ISSN 2515-981X

International Journal of Music, Health, and Wellbeing

Journal Homepage: www.musichealthandwellbeing.co.uk

Combined Music and Movement Based Entrainment Activities Positively Impact Sharing Capacity Exhibited in the School Environment by Children aged 4 – 5 years

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Article Info.

Date Submitted:
October 2024

Date Accepted:
December 2024

Date Published:
February 2025

Abstract

Entrainment is commonly experienced during musical and movement activities, and the benefits of moving or musicking together in relation to prosocial behaviours have been studied in a variety of contexts. This study examines the impact of entrainment interventions on the prosocial behaviours of 4–5-year-old children, with a particular focus on sharing capacity. Additionally, the impact of previous experience in movement and music related activities on prosocial behaviours is investigated. 29 participants in reception classes from an international school took part in different entrainment interventions, and were assessed on their sharing capacity during experimental assessment conditions pre-intervention, mid-intervention, and post-intervention. Their prosocial behaviours were also recorded via observations pre-, and post-interventions. Participants were assigned to one of three intervention groups - movement based, music based, movement and music combined activities, or a control. Over a two week period, intervention groups each had six 20 minute sessions.

Only the participants in the combined music and movement group showed significant improvement in exhibition of prosocial behaviours, and there was no significant difference between the results of those who had previous experience in movement and music activities, and those who did not.

This research provides valuable insights for early years practitioners and professionals in related fields. It is recommended that people working with young children carefully consider the benefits of engaging students and clients in music and movement entrainment activities to nurture social development.

Keywords: Entrainment, music education, early years, prosocial behaviour, musical experience, shared intentionality

1 Entrainment

Entrainment is a phenomenon whereby two or more rhythmic entities are synchronised to an element of measured time, involving cyclical or oscillatory patterns (Clayton et al., 2005; Merker et al., 2009; Phillips-Silver et al., 2010; Phillips-Silver & Keller, 2012). Seemingly

automatic behaviours such as bobbing one's head in time to music (Large, 2000; Phillips-Silver & Keller, 2012) have their roots deeply embedded in human nature, and may stem from, or result in changes, in personal and social experiences (Janata et al., 2012; McNeill, 1997; Phillips-Silver et al., 2010; Small, 1998), which this study aims to explore.

Scholars (Clayton et al., 2005; Clayton, 2012; Eerola et al., 2006; Overy & Molnar-Szakacs, 2009; Phillips-Silver & Keller, 2012) have claimed that whenever humans musick - any engagement in musical activities (Small, 1998) - entrainment is present due to the fundamental and complex shared elements of both acts, including imitation, chorusing, and turn taking (Kirschner & Tomasello, 2010; Phillips-Silver & Keller, 2012). Whilst entrainment adheres to certain rhythmic rules, these need not comply with strict temporal measurements dictated by some musical structures. Anti-phase entrainment (Clayton, 2012; Cross et al., 2016; Richardson et al., 2007) emphasises the importance of any temporal relationship over synchronicity in this phenomenon. Embedded in rhythmic (musical) (Merker et al., 2009) entrainment are two elements - the temporal and affective (Phillips-Silver & Keller, 2012) - meaning that findings from entrainment research may be attributed to physical and/or mental processes as they work alongside each other. Inspired by musicking having been associated with prosocial behaviours (Ilari, 2016), this study investigates how and if music and entrainment play different roles in the social development of children.

Entrainment in human behaviour is difficult to justify evolutionarily as it "does not seem to generate concrete benefits from a survival point of view (i.e., the time and effort it consumes might well be spent on more productive uses)" (Merker et al., 2009: 5). However, considering evolutionary social development including social functioning and cohesion (Huron, 2001), and contributions to personal emotional gain (Ilari, 2016; Janata et al., 2012; Kirschner & Tomasello, 2010; Madison, 2006; McNeill, 1997; Phillips-Silver et al., 2010), entrainment seems valuable. Blacking (1977) used the term "fellow feeling" (as cited in Clayton et al., 2004: 36) to describe the social mechanisms leading to increased social bonding as a result of synchronised movements, and Tarr et al. (2016), have discussed the physiological possibility that endorphins released whilst dancing (at a silent disco) may be responsible for this cohesion. Specifically regarding prosocial behaviours, some studies investigating different types of entrainment have found that it may enhance empathy, cooperation, helpfulness, and the capacity to share in children (see below). In non-music specific research, it has been suggested that imitation and mimicry can lead to increased affiliation (Hove & Risen, 2009; Lakin & Chartrand, 2003). As mimicry is one element of joint action in musical behaviours and is closely linked to entrainment (Phillips-Silver & Keller, 2012), this provides insight into the potential benefits of social entrainment interactions.

Although research suggests that different forms of entrainment may lead to improved prosocial behaviour in specific environments and circumstances, little is known about the value of individual elements. Further research in this area was recommended by Kirschner and Tomasello (2010) who suggested that future research studies "disentangle the components of traditional music making" (2010: 362). More recently, Ilari (2016) posits questions pertaining to the role of musicking in early childhood and the development of social referencing, shared intentionality, and joint action, including, "are individuals who show enhanced rhythmic entrainment abilities…in the early years, more prosocial and empathetic towards others?" (2016: 34). Addressing these channels of investigation as this study does, could help people working with children better equip themselves to provide appropriate programmes to develop prosocial behaviours.

2 Entrainment and Prosocial Behaviours

Research into how entrainment affects prosocial behaviours, most notably cooperation, empathy, helpfulness, and sharing has been conducted with participants of different ages, and using different facets of entrainment as independent variables. Some of these studies are discussed below.

2.1 Cooperation

Public goods economic or investment games are a popular measurement technique for adult and child participants (Cross et al., 2016; Reddish et al., 2013; Wiltermuth & Heath, 2009), and involve participants either working cooperatively towards an end goal, or choosing to partake competitively. Good and Russo (2016) found that group singing (in comparison with art or competitive games groups) positively influenced cooperation amongst middle school students using a prison dilemma based card game, and Kirschner and Tomasello (2010) measured cooperation in dyads of young children after taking part in playful activities with or without musical interactions. Several studies have found that entrainment enhanced cooperative behaviour, although they investigated different specific entrainment forms i.e. marching (Wiltermuth & Heath, 2009), movement (Cross et al., 2016; Reddish et al., 2014), singing (Good & Russo, 2016), and rhythmic (musical) entrainment activities (Kirschner & Tomasello, 2010). In each study, participants engaged in procedures and measurement assessments in groups of two, three, or four. It is difficult to separate entrainment from social effects in these types of experiments. Cross et al., (2016) noted that "the effects on cooperation seem to mostly stem from simply moving in time in a social context" (2016: 11), highlighting the relationships between social interaction, entrainment, and cooperative behaviour.

