

L'effet de la musique sur la participation parentale dans le cadre de réparations pédiatriques de déchirures

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Cette étude quasi-expérimentale a pour objectif d'évaluer une intervention utilisant la musique pendant de simples réparations de déchirures avec l'intention de favoriser la participation de parents d'enfants âgés de un an à cinq ans. Des haut-parleurs ont diffusé des chansons pour enfants pendant la réparation de déchirures et les parents étaient invités à participer à l'intervention en distrayant leur enfant. Le taux de participation parentale a été déterminé et les procédures entourant la réparation ont été filmées sur vidéo et soumises à un pointage objectif à l'aide d'une liste de contrôle des comportements pendant les procédures. Au total, 57 enfants ont participé à l'étude. Aucune différence n'a été notée entre le groupe de contrôle et le groupe d'intervention en ce qui a trait à la participation parentale. Pour ce qui est des contrôles fondés sur l'âge, le sexe et l'état, les taux de détresse étaient significativement plus élevés lorsque les pères étaient présents dans la salle de soins, comparativement aux cas où seules les mères étaient présentes (43,68 contre 23,39, $t(54) 4,296$, $p = <0,0001$). Les auteurs ont conclu que les taux de détresse varient selon l'âge de l'enfant et le parent présent pendant la prestation de soins. La présence de musique pendant de simples réparations de déchirures n'a pas favorisé de plus grands taux de participation parentale aux efforts de distraction.

Mots clés : déchirures, musique, pédiatriques

The Effect of Music on Parental Participation During Pediatric Laceration Repair

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The purpose of this quasi-experimental study was to test an intervention on the use of music during simple laceration repair to promote parent-led distraction in children aged 1 to 5. Children's songs were broadcast via speakers during laceration repair and parents were encouraged to participate in distracting their child. The proportion of parental participation was determined. Laceration procedures were videotaped and objectively scored using the Procedure Behavior Check List. A total of 57 children participated in the study. There was no difference in parental involvement between the control and intervention groups. When age, sex, and condition were controlled for, distress scores were significantly higher if the father was present in the procedure room than if only the mother was present (43.68 vs. 23.39, $t(54) 4.296, p = < 0.001$). It was concluded that distress varies with the age of the child and the parent who is present during the procedure. Providing music during simple laceration repair did not increase the proportion of parents who were involved in distraction.

Keywords: lacerations, music, intervention studies, pediatrics, pain

Introduction

In Canada more than 95,000 children visit emergency departments (EDs) annually because of injuries (Public Health Agency of Canada, 2002b) and lacerations and other open wounds account for 25% of injuries among children aged 1 to 4 (Public Health Agency of Canada, 2002a). Although laceration repair is a relatively painless procedure due to the use of topical anesthesia, children experience distress as a result of anticipatory fear. A child's fear, anxiety, and distress must be adequately addressed to ensure successful laceration repair and a positive hospital experience for parents and their children. The focus of this study was the testing of music as an intervention to increase parent-led distraction in the ED.

Literature Review

There is a wealth of research supporting the notion that children who are undertreated for pain suffer long-term deleterious effects. For example,

Taddio, Katz, Ilersich, and Koren (1997) found that neonates who were circumcised without analgesia experienced more distress in subsequent routine immunizations than children who were circumcised with topical analgesia. Simple laceration repair, defined in this study as the application of tissue adhesives or sutures to repair torn or damaged tissue without the use of sedatives, is a relatively painless procedure. However, children under 5 years of age are unable to distinguish between the experience and the sensation of fear (Carr, Lemanek, & Armstrong, 1998; Goodenough et al., 1999). Therefore, intense fear experienced by the child during laceration repair may lead to long-term negative outcomes similar to those described by Taddio and colleagues. If we consider distress as “the sum of anxiety and pain” (Walco, Conte, Labay, Engel, & Zeltzer, 2005), any medical procedure resulting in distress in young children may lead to long-term deleterious effects. It should therefore be a priority for all pediatric health-care providers to implement distress reduction in their practice.

Age has been identified as a significant variable in studies assessing pediatric distress, especially during acute, painful procedures. A study by Goodenough and colleagues (1999) found that ratings of pain and unpleasantness during a painful medical procedure decreased with increasing age. An earlier study, similarly, found a negative correlation between pain (both subjective and objective) and age, indicating that the pain response is attenuated by age (Fradet, McGrath, Kay, Adams, & Luke, 1990).

Psychological interventions have been shown to have a positive effect on procedural distress. Techniques such as distraction have a clear benefit in procedures such as venous cannulation or lumbar puncture (Cohen, 2002; Uman, Chambers, McGrath, & Kisely, 2006). There are, however, very few studies exploring these benefits in painless procedures such as laceration repair using topical anesthesia. Sinha, Christopher, Fenn, and Reeves (2006) attempted to use music as a distraction during laceration repair in children aged 6 to 18. They found that music effectively reduced anxiety in both the children and their parents during the procedure but that it did not have an effect on the sensation of pain. Conversely, a recent Cochrane review concluded that music has a small but measurable effect on the sensation of pain; the authors recommend that although music should not be used as a first-line treatment for pain, it could serve as a useful adjunct to analgesia (Cepeda, Carr, Lau, & Alvarez, 2006). Its positive effect on distress and its unobtrusive nature make music an ideal intervention for testing in a busy environment such as an ED.

