

Original Research

**“A Kind of Serene Feeling Washing Over the Centre”:
Perceptions of Staff and Trained Observers Regarding the Use
of Background Music to Improve the Auditory Environment
in an Early Childhood Centre Setting**

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Abstract

Noise in early childhood settings can reach potentially harmful levels. Carefully planned background music was introduced to help reduce activity generated noise in one preschool in New Zealand. This paper presents one aspect of the study – the impact of the music as perceived by trained observers and staff at the preschool. The study employed a small ‘n’ (ABCB) design. Over four non-consecutive weeks observers measured the perceived level of noise under baseline, ‘background music’, ‘no music’, and ‘background music’ conditions. Staff were also interviewed about any changes they might have noticed. Background music was believed to have assisted in creating an auditory environment which is likely to be conducive to positive social interaction and learning. Findings suggest that management of music is also crucial. Staff in preschool settings might benefit from the support music therapists can offer in planning and implementing a programme of background music to reduce noise levels during specific periods of the day, in their centres.

Key Words: Background music; preschool noise; teacher learning

Background

Noise in early childhood centres has been shown to reach levels that have the potential to cause harm to young children (McLaren & Dickinson, 2003; Picard & Bradley, 2001). In a large scale study undertaken by the authors, carefully planned background music was introduced to help reduce activity generated noise in one preschool in New Zealand. Measures for the larger study included readings from fixed Sound Level Meters, individual sound doseBadges worn by staff and children, event sampling by trained observers, and semi structured interviews with staff. Comparisons were made with the data collected by the sound level meter to that collected by the trained observers (McLaren, Rickson, Jones, & Dickinson, 2006). No correlation was determined between the two data sets, which reaffirms that the human perception of noise/sound with factors such as annoyance, pleasantness or the special characteristics of sound such as timbre which affect the human perception, cannot easily be quantified by sound pressure level measurements. This paper reports on one aspect of the study - the outcomes as perceived by the trained observers and the staff who were interviewed.

Introduction

Research indicates that music intended to be heard but not listened to actively, has individual uses as well as group uses (Radocy & Boyle, 2003). Background music has been found to reduce stress (Hallam, Price, & Katsarou, 2002; James, 2000), have a significant effect on children's sleep quality (Tan, 2004), improve the reading comprehension of learning disabled students (Wiley-Khaaliq, 1990), increase on-task behaviour and levels of attending, (Burlison, Center, & Reeves, 1989; Campbell, 1996; Center, Burlison, & Reeves, 1989; Davidson & Powell, 2001; Pratt, Abel, & Skidmore, 1995; Simpson, 1976; Stainback, Stainback, & Hallahan, 1973) and increase prosocial behaviour (Hallam et al., 2002; McCarty, McElfresh, Rice, & Wilson, 1978; Savan, 1999).

Nevertheless researchers describe differing responses of various populations to background music. For example, it has been found to increase arousal in brain injured students (Simpson, 1976) but also to reduce hyperactivity in overactive students (Hallam, 1998; Scott, 1970). Further, while Campbell (1996) found that background music played at soft or moderate volumes increased the compliant behaviours of seriously emotionally disturbed students, few differential effects for types of music were found. Klein (1981) found that preschoolers made more errors on a repetitive motor task when the tempo of background music increased, with hyperactive children making even more errors than normal subjects. A slow tempo condition brought the performance of the hyperactive children closest to that of the others. Klein's findings were reinforced by Hallam & Price (1998) who found that the introduction of 'calming' music had the greatest effect on those children whose behaviour could be described as hyperactive. In a later study these researchers describe calming music as having a positive effect on the number of mathematics problems completed, remembering words from sentences, and prosocial behaviour in children aged 10-12 years. Music perceived as arousing, unpleasant and aggressive had a negative effect on memory tasks and also led to a lower level of reported prosocial behaviour. These findings suggest that the effects of music on performance are attributable at least in part to its effects on arousal and mood.