2.2 Empathy

Longitudinal studies into the effects of music participation on empathetic behaviours have conflicting results. Ilari et al. (2018) studied the impact of an orchestral programme vs. sports on theory of mind (awareness of emotions and opinions in others) and found no significant difference between the groups. Rabinowitch et al.'s (2013) longer term study investigated the impact of musical group interactions (MGI), and found that whilst children in the MGI and the control groups took part in activities designed to nurture the same skills, namely "*movement/motor resonance, entrainment* and *imitation*, to *honest signalling, disinterest, shared intentionality* and *intersubjectivity"* (2013: 490), the MGI group displayed more empathy in both a matched face and emotion task, and a self-report questionnaire. The results may differ from Ilari et al.'s (2018) as the MGI intervention specifically emphasised Empathy Promoting Musical Components (Cross et al., 2012), rather than generic orchestral training. Had the MGI study included a control group, it would be possible to identify differences between children without intervention, the non-musical entrainment group, and the MGI group. Kirschner and Tomasello (2010), primarily investigated helpfulness, but also found that the musically engaged group of children displayed more empathy than the control.

2.3 Helpfulness

Cirelli et al. (2014), witnessed 14 months olds being more prepared to help experimenters who bounced them synchronously to music than experimenters who bounced asynchronously. During helpfulness measurements in Kirschner and Tomasello's (2010) study which included a narrative related to the experimental procedure as a whole role-play situation, the musical group scored more highly. Reddish et al. (2014) found that helpfulness was enhanced after movements were performed as a group, but not after social sedentary activities (for example jigsaw completion). The difference in helpfulness of participants performing synchronous vs. non-synchronous movements was small compared to the large difference

between static vs. any movement groups. This could imply that joint movement per se may encourage helpful behaviours, rather than synchronous movements specifically. However, Valdesolo and DeSteno (2011) found that participants engaged in a synchronous hand tapping exercise were more likely to display compassion and altruistic behaviour to their fellow tappers than those who experienced asynchronous tapping. The research indicates that different facets of movement entrainment may affect prosocial behaviours differently.

2.4 Sharing

Children who took part in an orchestral enrichment programme shared more stickers with friends than those who attended a sports one (Ilari et al., 2018). Kirschner and Ilari (2014) however, found no significant differences in children's capacity to share whether they drummed in a matching audio drumming context or a social drumming context, further demonstrating that the social and entrainment elements of such activities may contribute to different outcomes, or somehow interact with each other to impact prosocial behaviours.

Support exists for engagement in multimodal entrainment activities enhancing prosocial behaviours, although some effects may be partly due to experimental design - do dyads interact in the same way as a larger group, for example? Therefore, temporal and affective elements (Ilari, 2016; Phillips-Silver & Keller, 2012), and how social relationships may impact results should also be explored.

3 Temporal and Affective Entrainment in Social Context

The above studies include both dyadic and group interventions and data collection procedures, raising the question of how social dynamics may contribute to outcomes. Phillips-Silver et al. (2010) claimed that mutual social entrainment (dyads) and collective social entrainment (musical ensembles, groups) are slightly different, confirming the need to consider social aspects carefully. Whilst overall, rhythmically entrained groups have displayed enhanced prosocial behaviours, in order to learn more about how entrainment can benefit social development, we should consider the phenomenon holistically.

Social perspective was deemed important by Tunçgenç et al. (2015) who found that infants preferred toys that rocked in synchrony with them, but only if they were of a social nature i.e. had a face. However, when Launay et al. (2013) removed social parameters by engaging participants with an automated audio stimulus (participants were led to believe this was performed by another person), whether or not participants believed the sounds were automated or live had little bearing on their behaviour during a follow-up economy game. Participants who tapped in synchrony with a perceived partner showed higher levels of trust, suggesting that the synchronous experience, and not the social one, had the greater impact. The conflicting results of these two experiments indicate that a combination of social (affective) and rhythmic (temporal) entrainment may create ideal conditions in which to develop prosocial behaviours. Indeed, Reddish et al. (2013) found "synchrony combined with shared intentionality produced the greatest level of cooperation" (2013: 1), adding a new psychological dimension to consider - that of shared intentionality.

Shared intentionality is the awareness of a joint experience (Tomasello & Carpenter, 2007) and can also be described as "we intentionality" (Tomasello et al., 2005). Phillips-Silver and Keller (2012) discuss "joint action" (the physical response to shared intentionality), claiming it to be an important aspect of music making, and Bonshor (2016) discovered that amongst amateur adult choir members, the feeling of being in a team contributed to enjoyment and perceived success of performances. Keller (2008) suggests that there is a specific musical joint

action amongst performing musicians, coordinating not only sound and movements, but also mental states.

Generalised prosociality increased more amongst participants who engaged in group movement interaction than in those who participated in sedentary group activities (Reddish et al., 2014; Reddish et al., 2016). Synchronous conditions produced slightly better results than asynchronous, and importantly, regarding shared intentionality, a mutual goal was made explicit to the participants. Movement, synchrony, and shared intentionality each influenced these results, but even without shared intentions, in-phase synchronous movements have been shown to impact on social skills such as remembering conversations and faces (Macrae et al., 2008). Kirschner and Tomasello (2010) suggested future studies should "disentangle the components of traditional music making — as they were integrated into the current manipulation phase — in order to test precisely which of the proximate mechanisms proposed above [enjoyment, audiovisual motivation, shared intentionality, synchronisation, and mimicry] might cause the prosocial effects and in which particular ways" (2010: 362). The components that potentially require "disentangling" are discussed below.

4 A Multimodal Phenomenon

The complexities, and multifaceted structure of entrainment are described clearly by Ilari et al. (2018) who summarise the development of a united theoretical entrainment model by Phillips-Silver et al. (2010). Regarding behaviours such as audience applause and physical beat keeping, they remind us that "underlying these common behaviors is a complex network of sensory modalities - auditory, visual, and vestibular – that involve a combination of perception, production, integration, and adjustment of body movements in response to rhythmic structures" (2010: 1). The current study attempts to separate specific elements including audio, visual, and vestibular phases, including in-phase and anti-phase actions.

Some researchers have concluded that particular facets of entrainment are stronger mechanisms compared to others for example audio over visual (Fendrich & Corballis, 2001; Morein-Zamir et al., 2003; Recanzone, 2003; Repp and Penel, 2004), and some have found that synchronous movements positively impact prosocial behaviours more significantly than asynchronous or antiphase movements (see below). The wide range of conclusions drawn from these studies implies that more research into the effects of specific entrainment activities is required.

