THE DEVELOPMENT OF CRITERIA FOR DEFINING SEDATIVE MUSIC, AND ITS IMPACT ON ADULTS WITH MILD, MODERATE, AND SEVERE INTELLECTUAL DISABILITY AND CHALLENGING BEHAVIOUR

"The primary mission of music therapy is to help clients to achieve health through music... We must be prepared to use all facets of music to the advantage of the client" (Bruscia, 1995, pp. 72-73).

1. Introduction

The studies in this thesis investigate the effects of receptive music therapy on disruptive mealtime behaviours displayed by adults with an intellectual disability. The aetiology of challenging behaviour suggests that it is driven by mental state, as much as anything else. The poor coping mechanisms (Wayment & Zetlin, 1989) and irrationality (Lindsay & Olley, 1998) associated with intellectual disability exacerbated stresses associated with mealtimes, and raised arousal levels (O'Brien et al., 1991). The main research question examined whether using non-contingent sedative music (hereafter referred to as sedative music) to mask disruptive noise, to create a less startling environment and to soothe agitation would affect this type of challenging behaviour. The definition and application of recorded music for sedative purposes is also investigated as part of the main study.

2. Predictable Factors in Sedative Music (PFSM)

Receptive music therapy always involves listening (Wigram et al., 2002), and one of the first requirements of any investigation that uses music in this way is to make a selection suited to the individual, their situation and the purpose for which it is to be used.

A reliable tool (Predictable Factors in Sedative Music (PFSM)) was developed in order to define the sedative effect of music. The PFSM is grounded in previous research (Erdonmez Grocke, 1999; Shoemark, 2004; Wigram, 2004) equating sedative music with predictability. The PFSM brought a degree of systematic analysis to the process of selecting a sedative stimulus, identifying and defining six musical factors in terms of predictability (Table 1). One factor (melody) is divided into five subsections, so the listener evaluates ten separate elements and gives each

piece of music a PFSM score that ranges from zero (unpredictable/non-sedative) to ten (predictable/sedative).

Table 1: Predictable Factors in Sedative Music (PFSM)

Musical factor	*Description of predictability*
Form	Verse & chorus or introduction, verse & chorus structure.
Tempo	Remaining stable with gradual increases (accelerandos) or decreases (ritardandos).
Volume	Remaining stable with gradual increases (crescendos) or decreases (diminuendos).
Texture	Remaining stable with subtle changes in style or instrumentation.
Melody -Line	Repetition of material.
- Line	Little embellishment, no unexpected pauses or breaks.
- Timbre	Gentle sound with gradual changes within and between instrument families.
- Pitch	Gradual changes between registers.
-Accents	Few – used to add expression rather than energy to a melodic line.
Harmony	Modulations, cadences that don't introduce unexpected harmonies or dissonance.

3. Assessing the intrinsic validity of the PFSM

Four hundred and twenty-seven people participated in the six experiments described in this thesis. The first two experiments used non-disabled people to select sedative music and assess the intrinsic validity of the PFSM.

In *experiment 1,* forty-eight adults (18-69 years) received a cassette tape with fifteen, two-and-a-half minute pieces of music: instrumental arrangements of contemporary songs. This experiment identified a sedative stimulus for ensuing clinical investigations by determining the level of agreement between the participant's evaluations and the experimenter's pre-scores of the pieces against the PFSM.

Experiment 1 utilised the Energetic Arousal and the Tension Arousal sub-scales of the University of Wales Institute of Technology Mood Adjective Check List (UWIST-MACL), or UMACL for short, devised by Matthews et al., (1990). The participants were given a response sheet with sixteen of the original twenty-four UMACL words. Eight words measured an aroused response and eight measured a non-aroused one. The participants were asked to select six adjectives that best described how each extract "made them feel". The mean number of arousing and non-arousing adjectives chosen for each music selection was calculated. There was a very

strong significant positive correlation between the subjective PFSM score and the objective mean score (rho=0.870, N=15, p<0.0005, two tailed). It demonstrated that the PFSM scores were an accurate assessment of the sedative quality or otherwise of the various music selections, and identified the five highest scoring as appropriate sedative stimuli. An interpretation of the number of arousing and non-arousing adjectives chosen for each music selection indicated that the cut off for sedative music on the PFSM was a score of at least six.

In *experiment 2*, twenty-five participants (18-59 years) received two blank compact discs (CDs). They recorded a single piece of music on each CD, and identified their choice by coding the CD (e.g. 24678). The recordings were classical, folk and popular music, and they were performed by instrumentalists and vocalists.