Standley has conducted several studies investigating the use of music to improve the wellbeing of infants in neonatal intensive care units, including the use of music to mask ambient noise (Standley, 2002). She argues that "sound exists in an environment without a listener's ability to control volume, duration, location, or to pair it with its origin. Such noise, unlike music, is full of irregular frequencies and inconsistencies of tension, stress, and configuration. These unpredictable characteristics can produce fatigue and stress in the listener..." (pp. 23-24). Standley suggests that while erratic auditory stimuli are arousing, recorded or live music which is constant and relatively unchanging can be soothing and has the capacity to provide significant positive effects for premature infants across a variety of physiological and behaviour variables.

It seems that background music is a powerful medium which can calm or arouse and accentuate, maintain or reduce overt behaviours. Nevertheless, studies that attempted to monitor the effects of carefully chosen background music on the general environmental noise levels in a classroom are few (Giles, 1991), and only one was found to be undertaken in a preschool setting (Godeli, Santana, Souza, & Marquetti, 1996). In this latter study, Godeli et al reported that rock and folk music strongly influenced an increase in children's social interaction with peers.

Characteristics of the individual child including their cultural background, personality, musical training or experience and musical preference; as well as the nature of the music being played, the listening environment, recent life events of the individual, metacognition,

and task requirements; all contribute to the impact of music on behaviour and learning (Daoussis & McKelvie, 1986; Godeli et al., 1996; Kaniel & Aram, 1998; Kiger, 1989; Radocy & Boyle, 2003; Standley, 1992; Tucker & Bushman, 1991). Although researchers have hypothesised that repetition, modeling, and social reinforcement can influence music preference (Peery & Peery, 1986), Hallam and colleagues (2002) suggest that very young children are likely to have a more predictable, primitive, physiological response to particular types of music because they have had relatively little opportunity to acquire specific associations between particular events and specific pieces or types of music.

While the interaction of numerous musical and individual characteristics will impact on individual listener response, the structural factors of music appear to affect listeners' emotional response within limits (Abeles & Chung, 1996) and some musical elements have predictive value. At the broadest level, music can be considered as lying on a continuum from highly stimulating to soothing or calming (Gaston, 1968). There is considerable evidence that although people respond differently to contrasting types of music due to association of specific pieces with specific events, or their like or dislike of particular genres, there are general trends in our responses to stimulating or relaxing music (Hallam et al., 2002; Radocy & Boyle, 2003). Literature pertaining to the physiologic effects of music demonstrates the influence of music on the autonomic nervous system (ANS), and its potential to variously arouse and calm (Bartlett, 1996; Scherer & Zentner, 2001; Schneck & Berger, 2006). Authors suggest sounds that are non-percussive and legato characterise music that soothes, calms or tranquillises behaviour (Davidson & Powell, 2001; Radocy & Boyle, 2003). Standley (2002) has found that music that is predictable and simple can reduce arousal. "...Lullabies from all cultures have a melodic, harmonic and rhythmic consistency that soothes term infants" (p. 24).

Previous studies in early childhood centres have identified that noise at unacceptable level may occur at transitions from one to activity to another, arrivals and departures of children and carers, and adverse weather which confines children indoors (McLaren & Dickinson, 2002, 2003, 2004). We hypothesised that background music chosen and introduced with considerable care could create a calm environment and support children and teachers to diminish the levels of noise they created. We acknowledged that children need to be free and encouraged to develop creative and enthusiastic play activities and were aware that it would be unhelpful to influence their patterns of play. On the other hand children who are over aroused are not optimally engaged for learning and at the extreme can become distressed. We believed that music which was simple, had steady rhythm and few variations in dynamics, played at an appropriate volume and alternated with periods of silence to reduce risk of habituation (Hallam et al., 2002; Standley, 2002) could mask and/or prevent aversive ambient noise from increasing to uncomfortable levels thereby increasing potential for positive social interaction and learning opportunities for children at the preschool.