Synchronous movements increased the likelihood of participants perceiving each other as similar to themselves (Valdesolo & DeSteno, 2011; Wiltermuth, 2012), which may have positively influenced the cooperation and compassion shown towards movement partners (Valdesolo & DeSteno, 2011). Tunçgenç et al. (2015), however, recorded that infants do not appear to have such a preference for others moving in synchrony - their preferred toy choice was based on social appearance and interactive engagement rather than influenced by shared synchronous motion. The ability to entrain rhythmically and synchronously requires the intricate coupling of auditory and motor systems (Eerola et al., 2006) and is also affected by cultural understanding and experience of music and movement (Kirschner & Ilari, 2014). If there is a correlation between synchrony and prosocial behaviours, it seems possible that children who achieve synchronicity through a cultural or educational advantage would display more prosocial behaviours. It was therefore important to consider this covariate in the design of the procedure and analysis of this study. Wiltermuth and Heath (2009) identified the intricacy of this area when they stated that, "puzzles remain about what kinds of synchrony promote cohesion" (2009: 1).

Facets facilitating synchrony have been investigated to ascertain whether some have stronger channels in enabling entrainment. Richardson et al. (2007) found that when asked to maintain their natural tempo whilst rocking in a chair, participants would unintentionally match their movements to another participant in another chair, but only when they were focussing on the participant's chair, and not elsewhere in the room. This suggests that humans can entrain to visual stimuli with some level of automaticity. However, it can be debated that audio stimuli lead to more stable reception of rhythmic information, and a higher likelihood of accurate entrainment. Fendrich and Corballis (2001), Morein-Zamir et al. (2003), Recanzone (2003), and Repp and Penel (2004) all found that the auditory system was able to easily influence visual perception. In a Classical Indian ensemble, when synchronicity was discouraged for the performance, additional visual information resulted in more likelihood of accidental synchronous entrainment (Clayton, 2007), suggesting that individual facets may become stronger when presented together. This supports the argument for musical entrainment, incorporating audio, visual, and motor facets having a strong interaction (Kirschner & Tomasello, 2010). Kirschner and Tomasello (2009) question whether it was "shared visual representation of the drumming action, the shared acoustic representation of the beat, or combination of both that might have enabled the children to better synchronize their drum" (2009: 312). The individual strengths of different intertwined sensory inputs and outputs associated with entrainment remain unclear.

5 Age Matters

Research into the impacts of rhythmic entrainment in children, providing insight for educators and therapists may, "also contribute to music education in that it offers new ways to conceptualize music perception, production, and learning" (Ilari, 2015: 339), and must be designed accordingly, taking into consideration developmental milestones and abilities of children in relation to general expected progress. In Corelli et al.'s (2014) study, for example, children under 14 months did not exhibit any helpful behaviours, so would have been too young to take part in the helpfulness study as the behaviour variable would not have been accessible to them.

Four years of age is, according to research, a developmental landmark for children in both rhythmic entrainment abilities and the emergence of prosocial behaviours. Children have usually developed theory of mind (Tomasello & Rakoczy, 2003), collective intentionality, and a basic understanding of cultural expectations (Ilari, 2016). Therefore, participants of this age are likely to engage in role-play (a common design for intervention and measurement procedures (Kirschner & Ilari, 2014; Kirschner & Tomasello, 2010)), and should have the capacity to exhibit altruistic behaviours (Benenson et al., 2006). McAuley et al., (2006) found that accuracy in matching metronomic beat emerges around 4 years old, although this was limited to working within the preferred smaller and faster (compared to adults) tempi range favoured by young children, which is 120 - 150 BPM (beats per minute) (Drake et al., 2000; Eerola et al., 2006; Provasi & Bobin-Bégue, 2003). Other scholars concur that sensorimotor synchronisation develops in the preschool years (Ilari, 2015; Kirschner & Tomasello, 2009; Provasi & Bobin-Bégue, 2003), although with varying degrees of accuracy at different ages, and that musical experiences and culture may influence this (Kirschner & Ilari, 2014; Phillips-Silver & Keller, 2012). Some have concluded that this skill develops later in childhood (Merker et al., 2009; Phillips-Silver & Keller, 2012). Eerola et al. (2006) suggested that the development of good oscillatory motor skills (for example walking stably) may be a factor in the development of musical beat keeping, again, indicating that typically, by 5 years, the ability to beat in time is a plausible skill to possess. Therefore, research conducted using this age range should take into account cultural and musical experiences, and not rely upon precise rhythmic synchronicity as a variable, rather allow for it should it occur organically within the sample, and where possible use music at the participants' preferred SMT.

6 The Current Study

Sharing was chosen as the prosocial behaviour independent variable, firstly because the nature of sharing encompasses other prosocial qualities including empathy, helpfulness, and cooperation, and secondly, because there is less already reported about the impact of entrainment on sharing compared to other prosocial behaviours. Empathy, helpfulness, and cooperation were considered on a broader level, and the study used a mixed methods approach as recommended by Clayton (2012).

Previous studies have noted that musical education and cultural experiences may influence the ability to entrain (Drake et al., 2000; Kirschner & Ilari, 2014), and that higher accuracy in entrainment leads to more prosocial behaviours (Ilari, 2016). Therefore, prior musical/movement experience was included as a covariate to control for different levels of musicianship and potentially, therefore, the ability to entrain.

Given that young children do not always easily or naturally entrain synchronously (Ilari, 2015; Kirschner & Tomasello, 2009; Phillips-Silver & Keller, 2012; Provasi & Bobin-Bégue, 2003), and that large and small body movements produce different results (Reddish et al., 2014; Valdesolo et al., 2011, Wiltermuth, 2012; Wiltermuth & Heath, 2009), a combination of synchronous and asynchronous, small and large motor movements, all of which are likely to be in the repertoire of the participants (Eerola et al., 2006), were used. Where possible, rhythmic activities were at the suggested SMT for children (Drake et al., 2000; Eerola et al., 2006; Provasi & Bobin-Bégue, 2003).

Measurement procedures were deemed accessible to children and inspired by previous successful research (for example Benenson et al., 2006; Kirschner & Ilari, 2014; Kirschner & Tomasello, 2010; van Baaren et al., 2004). Interventions incorporated shared intentionality (Tomasello et al., 2005) and took place in social groups to emulate a life-like impression of how entrainment activities could be used in a school setting.