The experimenter gave each selection a PFSM score, and then compared the outcome of that assessment with the participant's information. The blind evaluations identified all the sedative selections, and twenty-one of the stimulative choices (the remaining four were incorrectly placed in the sedative category). This outcome indicated that the PFSM can distinguish between sedative and stimulative music, and confirmed the intrinsic validity of the tool (X^2Yates=32.84, df=1, p<0.001).

4. Identifying an appropriate sedative stimulus

Experiment 3 was carried out to find out if the stimuli could be consistently perceived as sedative. There were 224 non-disabled participants (18-69 years). Of these participants, 160 listened to the five highest scoring selections sequenced together in full into seventeen minutes and thirty-nine seconds (17:39) of sedative music. The remaining 64 participants listened to eighteen minutes and twenty-five seconds (18:25) of accordion music. They controlled for the possibility that simply sitting to listen to music changed arousal levels.

The UMACL measured four dimensions (energetic arousal (EA), tense arousal (TA), hedonic tone (HT) and general arousal (GA)), and the participants completed the UMACL before (pre) and after (post) they listened to the music.

Mixed ANOVAs were used to analyse EA, TA, HT and GA. As well as a repeated measures element (pre and post dependent variables) there was a between-participant's design with four gender/musical ability combinations (male/musician; male/non-musician; female/musician; female/non-musician).

The sedative music significantly lowered all the dependent UMACL variables (EA: $F(1,156)=16$, $p<0.05$; TA: $F(1,156)=19.76$, $p<0.05$; HT: $F(1,156)=6.67$, $p<0.05$; GA: $F(1,156)=47.65$, $p=.000$) and the control condition produced a different reaction (it increased three dependent variables). This indicated that the calming qualities of sedative music, and not participating in a passive activity, affected the participant's response. The participants had recorded their reactions at their leisure and in the comfort of their own home. The decision to eschew a laboratory setting and to carry out the experiment under 'naturalistic' conditions strengthened the outcome. The discussion conjectured that familiarity, preference, gender differences and structural musical features may all have contributed to different sub-group responses.

5. Comparing how people with and without an intellectual disability respond to music

Preference plays a crucial role determining how people are effected by music; favourite music is often more influential. Despite the work carried out in experiments 1, 2 and 3 the challenge remained to balance this factor with the awareness that adults with intellectual disability often cannot make choices.

In *experiment 4*, 48 adults (25-55 years) with an intellectual disability were played the same fifteen instrumental arrangements of popular songs as the participants in experiment 1. Experiment 4 (which also measured the participant's arousal response) matched the listening time (30 seconds) and the response sheet to their cognitive ability. They were asked to choose from two drawings: 'chilled out' man lying back looking calm and relaxed (non-aroused response), or 'move about' man dancing energetically with cane in one hand and top hat in the other (aroused response).

There was a very significant result ($rho=0.831$, $N=15$, $p<0.001$, two tailed) when the number of participants with an intellectual disability who selected the 'chilled out' man for each arrangement was correlated with the non-disabled participants who recorded a non-aroused response in experiment 1. The two participant groups had responded in a similar way, and therefore the non-disabled could choose sedative music for the intellectually disabled population.

6. Overview of experiments 1, 2. 3 and 4

A review of sedative music literature published between 1996 and 2008 looked at forty-four papers and discovered shortcomings in the criteria used to determine a sedative stimulus, in the level of consensus obtained to support the final choice and in the way the final choice of music was reported. Experiments 1, 2, 3 and 4 dealt with the first two of these limitations. The final one can be addressed by providing detailed information about the sedative music. Along with the name of the composition, details of the compact disc are needed to replicate a receptive music therapy investigation. The five arrangements identified as sedative by experiments 1, 3 and 4 were: *No matter what* (PHILIPS 468362-2), *The long and winding road* (459692-2), *Blue eyes* (724353543129), *I have a dream* (EMPRCD585) and *Yesterday* (529556-2).

7. The effect of sedative music on the disruptive mealtime behaviours of adults with an intellectual disability.

7.1 Background

The experimenter set out to ethically identify a situation that people with an intellectual disability found stressful, and to use sedative music to alleviate anxiety and distress in a controlled study. Mealtimes were identified as a source of stress. It appeared that disruptive eating behaviours (non-cooperation, throwing food, physical aggression, verbal aggression and self injury) were anxiety driven behaviours exacerbated by hunger, by the heightened activity and noise levels of dining rooms and by the close proximity of other diners (Denney, 1997).