Method

The Setting

The research was carried out in one licensed and chartered early childhood centre which was located in a commercial office type building. The centre was an open plan style with a large main activity room for the children with the kitchen, laundry, staff offices, ablutions, and a sleeping area, in rooms located around the perimeter of the main room. As the centre was not at ground level, a large deck was located at the far end of the main room and served as an enclosed outdoor play area. A maximum of thirty children attended the centre which was staffed according to government regulations.

Study Design

The study was undertaken over four non-consecutive weeks, approximately one month apart. Initially the study was planned as a small 'n' (ABAB) design where baseline noise is measured (A); followed by the specially designed music intervention (B), return to baseline measurement (A) and a further music intervention (B). However staff at the preschool demonstrated considerable interest in the study and this led to them making their own changes to the background music they used, and the final design was (ABCB) where C involved a modified programme of music managed by staff.

Measures

During each stage of the research, between 9.00am and 12.00pm over five consecutive days, trained observers manually recorded events relating to noise through event sampling. Two independent paid postgraduate psychology students who had no vested interest in the research and two of the researchers undertook the observations in pairs, rotating in random order according to availability. Observers made minute by minute recordings of noise levels as 'Very Noisy' (4), 'Noisy' (3), 'OK' (2) or 'Quiet' (1), and included an explanatory note about how the noise was generated, particularly if it was sudden noise. At 10 minute intervals the observers also recorded how many children were inside the main room at the centre and any group activities that were taking place. Inter-rater reliability measure over the baseline period was 90%.

Semi-structured interviews were undertaken with centre staff at the completion of each music intervention phase to determine whether they perceived any change over time in the centre. Six staff members were interviewed at the conclusion of the second stage and six were interviewed at the end of fourth stage. However, due to the turnover of staff only two of the first group was re-interviewed at the end of the study. All who were interviewed had been present during 'intervention' and 'no intervention' periods.

Four 'trigger' questions were used to guide the interviews.

1. What differences, if any, did you notice when the background music was playing?
2. Were there particular times when you felt the background music was more or less helpful? If so, how would you describe what was happening at that time and what the impact of the music was?
3. Did you notice any particular pieces of background music that seemed to be more or less helpful? If so, how would you describe what was happening at that time and what the impact of the music was?
4. What difference did the music make for you personally, as a staff member working in the facility?

Data Analysis

Interview data was interpreted according to procedures outlined by Ely, Vinz, Downing, & Anzul using QSR N6 software. Interviews were transcribed verbatim, observer comments were included, and interviews were returned to participants for verification. Categories were developed and memos created, and these were searched for themes and exceptions. Participants were invited to clarify, expand or confirm research findings. However, because of the high turnover of staff, several were unavailable for this process.

Baseline Data

Data from baseline period (A) highlighted two consistently noisy periods: when children were arriving at the centre at 9.00am, and when they were mostly engaged in free play or

preparing for or having morning tea between 9.45 and 10.30am (see Figure 1). Between 9.45am and 10.30am sudden noises were generated by baby alarms, the telephone ringing, children banging toys on tables or doors being slammed, kitchen timers and other equipment, scraping furniture and dropped toys, sudden crying and shouting or screaming, excited yelling and the occasional loud cough. Staff and parents raised their voices to communicate above the general levels of noise. This phenomenon is known as the Lombard, or Café effect (Lombard, 1911). They also engaged the children in activities that generated high levels of noise – action songs and chants were occasionally noticeably loud.

Around 11.30am staff began ‘group time’ process. Asking children to form a group, giving instructions to tidy up, engaging them in the tidying up process and reforming the group for activities was noisy and perhaps stressful for children and staff. Observers noted that staff were already playing a lot of recorded music during the baseline period (A) of the study but it seemed likely that the music being played, and the way it was being managed, was having a negative impact on noise levels (see discussion section). The study aimed to support the introduction of more suitable music and the appropriate management of same to reduce the overall volume of noise particularly between 9.45 and 10.30am. Surround sound, non-obtrusive music equipment with remote control was fitted to the environment for the study.