7 Hypotheses

Based on the fact that participants are of an age at which interesting musical and social development milestones are prevalent, and considering results from previous studies, the hypotheses this study investigates are three fold.

1) Entrainment interventions will positively impact sharing capacity exhibited by 4 and 5 year olds in their school environment.
2) Improvements in sharing capacity over time will vary according to the type of entrainment activity the child has been involved in (movement only, music only, music and movement combined, no intervention), with the music and movement intervention resulting in the most significant impact.
3) Previous experience in musical or movement based activities will also have a positive effect on the exhibition of prosocial sharing behaviours.

8 Method

8.1 Participants

Malaysian, British, Japanese, Chinese, Slovakian and French participants (18 female, 11 male) attended a British curriculum international school in Malaysia (at which the researcher was employed), and were aged between 56 and 66 months (4.6 and 5.5 years old).

8.2 Measures

Measurement procedures took place pre-intervention, midway, and no later than one day after the final intervention. Each was conducted in the same room in the Early Years department, and led by the researcher (with one other familiar teacher joining for the second assessment). All procedures were videoed on an iPad. Children attended individually, and provided assent before participation. Participants had the opportunity to share with the experimenter(s) (without obligation), something they would hopefully have perceived as valuable, and to reduce the likelihood of learned responses and demand characteristics, each procedure was different. Procedures are briefly outlined below (for more details, see Appendix 1).

8.3 Assessments

Assessment 1

Participants were invited to play a game and asked to bring a toy. On the way to the room, the toy met with an accident, or was declared "unwell". The room was set up as a hospital ward in which the child and researcher could "heal" the toy by playing music. The participant had numerous instruments to play, whilst the researcher had a limited choice.

Assessment 2

The role-play scenario was a birthday party. Children were given four sweets of their choice whilst the two teachers whose birthdays were being celebrated, only received one each.

Assessment 3

Each child received ten stickers to thank them for "taking part in the movement and music activities". They could share these with others or keep them all. Stickers were distributed by participants into "sharing" and "keeping" envelopes whilst the researcher appeared to be busy elsewhere in the room.

The participants scored 1, 2, or 3 points for each assessment based on their sharing. No sharing earnt 1 point; some sharing, deliberation, or providing excuses for not sharing earnt 2 points; sharing freely and generously earnt 3 points (adapted from Ilari et al. (2018), and Kirschner & Tomasello (2010)).

8.4 Observations

The full time teaching team observed children in their natural environment for two consecutive mornings, noting empathetic, helpful, cooperative, and sharing behaviours, once before, and once after the intervention period. Teachers and TAs were asked to take notes on any behaviours they observed relating to these traits, stating the type of behaviour exhibited, and a brief description of the incident. Subjectivity was removed as much as possible, by providing the teaching team with definitions and examples of the behaviours expected to be observed during this period (see Appendix 1).

The timetabling for interventions and assessments was designed to counteract confounding variables such as time of day and length between interventions or assessments. Inevitably, absence from school and non-assent meant that not all participants attended all sessions.

8.5 Procedure

Four evenly matched groups were created ensuring an even spread of nationality, English speaking ability (EAL), additional educational needs (AEN), gender, age, and extra-curricular musical/movement experience. Groups consisted of seven or eight participants, each

representing a different independent variable condition (movement only (M), music only (Mu), movement and music (MM), and a control (C)). Children were told they would be attending "extra music and movement sessions", and attended six intervention sessions, each lasting 20 minutes, spread over 2 weeks. Interventions were conducted in the Early Years music classroom. Teaching assistants chaperoned groups as they would a music lesson, and remained with the same group throughout the research period.

8.6 Interventions and Stimuli Material

To aid validity, the themes of each intervention across the different groups were kept as similar as possible for example story/memory/performance, and given that previous studies have found shared intentions to be beneficial in encouraging the accuracy of entrainment (Kirschner & Tomasello, 2009; Kirschner & Tomasello, 2010; Lakin & Chartrand, 2003; Reddish et al., 2013; Reddish et al., 2016), goals were shared with the children. These were physical (for example collecting jigsaw pieces), personal development (for example "Today we are going to relax"), or abstract (for example "We will perform for the toys").

Session 1 was a story-telling of "The Three Billy Goats Gruff". At certain points in the story, children were required to respond or join in - musically for group Mu, physically for group M, and musically and physically for group MM.

In the second session, group M participated in breathing techniques, a yoga story, and guided meditation. The Mu, and MM groups learnt a song without (or with) accompanying actions, after a vocal warm-up (purely vocal for the Mu group and including movement for the MM group). Participants performed the song at the end of the session to an audience of toys they brought with them.

The third session was a memory challenge and included working with a similarly matched partner from the same group. Group M had to follow and recall a movement sequence in their dyads. All movements were natural (Eerola et al., 2006) and safe enough for children to perform. The Mu group had to play a sequence of instruments chosen from the limited range available to them (laid out for each pair). The instrument combinations meant there was more than one correct option - if the instruction was, "play something red", there were several instruments to choose from. Therefore, whilst participants worked together in their dyads, they rarely moved in precise synchrony because the actions to play a shaker and a xylophone are different. Instrument descriptions included colours, materials, and sound production technique. Each set of instruments was different, but with the necessary qualities for the task to be completed successfully without too much matched movement. The MM group learnt a dance routine, the warm-up for which was a mirroring activity. Participants first had to follow the researcher's movements accompanied by a 150 BPM drum beat track. The children then performed the same activity within their dyads, taking turns to lead.

Sessions 4, 5, and 6, pursued the same objective outcomes as 1, 2, and 3, but with additions or alterations to previous sessions. Variations included a different fairy tale, different songs and dance routines, and a different memory sequence or instrument selections. The dyads in Session 6 consisted of children least similarly matched (according to gender, musical/dance background, nationality, AEN, EAL considerations, and age) in order to contrast with Session 3.

The control group only had two sessions, simply intended to ensure they felt "involved", and to reduce the likelihood of suspicion. They listened to "The Three Billy Goats Gruff" and "Goldilocks" told in a traditional style with accompanying pictures.

8.7 Data Analysis

Quantitative results from the three assessment procedures were input to IBM SPSS Statistics (version 29.0.0.0). Observation data was collected as handwritten notes onto a grid printout which recorded the time, participant ID, behaviour type (sharing, cooperation, empathy, helpfulness), brief description of behaviour, and other notes, subsequently typed up for analysis. The frequencies of types of behaviour observed for individuals and groups were used during data analysis (Tables 3 and 4).

