is not to say that all music therapy clinical research should conform to a common methodology (Aldridge 1996; Aldridge 1999; Aldridge 2000), or that it be medical research, rather than standard research tools and methods of clinical assessment be developed which can be replicated, which are appropriate to music therapy, and develop a link with other forms of clinical practice. In this way we develop working tools which allow us to inform others and

ourselves. There is a lively debate in music therapy circles about appropriate methods and a variety of books have addressed themselves to presenting research material and methods (Wheeler 1995).

The research that has been produced is notably lacking in follow up data, without which it is difficult to make valid statements about clinical value. The assessment instruments are generally lacking by which internal or external validity can be conferred. For example, as 'depression' appears to feature in many chronic diseases then a clinical rating of depression, using a validated scale, would be appropriate to include in a research design. If this assessment of depression could be combined with an overall assessment of life quality then a significant step forward would be made in establishing a minimal data set for assessing clinical change.

Much of the research work has been developed within the field of nursing where the use of music is accepted as a useful therapeutic adjunct. Not surprisingly, the work from this field has concentrated on medical scientific perspectives. There is almost a complete absence of cross-cultural studies, or the use of anthropological methods that would bring other insights into music therapy. That music has been used therapeutically in other cultures cannot be denied, and other perspectives regarding the application of music therapeutically would highlight the limitations of modern Western scientific approaches when used as the sole means of research.

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