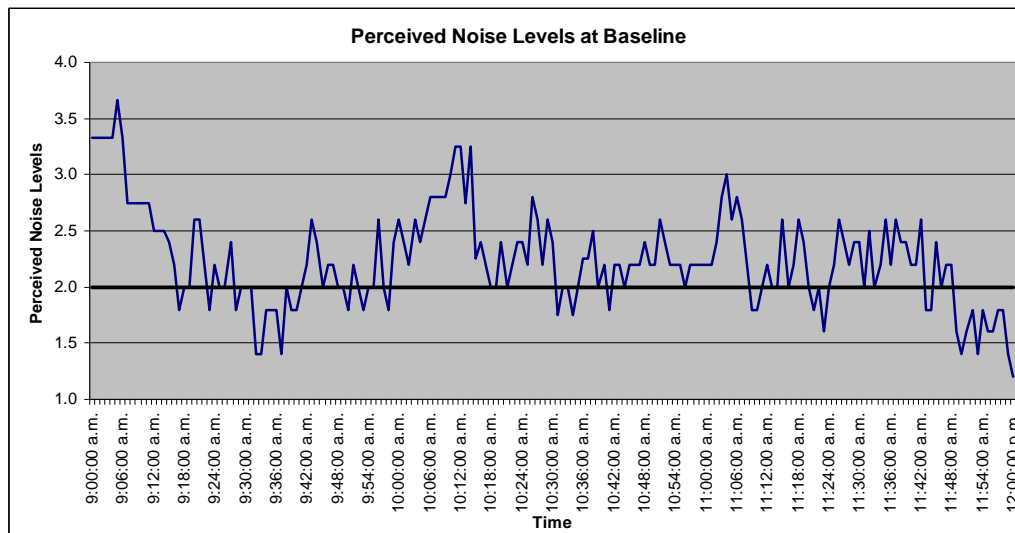


FIGURE 1: Average Perceived Noise Levels over Five Baseline Days

Music Intervention

The music was turned on at 8.15, and off again at 9.15am the time when baseline noise levels had begun to drop. At 9.45am, a time when baseline noise levels were high, the music was reintroduced for another half hour.

The playlist was compiled by a Registered Music Therapist. A wide range of CDs was considered, and tracks were analysed for inclusion according to complexity of style and instrumentation. The music chosen was relatively simple, predictable and repetitive. Tempi, beat and rhythm were consistent, there were few surprising leaps in melody or sudden changes in dynamics, and harmonic frames were predictable. Nevertheless the pieces were all very different. Instrumental saxophone tracks, Malian and Guinean folk style guitar from the 1950s and ‘60s called Jamana Kura, classical guitar, children’s lullabies from Australia,

Canada, South Africa, Benin and Scotland, and two original children’s recordings were included. Although several of the tracks were lullabies they conveyed a sense of ongoing movement which seemed unlikely to lead to under arousal.

As an additional measure, and at the request of staff, the researchers introduced a piece of recorded marching music (Story, 2000) to serve as a ‘tidy up song’ at 11.30am. The children were asked to tidy up while the music was playing and to quietly form a group when the music stopped. This intervention was an important addition to the study. The use of music as a cue to undertake a specific task contrasts with music to mask or reduce general noise. Nevertheless it was presumed to have an impact on noise levels around 11.30am and is therefore additional information which is necessary for the interpretation of results.

Ethical Approval

Full approval for the study was gained from Massey University Human Ethics Committee (HEC: WGTN Application 05/34) and all steps were taken to ensure that ethical principals for research involving children were adhered to.

Results

Observation Data

Observers perceived noise levels to be considerably reduced during the intervention weeks compared to baseline measures (see Figures 2 & 3). The introduction of the music early in the morning particularly seemed to keep ongoing noise levels down.