9 Results

9.1 Initial Investigation of Hypotheses 1 and 2

During initial tests, the data relating to H1 and H2, were found to violate the assumptions of the parametric two-way mixed ANOVA, which would have explored both between and within group differences concerning the impact of interventions over time on prosocial behaviours overall, as well as those specifically resulting from the MM interventions. Given this, and the fact that the data contained ordinal statistics, non-parametric tests were used for analyses.

9.2 H1: Entrainment Interventions Positively Impact Sharing Capacity

The midpoint scores which were unevenly distributed were of particular interest, so three separate Wilcoxon's signed-rank tests were conducted to identify differences in scores between assessments 1 and 2, assessments 2 and 3, and assessments 1 and 3, including scores for all four groups. Data were discounted case wise when participants did not have scores for both assessments.

From the pre-intervention assessment to the midpoint, no participants improved their scores, three scored less, and 23 obtained the same score. The median scores for each group remained the same (1.00), and any differences were not statistically significant, $z = -1.73$, $p = .083$. From the midpoint to the post-intervention score, 12 participants showed improvement, and eight retained the same score. The positive differences of the median scores measured 1 point and were attributable to the Mu (0.5 point difference), MM (2 point difference) and C (1 point difference) groups (Table 1). These differences were statistically significant in the overall difference between the second and third scores, $z = 3.18$, $p = .001$.

From the pre-assessment score to the post-assessment score, 11 participants improved, and 11 participants showed no change in scores. Overall median scores improved by 0.5 points and were mostly attributable to the MM group (2 points difference between scores 1 and 3, see Table 2). This was statistically significant, $z = 3.04$, $p = .002$.

9.3 H2: Movement and Music Entrainment Interventions Have the Greatest Positive Impact on Sharing

Given that there was a statistical significance between pre- and post-intervention sharing scores, indicating some improvement in prosocial behaviours over the intervention course, a Wilcoxon's signed rank test was conducted on the first and final scores for each group to ascertain which had the most significant bearing on the improvement trend. The only group which showed statistically significant change was the MM intervention group, with all five participants improving their score from the pre- to post-intervention assessments, $z = 2.07$, $p = .038$. Both the M and Mu groups showed insignificant changes with the same z score and significance value, $z = 1.41$, $p = .157$. The changes were even more statistically insignificant for the control group, $z = 1.34$, $p = .180$.

Table 1 *Median Scores by Group: Assessments 2 and 3*

Group	Assessment 2	Assessment 3	Difference
Movement	1.00	1.50	0.00
Music	1.00	1.50	0.50
Combined	1.00	3.00	2.00
Control	1.00	2.00	1.00
Total	1.00	2.00	1.00

Table 2 *Median Scores by Group: Assessments 1-3*

Group	Assessment 1	Assessment 3	Difference
Movement	1.00	2.00	0.00
Music	1.00	1.00	0.00
Combined	1.00	3.00	2.00
Control	1.00	2.00	0.00
Total	1.00	2.00	0.50

9.4 H3: Movement or Musical Experience Positively Impacts Sharing

A Mann-Whitney U test explored any differences between overall scores obtained by participants in the three sharing assessments based on their prior experience in music or movement activities. Distributions of the scores for experienced and non-experienced participants were similar. Median sharing scores for inexperienced (3.00) and experienced (4.00) groups were not statistically significantly different, $U = 74.50$, $z = -1.133$, $p = .257$.

9.5 Observation Data

The observational data provided information about general prosocial behaviours exhibited by participants across two mornings of an average school day.

Table 3 shows that for pre- and post-interventions, the Mu group consistently obtained lower frequencies of prosocial behaviours. Overall, sharing capacity was noted more frequently during post-intervention observations (+10), and levels of cooperation appeared to drop dramatically (-15). Helpfulness and empathy observations also dropped, but by much less, with empathy being the least recorded behaviour. The only improved overall frequency was in sharing (+10).

Table 4 shows pre- and post-intervention exhibitions of prosocial behaviours recorded for each participant, as well as the difference (post-intervention frequency - pre- intervention frequency), including a total frequency and difference for each group. More sharing behaviours were observed in the post-intervention observations for the Mu, MM, and C groups, but not M group. The biggest positive difference in sharing was in the music group (+5). Whilst the frequency of observed sharing behaviours generally increased from pre- to post-interventions, the other prosocial behaviours when grouped together became less frequent across all groups,

with the MM group showing the smallest decline in prosocial behaviours (-3). This analysis does not account for absences of participants, with the M group who showed no increase in sharing, suffering the largest number of absences. The total number of prosocial behaviours observed decreased during post-intervention observation for most groups, with the M group declining the most (-8), and only the MM group retaining the same score pre- and post-interventions.

10 Discussion

The findings reported above regarding the exhibition of prosocial behaviour and particularly sharing amongst twenty-nine reception aged children who received entrainment interventions or were in a control group, are discussed below.

10.1 H1: Entrainment Interventions Positively Impact Sharing Capacity

The greatest difference between assessment scores for all groups was between the mid and post-intervention points, with median scores improving in the music, control, and combined groups. The enhanced sharing capacity of the control group is of particular interest, as this cannot be attributed to intervention type, therefore another variable such as attendance or natural development of participants should be considered. Although improvements might be attributed to interventions, they could derive from personal participant preference for assessment stimuli, general progress, or sample attendance (SPSS discounted on a case wise basis participants who did not have scores for both tests).

Table 1 shows a small increase of 0.50 in the movement group between scores 2 and 3, but this is not a substantial enough change to reach the threshold of significance. At some point during the intervention period, all groups showed improvement, which supports previous research on entrainment impacting positively on prosocial behaviours in children (Good & Russo, 2016; Kirschner & Tomasello, 2010; Rabinowitch et al., 2013). Despite this, the similarities between the control, music, and movement groups do not allow for the alternative hypothesis to be accepted. These findings do not show that entrainment interventions (other than combined) may enhance prosocial sharing behaviours amongst young children.

Additional ambiguous results are found in the observation data. Frequencies of sharing behaviours were mostly higher during the second observation period (Mu = +5, MM = +3, C = +3), but not for the M group, which actually dropped the frequency of prosocial observations by eight overall. These data are too similar to draw anything conclusive from, although it should be noted that the greatest number of participant absences occurred in the M group - potentially explaining the decrease in total frequency of observations during the second period.