7.2 Experiment 5 and experiment 6

Experiment 5 (pilot study) and *experiment 6* (main investigation) were carried out to determine the effect of the sedative music identified by the PFSM, and experiments 3 and 4, on the disruptive mealtime behaviours of adults with an intellectual disability. They are summarised in table 2.

Table 2: Main features of experiment 5 and experiment 6

Experiment 5 (CSO funded pilot study)	**Experiment 6 (main investigation)**
38 participants (29-67 years) moderate (mod.) intellectual disability	24 participants (29-63 years)* mild/mod./severe intellectual disability
Observation period: 3 weeks	*Observation period*: 2 days
3 conditions: BL/music/non-music	*2 conditions*: music/non-music
Design: 17 participants: Week 1 - BL *(Group A)* Week 2 - Music Week 3 - Non-music 21 participants: Week 1 - BL *(Group B)* Week 2 - Non-music Week 3 - Music	*Design*: Day 1: Participant A - Music Participant B - Non-music Day 2: Participant A - Non-music Participant B - Music *Music & non-music introduced at the same time as the participants sit together.*
Music: No matter what (PHILIPS 468362-2) The long and winding road (459692-2) Blue eyes (724353543129) I have a dream (EMPRCD585) Yesterday (529556-2)	*Music*: No matter what (PHILIPS 468362-2) The long and winding road (459692-2) Blue eyes (724353543129) I have a dream (EMPRCD585) Yesterday (529556-2)
Presenting music: Free field	*Presenting music*: MP3 player & earbuds
Dependent measures: 1. Food & fluid inventory (calculates amount consumed as % of that served). 2. Agitation inventory (13 behaviours). 3. Intra session agitation (record pre- and post- meal level on Likert scale). 4. Staff questionnaire (20 respondents answer questions about music, patient's response, their response).	*Dependent measure*: 1. Agitation inventory (13 behaviours). *Only record 'anxiety provoked' disruptive behaviours. They had been distinguished from habitual, perserverative, or manneristic ones.*
Data collection (Agitation inventory): Each incidence of agitation as it occurred.	*Data collection (Agitation inventory):* Record incidence & duration from video.
Data collection period: April-July '03	*Data collection period:* March-June '07

*****30 were recruited

Experiment 6 addressed various methodological issues that had been identified at the conclusion of experiment 5. Ear bud headphones were used to simultaneously monitor participants with and without sedative music, and to control for the possibility that their behaviour was changed by different circumstances during separate experimental conditions, rather than by the introduction of sedative music. The quality of data collection was improved by distinguishing 'anxiety provoked' disruptive behaviours from habitual, perseverative, or manneristic ones. Finally, four dependent measures were reduced to one. Part of the original hypothesis (would sedative music increase the amount of food consumed) did not merit further investigation. Experiment 6 focused on testing whether sedative music would help

alleviate mealtime stress and affect the disruptive behaviours displayed by adults with an intellectual disability during this daily activity.

7.3 Results and discussion

In both experiments, disruptive mealtime behaviour was not as prevalent as anticipated; for example, only 12.5% (n=3) of the twenty-four participants in experiment 6 disrupted mealtimes compared with reported rates of between 18% (Reid et al., 1978) and 45% (Dudley et al., 1999). Nevertheless, the intervention often lowered any disruptive mealtime behaviour that did occur. In experiment 5 it significantly reduced restlessness (X^2=6.911, df=2, $p<0.05$) and decreased inappropriate handling of objects including food, cutlery, crockery and furniture (T=-2.297, N=14, $p<0.05$). In experiment 6, one of the three cases of disruptive mealtime behaviour decreased by over 50% and the other two decreased by over 75%.

There was also a very interesting individual reaction in experiment 5, where the pattern of responses of a 53 year-old woman demonstrated the impact of sedative music. A daily average of 11.8 disruptive mealtime behaviours during week 1 (non-music), fell to 4.6 when music was introduced in week 2, only to increase to 8.4 in week 3 when the background music was withdrawn and the non-music condition was reinstated. Case study research may more effectively investigate these phenomena.

In experiment 5, the intervention did not have a statistically significant effect on twelve of the thirteen behaviours analysed, and in experiment 6 the response of one of the three disruptive participants did not match the general pattern of results. Although the intervention was proposed on the basis that it would help reduce disruptive mealtime behaviours, sedative music was only powerful enough to modify challenging behaviours that had a physiological component, and that were motivated by internal processes (restlessness, for example, modulates hypo- or hyper-reactive sensory systems); it did not influence dimensions of the physical and social world causing some challenging behaviours.