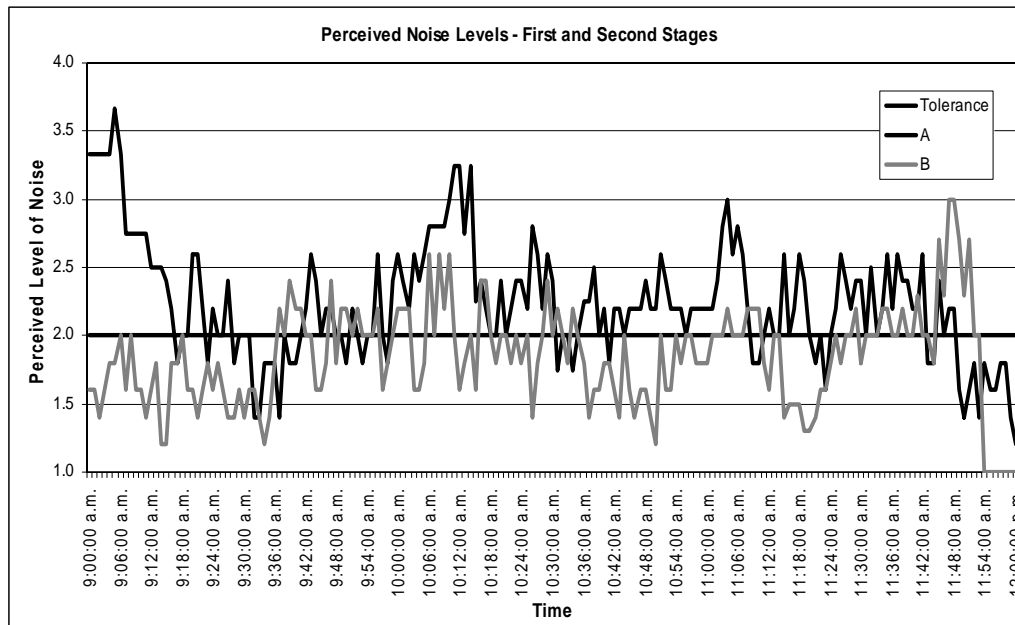


FIGURE 2: Perceived Noise Levels – First (baseline) and Second (Intervention) Stages

The ‘tidy-up’ music also seemed to have eventually had an influence on noise levels around 11.30am. During the third period of the study (C), when staff modified their own music programme, noise levels were lower than baseline.