10.2 H2: Movement with Music Entrainment Interventions Impact Sharing Behaviours More than Music or Movement Alone

Results from separate Wilcoxon's signed rank tests revealed that the MM group showed a statistically significant difference over time, and the descriptive statistics inform us that 100% of participants in that group (n = 5) improved their sharing scores over the intervention period. Therefore, the alternative hypothesis that interventions using combined music and movement entrainment activities have the most significant impact on sharing behaviours is accepted. The results from the M and Mu groups were close, meaning it was difficult to identify specific differences between the benefits of movement (Cross et al., 2016; Reddish et al., 2013; Wiltermuth & Heath, 2009) and music (Good & Russo, 2016; Kirschner & Tomasello, 2010) activities on prosocial behaviours, which would have produced insights into the roles of separate structural elements of entrainment. However, the lack of variation provides some support for the multiple facets (Clayton, 2007; Kirschner & Tomasello, 2009; Phillips-Silver et al., 2010) existing on a hierarchical plane in terms of entrainment (i.e. some mechanisms respond more strongly than others during entrainment (Clayton, 2007; Fendrich & Corballis, 2001; Morein-Zamir et al.,

2003; Recanzone, 2003; Repp & Penel, 2004)). Combining the strength of these individual facets may induce social cohesion, whilst enhancing “we intentionality” (Tomasello et al., 2005), leading to more prosocial behaviours, hence the progress of the MM group.

Table 3 *Frequencies of Sharing, Cooperation, Helpfulness, and Empathy Episodes Observed by Each Intervention Group*

Group	S	C	H	E	Total
M	12	16	6	1	35
Mu	7	4	3	4	18
MM	17	16	2	3	38
C	8	13	8	5	34
Total	44	49	19	13	125
Observation Period 1					
M	6	11	5	0	22
Mu	1	4	2	3	10
MM	7	10	1	1	19
C	3	7	5	4	19
Total	17	32	13	8	70
Observation Period 2					
M	6	5	1	1	13
Mu	6	0	1	1	8
MM	10	6	1	2	19
C	5	6	3	1	15
Total	27	17	6	5	55

Note. S = Sharing, C = Cooperation, H = Helpfulness, E = Empathy

Table 4 *Breakdown of Frequencies of Sharing and Other Prosocial Behaviours Pre- and Post-Intervention, by Participant and Group*

ID	Group	Sharing pre	Sharing post	Difference post-pre	Other prosocial behaviour pre	Other prosocial behaviour post	Difference post-pre	Notes
1	M	1	0	-1	2	2	0	
2	M	2	0	-2	5	0	-5	Absent 31/03 (post)
3	M	1	3	2	5	3	-2	
4	M	1	3	2	3	1	-2	Absent 13/03 (pre), 31/03 (post), 03/04
5	M	1	0	-1	0	0	0	Absent 13/03 (pre), 31/03 (post). AEN
6	M	0	0	0	0	0	0	Absent 13/03 (pre)
7	M	0	0	0	0	1	1	
Total	M	6	6	0	15	7	-8	
8	Mu	0	1	1	3	0	-3	
9	Mu	0	1	1	2	0	-2	
10	Mu	0	1	1	2	0	-2	
11	Mu	0	1	1	2	0	-2	Mostly friends
12	Mu	1	1	0	0	2	2	
13	Mu	0	1	1	0	0	0	EAL
14	Mu	0	0	0	0	0	0	Absent 13/03 (pre)
15	Mu	0	0	0	0	0	0	Present for all
Total	Mu	1	6	5	9	2	-7	
16	MM	2	3	1	2	4	2	
17	MM	1	0	-1	3	0	-3	Absent 31/03 (post)
18	MM	1	0	-1	4	2	-2	Absent 31/03 (post)
19	MM	2	2	0	2	0	-2	
20	MM	1	1	0	1	0	-1	Always with friends
21	MM	0	4	4	0	3	3	Absent 31/03 (post)
22	MM	0	0	0	0	0	0	Present for all

Table 4 (continued) *Breakdown of Frequencies of Sharing and Other Prosocial Behaviours Pre- and Post-Intervention, by Participant and Group*

ID	Group	Sharing pre	Sharing post	Difference post-pre	Other prosocial behaviour pre	Other prosocial behaviour post	Difference post-pre	
Total	MM	7	10	3	12	9	-3	
23	C	1	1	0	1	1	0	AEN
24	C	0	0	0	4	2	-2	Absent 13/03 (pre)
25	C	1	3	2	6	3	-3	Often with friend, in favourite area
26	C	0	1	1	1	1	0	
27	C	1	0	-1	2	2	0	
28	C	0	0	0	1	0	-1	
29	C	0	0	0	0	1	1	
Total	C	3	5	2	15	10	-5	

Note. M = movement, Mu = music, MM = movement and music, C = control.

Shared intentionality was included in the intervention plans, as this has been highlighted as a useful cohesion tool (Ilari, 2016; Rabinowitch et al., 2013; Reddish et al., 2013; Tomasello et al., 2005; Tomasello & Carpenter, 2007) and is usually good standard teaching practice, helping to engage students. Kirschner and Tomasello (2010) discuss "underlying proximate mechanisms" (2010: 262) which are also relevant to this study. Alongside shared intentionality, they claim other mechanisms include mimicry, audiovisual motivation, synchronisation, and enjoyment. In the intervention activities, mimicry was used when songs, dances, or reactions were taught by rote, and whilst synchrony was given scope to emerge, it was not insisted upon so participants adhered to their own personal abilities, which at this age does not necessarily include instinctive beat keeping (Ilari, 2015; Kirschner & Tomasello, 2009; Phillips-Silver & Keller, 2012; Provasi & Bobin-Bégue, 2003). Synchronisation was, however, possibly due to the multi-modal requirements and addition of audiovisual motivation more easily and automatically achieved during the combined group interventions. The children in the combined group found performing for their toys more enjoyable than the music only group, who engaged in a similar activity. This was witnessed in their projection of enjoyment onto their "audience" - when asked, more of the toys in the MM group "enjoyed" the concert than in the Mu performance.

Whilst the observation data neither supports or contests the improved recorded assessment scores amongst the combined group, it is of interest to note that sharing capacity was improved during the second observation period (although this is also true for the Mu and C groups). The consistent frequency of observations (Table 3) pre- and post-intervention period for the MM group is intriguing, as all other groups dropped scores overall, despite all except the M group showing improved sharing (Table 4). As most groups increased frequency of sharing (including the control), but declined in general prosociality, this consistency could indicate prosocial tendencies being prevalent in the MM group as a result of their intervention type. The likelihood of observer bias is unlikely due to the natural environments they were recorded in, by several members of staff, and with no direction regarding the hypotheses.