Two very practical considerations emerged from experiment 6. The pattern of the disruptive behaviour should encourage carers to carefully plan mealtimes without waiting times, and participant's reactions to the introduction of headphones suggests a need to carefully consider how each person prefers receptive music to be delivered.

8. Limitations

The final two sections of this summary (limitations, directions for future research) look at the six experiments as a whole.

The PFSM was devised with considerable care. However, inaccurate conclusions were reached during experiment 2 when some of the participant's stimulative selections were identified as sedative. A weighted rating system might be more helpful than the non-weighted one used in this thesis. In experiment 1 the participant's current mood state may have affected their response, and the measuring instrument was not sensitive enough to capture moment-by-moment reactions. Instances when participants altered choices did suggest they had followed the instruction to base their response on an overall impression rather than the opening moments of a composition.

Two clinical investigations were carried out with the intellectual disability population. The second (experiment 6) did broaden the sample to include people with both mild and severe disability. However, all the participants with severe intellectual disability refused to use the listening equipment, and this leaves the research question unanswered among those most likely to exhibit the type of disruptive behaviour under investigation. Although using headphones was one of the more innovative aspects of this thesis, experiment 6 did not reflect common practice. In community settings, it would be more usual to play background music 'free field' than to issue everyone with MP3 players.

9. Directions for future research

Future research might compare different ways of delivering sedative music (headphones, free field) and determine what types of background music are most effective in reducing disruptive mealtime behaviours. Future research might consider long-term effect, and look at the timing of the intervention by introducing it 15 minutes, 30 minutes, or 1 hour before mealtimes. Future research might also look at how sedative music affects caregivers. Two nurses who completed the pilot study questionnaire commented that their behaviour was affected by the intervention.

Finally, the PFSM is more than just a tool for analysing music; it can help music therapists manipulate the dynamics, rhythm, tempo and/or tonality of improvisations, and create music matching client need. Furthermore, the clinical investigations may encourage music therapists working with the intellectual disability

population to be creative and flexible. They should not limit their roles. They should think about addressing the social needs of their clients, and consider how music can enhance their environment and their lives beyond the treatment room.

10. References

Denney, A. (1997). Quiet music: An intervention for mealtime agitation? *Journal of Gerontological Nursing, 23*(7), 16-23.

Dudley, J. R., Ahlgrim-Delzell, L., & Calhoun, M. L. (1999). Diverse diagnostic and behavioural patterns amongst people with a dual diagnosis. *Journal of Intellectual Disability Research, 43*, 70-79.

Erdonmez Grocke, D. E. (1999). *A phenomenological study of pivotal moments in Guided Imagery and Music (GIM) therapy.*, University of Melbourne. Dissertation Abstracts International #9982778.

Lindsay, W. R., & Olley, S. C. M. (1998). Psychological treatment for anxiety and depression for people with learning disabilities. In W. Fraser, D. Sines & M. Kerr (Eds.), *Hallas' The care of people with intellectual disabilities.* (9th ed.). Oxford: Butterworth-Heinemann.

Matthews, G., Jones, D. M., & Chamberlain, A. G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology, 81*, 17-42.

O'Brien, S., Repp, A. C., Williams, G. E., & Christophersen, E. R. (1991). Pediatric feeding disorders. *Behavior Modification, 15*, 394-418.

Reid, A. H., Ballinger, B. R., & Heather, B. B. (1978). Behavioural syndromes identified by cluster analysis in a sample of 100 severely and profoundly retarded adults. *Psychological Medicine, 8*, 399-412.

Shoemark, H. (2004). *Colour-coded ranking of commercially produced CDs for use with hospitalised newborn infants and children [Guidelines]*. Melbourne: Music Therapy Unit, Royal Children's Hospital.

Wayment, H. A., & Zetlin, A. G. (1989). Coping responses of adolescents with and without mild learning handicaps. *Mental Retardation, 27*(5), 311-316.

Wigram, T. (2004). *Improvisation: Methods and techniques for music therapy clinicians, educators and students*. London: Jessica Kingsley Publishers.

Wigram, T., Pedersen, I. N., & Bonde, L. O. (2002). *A comprehensive guide to music therapy: Theory, clinical practice, research and training*. London: Jessica Kingsley Publishers.