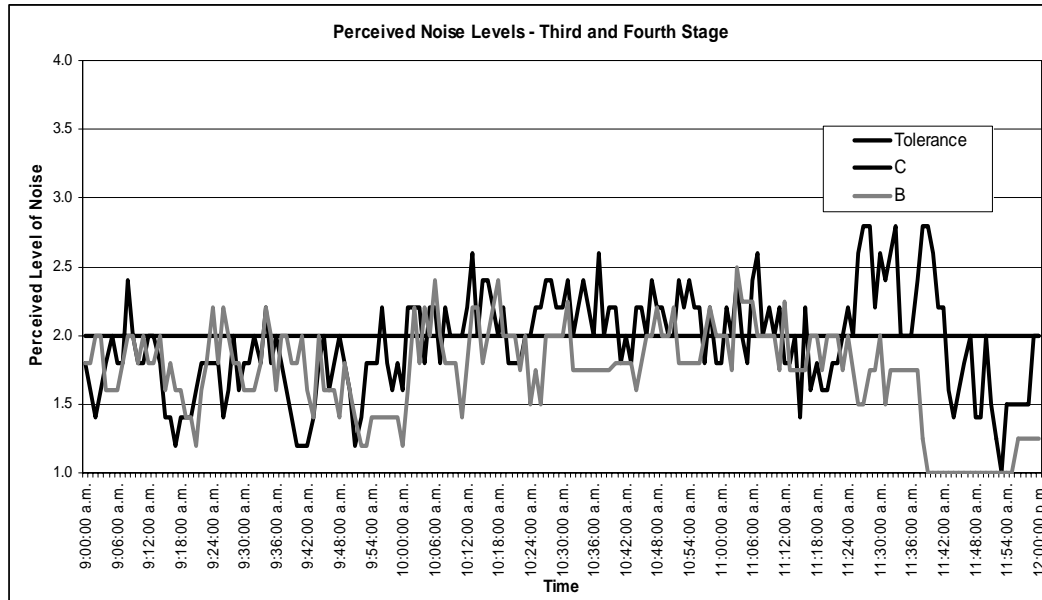


FIGURE 3: Perceived Noise Levels at Third (Usual music) and Fourth (Intervention) Stages

Staff perceived the noise levels to be reduced with the introduction of the background music. Many also referred to the ‘good weather’ and having children outside as a possible reason for the reduction. But the weather was also fine over the baseline period and analysis of numbers of children ‘inside’ shows that there were more children inside during intervention week (B) than at baseline (A) (see Figure 4). It was during usual music week (C) that numbers were lowest, and when researchers’ music was reintroduced (B) numbers of children inside were very similar to at baseline.

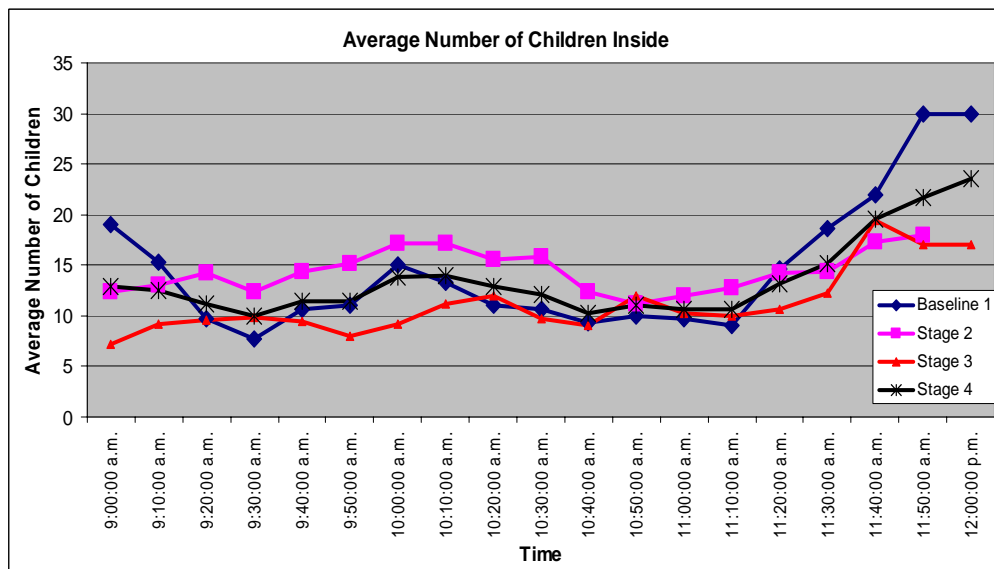


FIGURE 4: Average Number of Children Inside

Interview Data

While staff did initially attribute the reduced noise levels to having more children outside, they also believed that the music contributed to the improved conditions. There was consistent agreement that children were quieter, more relaxed, settled, and calm; and just in a different mood - chilling out. The preschool was described as “peaceful” “calm”, and “serene.”

The music intervention was particularly valued at the start of the morning. Staff agreed that because it seemed quieter at this time it ‘set the tone’ for the day and there seemed to be less boisterous activity as a result.

I do find that first thing in the morning when you have parents in too, they try to talk to each other, and children are excited to see each other and they get shouting...the kids and the parents came in and they weren't trying to shout over a volume that you couldn't hear but having the music first thing in the morning creates an environment and even an atmosphere that's kind of calm and settling.