10.3 H3: Previous Movement or Musical Experience Positively Impacts Sharing Behaviours

Previous findings suggested that synchronicity during entrainment activities enhance the beneficial outcomes (Howard et al., 2021; Launay, 2013; Reddish et al., 2013; Valdesolo & DeSteno, 2011; Wiltermuth, 2012), and that cultural or educational differences in musical experience can enhance accuracy in musical entrainment (Kirschner & Ilari, 2014). However, the Mann-Whitney test indicated there was no significant difference between scores of participants in this study with previous musical or movement experience, and therefore the null hypothesis shall be retained (for this age group).

10.4 Limitations, Reflexivity and Future Study

The social approach this study utilised is closer to everyday life at school for young children (rather than dyadic entrainment and interactions on which similar studies have focused previously (Kirschner & Tomasello, 2009; Kirschner & Tomasello, 2010; Valdesolo & DeSteno, 2011)), where generic instead of parochial (Reddish et al., 2016) positive social developments are likely to be desirable. The procedure was deemed age appropriate because children by this age typically possess the ability to role-play (Tomasello & Rakoczy, 2003), which was necessary for the assessment procedures. Prosociality was measured through a combination of observation and experimental measures. However, differing material values of sharing items introduce extraneous variables. The seemingly irregular results from assessment 2 as discussed in the results section may have been due to a design flaw in the experiment, or attributable to extraneous variables e.g the child not favouring the sweets on offer. Despite erratic results in assessment 2, the Wilcoxon's test for each group from first to final assessment scores, show distribution as being fairly consistent, with the MM group showing statistically significant improvement. This result is not as clearly replicated in the observation data (Tables 3 and 4), as none of the groups showed an increase in frequency across all behaviours from the pre- to post-intervention periods. However, sharing for the Mu, MM, and C groups did improve. Results may be inconclusive owing to limited sample size. A larger one is recommended in future studies, to provide a deeper understanding of potential correlational relationships between scores and groups, as well as participant absences being less influential.

The low frequency of empathetic behaviour observations could be an indicator of theory of mind being quite newly developed in children of this age (Ilari, 2016). The research team noted all relevant behaviours including combined behaviours, so in a hypothetical situation when a child was empathetic and subsequently helpful, both behaviours should have been documented. Observations are subjective, so some behaviours may have been misinterpreted, or perhaps empathy was simply not exhibited much. Clearly defined parameters are difficult to implement during observations of prosocial behaviours, particularly when traits cross over, which is why "sharing" was chosen as the measured variable. Other prosocial behaviours are embedded in the practice of sharing, and these were somewhat incorporated into the marking scheme of the experimental procedures, as inspired by Ilari et al. (2018), Kirschner and Ilari (2014), and Kirschner and Tomasello (2010). Even though empathetic behaviour decreased in frequency during observations, its non presence cannot be assumed. Subjectivity is a limitation in the results of the assessment scores, as these marks were not moderated. Future studies should ensure moderation of the marking, ideally from somebody unfamiliar with the children in order to encourage impartiality.

In the observation data, prosocial behaviours exhibited by the Mu group were of a low frequency compared to others (Table 4), although some improvements were noted. This may be the result of an unusual demographic, in which case any improvements at all for this group might be more significant than they appear at face value. An initial baseline assessment of prosocial behaviours for individuals prior to evenly matching groups, may have alleviated this discrepancy.

The binary categorisation of participants' previous musical or movement experiences ("some" or "none") was deliberate, as investigating experience was not the main focus of the study. Children of 5 years old are naturally limited in the amount of experience they have given their young age. The inclusion of slightly older children would have allowed details such as duration and intensity of training in specified areas to be investigated. More in-depth details may help ascertain whether cultural and educational differences in a related field have an impact on entrainment ability (Kirschner & Ilari, 2014). It may also provide insight into when and how children develop the ability to synchronise rhythmically (Ilari, 2015; Kirschner & Tomasello, 2009; Phillips-Silver & Keller, 2012; Provasi & Bobin-Bégue, 2003), which in turn could aid understanding of the importance of synchronicity in the social entrainment context and development of children, lending support to previous research that has found synchronisation to be a major factor in enhancing prosocial behaviours (Cirelli et al., 2014; Hove & Risen, 2009; Howard et al., 2021; Kirschner & Tomasello, 2010; Launay, 2013; Reddish et al, 2013; Valdesolo & DeSteno, 2011; Wiltermuth, 2012). The study is easily replicable in this respect because the resources and approaches are equally as appealing and relevant to children in EYFS and KS1 (but not older or younger than this).

Finally, the power of this study could be improved by using parametric tests. A larger sample and redesigning the assessment marking structure to include more continuous (or more options on an ordinal scale) data, would likely increase the chances of passing the ANOVA assumptions.

11 Conclusions

Prosocial behaviours, and specifically the capacity to share, may be enhanced through participation in entrainment activities which incorporate rhythmic, musical and movement elements.

Another aspect that has been explored is that of shared intentionality, which can be a strong influence on social cohesion (Kirschner & Tomasello, 2010; Reddish et al., 2013) and is something that people working with young children should endeavour to include in their practice. Participants displayed high levels of enjoyment and engagement, possibly attributable to shared goals, although there is no comparison available to confirm this.

Activities which combine musical and movement based rhythmic activities may contribute to the positive development of prosocial behaviours amongst 4-5 year olds in a school setting. Entrainment interventions focusing on musical or movement activities alone produced little or no improvement in prosocial behaviours amongst participants. By the age of 5 years, previous musical or movement experience of individuals has little bearing on the social effects of entrainment. Future studies should utilise mixed methods research, and ensure a larger sample size and broader age range for comparison purposes and to add power to the results. Obtaining a baseline assessment of prosociality is recommended before matched sample groups are created, and proper moderation of scoring should be carried out. People working with young children should incorporate into their practice the opportunity for children to entrain using a combination of musical and motor-based mechanisms to encourage positive development in prosocial behaviours towards others.

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Acknowledgements

My thanks to my supervisor, Katherine O'Neill, for supporting me throughout the completion of this study.

Appendices

Appendix 1. *Observation Protocol and Measurement Procedures – Instructions for Teachers and TAs*

OBSERVATION PROTOCOL

- The particular behaviours to be observed are those associated with **sharing** (primarily), **cooperation**, **empathy**, and **helpfulness**. The definitions and examples of these can be found below.
- Not every child needs an entry - you might simply not see a child exhibiting these behaviours - that is ok.
- If a child is absent, please continue their observation on another day, so all children have the same amount of time to exhibit prosocial behaviours (The earlier in the process the better).
- Please make sure you document the events on the correct time sheet!
- Anything else of note could be important, so just note it down.
- All notes should be brief, this is not meant to be a time-consuming activity!