When all the children are in at quarter past eight to like quarter to nine it's really nice to have that relaxing music, and it just keeps the whole place calmer. When we don't have all of the staff here before nine it's really nice to have something to keep them quiet with.

Although the actual volume of the stereo was monitored carefully to ensure there were no differences between the first and second intervention periods, one of the staff thought that the music seemed louder during the second week of intervention. This might be due to the overall noise being reduced, allowing for the music to be noticed and heard more readily. Another noticed a contrast between morning and afternoon noise levels, and this was an additional indication for her that it might have been quieter in the morning. A third staff member felt that when music was being played in the morning the children were quieter all day.

Staff also commented on the type of noise being generated. Although, as the researchers had hoped, the music did not seem to change the children's play patterns significantly, it may have enhanced the play experience:

I think generally they have been quite peaceable and playing..., you know, extremely well with no undue hassles. Sure the children have fallen and hurt themselves, and there have been the normal squabbles we have about turn taking and the odd pushing and things like that, BUT I think over the week it has been more peaceable.

It's kind of a very serene feeling that was sort of washing over the centre and I quite enjoyed that... even some of the (children's) play I think sort of calmed down a little bit.

Staff who worked with the infants believed that the music helped the babies to go to sleep, and to sleep longer:

It's really good to see it quiet out there because it's paper thin the walls, you can hear them banging out there and the children slept longer in the mornings – and that helped me.

I mean, we've just brought the CD in the babies sleep room...and we've been finding that they're sleeping longer.

The tidy-up music was enjoyable for the children, and helped them to complete tasks by cuing them into the activity and supporting their movement. Staff said that it:

Worked really well.

(Was) cool, because they stop, they hear the music and know its tidy up time... the majority of them will tidy up.

(Was) awesome because I noticed (a particular child) who was absolutely marching around trying to clean up and things which is great. And that's a definite, definite thing that I've noticed is that.

Staff identified that when trying to plan background music they did not know what to choose and felt at times that their music was 'not right':

Because you put on tapes and they tend to be of a particular type and style that might not be appropriate and then you try another tape, and then you think 'oh no' that doesn't sound right and then you think oh the children are getting all hyped up.

(Our music) doesn't necessarily bring them down and settle them down it sort of rarks them up... definitely.

(Your music was) just nice and quiet and peaceful and it was a nice change to our rowdy Hi Five and stuff.

Staff were keen to continue with the background music strategy, and were grateful to have resources readily available. They clearly valued the support of a music therapist to assist with the development of materials. On the other hand because they were more aware of the auditory environment they were keen to make changes themselves based on what they had learnt from the researchers:

Cos sometimes you come in and you think 'I feel like some music' - I don't know WHAT I should put on and sometimes someone else might put something on that you don't like - and it's just nice not to have to worry about it.

Just lately we've been picking up our music and looking at it more ...and making all new mixes cos we've just been playing the same stuff...I think we're getting a lot better in that now.

Discussion

Trained observers and preschool centre staff agreed that the background music seemed to help in the reduction of general noise levels and thus create an environment conducive to positive social interaction and learning. However, there are several human factors that may have affected the perception of observers and staff.

Although staff were not questioned specifically about the impact of the music on noise levels, they would have been aware of the nature of the study through the informed consent procedure. It is possible that they anticipated change because they were aware of the desired outcome. Further, the music seemed to have a positive impact on the staff themselves. Staff talked about feeling relaxed and singing with the music the researchers introduced and also how much they enjoyed listening to it. One of the teachers just assumed that because she felt "really good" when the music was on, that it would affect the children as well. Staff 'feeling good' because they were enjoying the music intervention might also have had an impact on

their perception of noise levels in the centre. If they were more relaxed they may have perceived the environment to be less stressful overall. Moreover, the high number of staff turnover meant that some staff were only able to consider the impact of one period of intervention while others were able to think about whether they perceived any differences when music was introduced, withdrawn, and reintroduced. It seems likely that it would be more difficult for them to notice differences during one week of intervention.

In addition, there was no significant correlation between 'actual' fixed sound level measures and 'perceived' levels of noise recorded for the larger study. This could be due to several factors including the placement of the measuring instruments, the precision of measures (e.g. if clocks were not precisely synchronised), the relatively crude analysis procedure, the type of noise and whether it was generated inside or outside the centre, and the emotional content of the noise. Future research could compare the annoyance or intrusiveness of perceived noise, with actual recorded levels. Finding ways to measure accurately the impact of noise on children in early childhood centres continues to be an issue for researchers.

The use of background music needs to be carefully balanced with opportunities for spontaneous and planned music making. Live music making contributes significantly to children's development (Bamberger, 2006; Cohen, 1999; Coulter, 1995; Pound & Harrison, 2002; Strickland, 2002; Taylor, 2005). Staff at this centre seemed dedicated to providing the best possible environment for the development and learning of the children, and at least two of them had a particular interest in the use of both live and recorded music at the centre. Group time included live music experiences each day and some of these sessions were very well planned and facilitated. In addition to the more formal groups, staff also took the opportunity for spontaneous musical interaction. The researchers were delighted to observe the range of music that occurred in the setting and do not advocate the use of background music in lieu of structured or spontaneous live music making with children. Rather, that music should be considered and used for a particular purpose. Silence is crucial too for giving space and significance to a sound and even though the background music was not planned to be listened to actively, it might lose its effectiveness if played constantly (Hallam et al., 2002; Standley, 2002).

Unfortunately staff generally indicated that they did not have the understanding, skills, experience, or time, to manage all the various aspects of the music programme and the majority were not confident that they could choose or manage the background music in the centre. Over the baseline period music was chosen, or the radio was played, seemingly with no thought to content. They mostly selected popular children's music (e.g. Wiggles, Hi Five, Aqua) which is lively and invites interaction. This would be appropriate if the children were engaged in music activity. But the music was sometimes left on a 'repeat' loop and continued to play long after the children had left the activity. Recorded music was left on to compete with live music, for example when children were singing songs in Maori before morning tea. Choosing the time and place for using music is important and it seemed that staff were not consistently thinking about how the music might support what the children were interested in, or what they were expecting them to do.

During the third period of the study (C) staff had become increasingly aware of ways in which they might manage environmental noise. They had begun to ask questions about the project, particularly about the intervention and the results, and clear and honest answers were provided. The researchers were aware that this was likely to have an impact on the results of the study but believed it was more important to allow staff to modify their music management because it was considered likely to be in the best interests of all who attended the centre.

Initially, simply reminding them about the auditory environment seemed to help staff to understand the importance of managing the background music carefully. The music chosen to support the tidy-up task was highly valued by staff and they became increasingly aware of the importance of choosing every piece of music for a purpose. Over the period of the study staff began to introduce a wide range of preferred music from their own collections. Although focusing on their preferences rather than the needs of the children might not be ideal, when staff observe and respond to their own reactions to music they are more likely in time to make good choices for the children.

However, despite their increased awareness staff were not confident that they had the ability or time to develop playlists. Importantly, those who took an interest in choosing and compiling music for the centre did so in their own time at home. Because the work can be very time consuming, it was probably not done as well as it might be under different circumstances. Staff had neither the time nor energy to put into planning and compiling a programme, and several expressed relief and gratitude that the researchers had been able to assist in this way. Staff in other preschool centres might also benefit from the support a music specialist or music therapist could offer in this regard.

Summary

In this study background music was perceived to reduce levels of activity generated noise and, according to staff, improve the general environment in the early childhood centre. Music was analysed according to complexity of style and instrumentation, and playlists of calming music were compiled. Staff interest and response to the research led to them modify their own choice and management of music, but they also indicated that the support of the music therapist in choosing music and guiding the management of the auditory environment was important. This suggests that staff in preschool settings might benefit from the support music therapists can offer in planning and implementing a programme of background music to improve the auditory environment in their centre.

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