- *Sharing* is defined for this purpose as any activity in which a child voluntarily offers something in their possession or care to another, as a result of noticing that they may enjoy it, need it more than them, or so that they can achieve a shared goal together. This can include role play scenarios for example making toys share things out. They should not be instructed by staff to share - it should be witnessed as a spontaneous action. It also does not include things like passing on a piece of play equipment and then running off to play with their next toy.

- *Cooperative behaviours* are when two or more children work together towards a common goal. There may be some cost to one or more of the children, but if the main aim is to achieve together, and the children are solving problems, and perhaps altering their approaches without ending up arguing then this is deemed "cooperative behaviour". It might be interesting to note any occasions when you think cooperative behaviour may be emerging, but ultimately fails as a fight ensues.

- *Empathy* is demonstrating the ability to view the world as another, and to understand the emotions of others, and acting accordingly. By this I mean that in response to "how do you think *x* feels about that", the answer cannot merely be "sad" for empathy to be expressed. The sadness must almost appear to be felt by the other person and their behaviour impacted for example they recognise (independently) that somebody might be feeling sad, so go to give them a hug.

- *Helpful behaviour* must also be voluntary. If a child helps another (or adult), and particularly if at a personal cost, this must be documented. By cost to themselves, I mean that perhaps they are already engrossed in something they clearly enjoy, but give that up momentarily to fetch an adult for a friend who has fallen over, for example. Or perhaps the helpful activity might cost them time, or standings in a game or competition. Interesting notes on this might include whether they are friends with the person they help, how much the personal cost was, and if there was any personal gain in helping the other. Behaviour resulting from an instruction provided by an adult should not be documented.

- Note that there may well be cross overs with these pro-social behaviours. This is actually quite likely! So if in doubt, please enter every code that you think is relevant, more than one code per incident logged is perfectly fine.

- Codes: S, C, E, H (Sharing, Cooperation, Empathy, Helpfulness)

MEASUREMENT PROCEDURE 1

- Set up in Butterfly Room.
- EY teachers and TAs deliver the following message to students "Miss. Hodgson will have some music activities during some COOL periods this week, and she says she would like you and a favourite toy to join her. So when you are called to go and play with her, make sure you have your toy ready".
- TAs to prepare children and toys prior to assessment procedure.
- TA to show where the next child to collect is. Ensure toy is present. I will take the toy from the child and ask a selection of the following questions "Who is this?"/"Tell me about your friend/car/game etc"/"Why did you choose to bring…?"
- Just outside the Butterfly Room there will be an accident and the toy will be dropped. Exclamation "Oh no, poor …! I hope they are ok!" Alternatively, a role play conversation might be appropriate if the child appears that dropping the toy would cause distress, or if the toy is genuinely fragile and might break. This would be held between myself and the toy "oh no…they say they aren't feeling very well today".
- Inside BR will be an iPad set up to record the assessment. Also, a role play doctor's coat and cot for the toy to lie in.
- Equipment set in front of child: 1 xylophone, 1 step glockenspiel, 1 set bongo drums, 1 tambour, 2 sleigh bells, 1 duck castanet, 1 shaky egg
- Equipment set in front of experimenter: 1 shaky egg, 2 chime bars (G + E)

- "It's a hospital room!" - ask the child if they can see where an injured or sick patient would go - place toy in the cot. Ask child if they would like to wear the music doctor coat. Invite child to sit down opposite experimenter. "Let's play healing music together to make x better. Do you think we can make them feel better?" If the child shares instruments at this point, demonstrating awareness that if both experimenter and child have more instruments we can cure toy more efficiently, they will score 3 points. If during the next 60 seconds playing time the child recognises that there are different instruments, or identifies that they could share but won't for some reason, or if they share after the prompt, they receive 2 points. No willingness or action to share scores 1 point. The prompt will take place after 40 seconds. This will take the form of "Have you tried all of your instruments?" or "You aren't using all of your instruments!". Playing will cease after 60 seconds. Alarm set and the alarm will also be signal for the toy feeling better/being fixed. Ask the child to check on the toy to see if we were successful.
- Repeat procedure for each child recording score immediately.

MEASUREMENT PROCEDURE 2

- Set up in Butterfly Room (recording device, balloons, party hats, skittles/M&Ms, treat doilies, spoons, party playlist).
- Experimenters are SG and AH
- Children are kept near the BR (can be playing a game with TAs for example). Children called in by both teachers to Butterfly Room individually. Wearing party hats, celebration/birthday song playlist and some balloons around to provide festive feel. Each child greeted and invited to sit in their place. AH/SG alternating each child say "it's our birthdays this month, and we wanted to celebrate by having a little party with each child! Would you like that? Shall we celebrate with skittles or M&Ms?" According to child's choice, AH distributes 1 M&M/Skittle each to birthday teacher, and 4 to the child (on party plate). Sing Happy Birthday to one teacher, then the next. "I think I might eat my Skittle/M&M now. What about you [to another teacher]?" They may choose to eat it or save it - this is the prompt for the child to share. Further prompts could also include "I'm looking forward to eating mine later" or "Are they good?" Thank child for joining the party and remind them to keep it a secret from the other children as we want it to be a surprise. If the child shares before the prompt they receive 3 points, after the prompt(s), 2 points, and not at all, 1 point.

MEASUREMENT PROCEDURE 3 (Stickers (not same as usual music housepoint stickers), envelopes (2 for each child, 1 with child's name on, 1 with sharing and a drawn picture of children holding hands), also scissors so children may cut up their strip of stickers to share/keep)

- Butterfly Room (recording device set up)
- Each child called to the room individually by AH, TAs assist locating and perhaps preparing next child, no procedure particularly necessary to follow for this measurement.
- "Thank you for taking part in my extra music and movement sessions. I want to thank everyone by giving them some stickers. So, these are for you. But I don't know if I will have time to get round to everyone, so if you want to, you can put some to share with other children in this envelope in case I don't get round to all your friends. Or you can keep them all. It's up to you." Indicate and model the envelope with the child's name, and how they may distribute the stickers. Make explicit they do not have to share, they might want them all for themself. Turn back on child once they have understood and ask them to complete the task as they wish whilst "I go and get on with this work". After child has finished, explain that the envelopes will be kept and distributed at the end of the day. In fact, all children will receive all 10 allocated stickers under the pretence that "Miss Hodgson was able to get round everyone, so nobody had to share". Child's kept stickers and donated stickers recorded.
- 3 points - over half of stickers shared; 2 points - some stickers shared, maybe some deliberation or negotiation about decision; 1 point - no stickers shared.