Child caregivers are often closely attuned to the child and consequently can have a considerable effect on levels of distress experienced by the child. When a parent is present in the treatment room during a

potentially painful event, positive effects include lower distress scores for the parent and the child (Wolfram & Turner, 1996), increased parent satisfaction, and a sense of being helpful (Piira, Sugiura, Champion, Donnelly, & Cole, 2005). Finally, it has been demonstrated that parental engagement in coping behaviours, such as use of humour and non-procedural talk directed at the child, serve to decrease the amount of distress experienced by the child (Blount et al., 1989).

Interestingly, some coping strategies used by parents, such as verbal reassurance (e.g., “it’s okay,” “don’t worry”), empathy, criticism, and apologizing for the child’s behaviour, have been shown to heighten the child’s distress (Blount et al., 1989; Manimala, Blount, & Cohen, 2000; McMurtry, McGrath, & Chambers, 2006). It is unclear how these parental behaviours directed towards the child serve to increase distress. McMurtry and colleagues (2006) summarize the findings on reassurance and report that this coping strategy may increase distress via three mechanisms. First, reassurance may cue the child to prepare for an unpleasant event and incite fear and anxiety in the child. Second, it may reinforce and encourage distress behaviour: The more the child expresses feelings of distress, the more attention he receives from the parent. Finally, reassurance may provide validation for the child’s feelings, effectively telling the child that it is “okay” to be distressed (McMurtry et al., 2006). Showing empathy and apologizing for the child’s behaviour likely work via similar mechanisms. Further, it has been demonstrated that parental engagement in these distress-promoting behaviours can result in similar behaviours by those treating the child, such as nurses and physicians (Frank, Blount, Smith, Manimala, & Martin, 1995).

It is therefore important that strategies be developed whereby a parent can actively participate in a procedure and thus be made to feel helpful yet not engage in distress-promoting behaviour. Distress-promoting behaviours may be difficult to prevent, as a parent will intuitively attempt to reassure a child who is experiencing distress. Music, as a recommended adjunct for the treatment of pain, may be a useful tool for distracting the child and involving the parent in an activity that will prevent him or her from engaging in distress-promoting behaviours.

Purpose

It has been demonstrated that distraction is an effective means of decreasing distress. The purpose of this study was to test an intervention using children’s songs to promote parent-led distraction during simple laceration repair in children aged 1 to 5. Parents were encouraged to participate in their child’s treatment by singing along to music being broadcast via speakers. A parent who actively participates by singing will have less

opportunity to engage in distress-promoting behaviour and, as reported by Sinha and colleagues (2006), may experience less anxiety during the procedure. Maternal behaviour could account for as much as 53% of the variance in distress experienced by a child (Frank et al., 1995). This finding supports the notion that an intervention targeting both parent and child could have a significant impact on the child's distress. This simple and easily implemented intervention provides parents with a medium through which to distract the child while simultaneously avoiding distress-promoting behaviours. Further, music is an inexpensive, easily implemented, low-burden intervention, requiring only the press of a button. This intervention could lead to a measurable reduction in distress during simple laceration repair by increasing parent-led distraction, thereby improving the hospital experience for both young children and their parents without placing an undue burden on professionals integrating the intervention into their practice.

We hypothesized that parents in the intervention group would demonstrate a greater degree of parent-led distraction than those in the control group. With this objective in mind, we formulated the following research question: *Does music broadcast via speakers have a measurable effect on parent-led distraction during simple laceration repair in children aged 1 to 5?*

Methods and Materials

Design

This quasi-experimental study was conducted in a pediatric ED located in a large city. This study design was chosen over randomization because no between-group differences were expected in children presenting at the ED, based on a review of the department's patient-tracking software conducted by one of the investigators. As the study site was experiencing a severe staff shortage at the time of the study, this method also served to minimize any burden associated with randomization (e.g., using randomization software) and to simplify study logistics for participating ED staff.

Recruitment took place in 2-week blocks. Those children presenting during the first 2 weeks of the study had laceration repair as per department protocol, without the music intervention. During the second 2 weeks, consenting patients received the intervention. Recruitment took place over an 8-week period, Monday to Friday from noon to 8 p.m. A review of the patient-tracking software used at the study site, which tracks the presenting complaint, demographic data, and discharge diagnosis, determined that these days and times would allow for the greatest recruitment potential, as they were when lacerations in the 1-to-5 age group were most likely to present at the ED.

Sample

Children aged 12 to 71 months, inclusive, presenting at the ED with a single, simple laceration requiring repair with sutures or tissue adhesives and pretreated topically with lidocaine, epinephrine, and tetracaine (LET) were included in the study. This age range was selected so the intervention could be studied in a narrow developmental range and to facilitate standardization of the intervention and pre-procedural teaching. All children who required suturing received LET followed by injectable lidocaine to ensure that the procedure remained painless. Children were recruited regardless of prior experience with lacerations or laceration repair. Excluded were children who had more than one laceration, required sedation for their laceration repair, presented at the ED without a family member, or were accompanied by a family member who did not speak English or French.

Families were identified as eligible for the study by the triage nurse and flagged for the research assistant. The research assistant then approached the family and requested consent for participation prior to examination by the physician. Recruitment took place over the months of July and August 2008. Of the 69 families screened for the study, 68 agreed to participate (98%). Eleven of the families were excluded from the final analysis because the child did not meet inclusion criteria after being examined by the physician (e.g., required sedation, required complex laceration repair, had multiple injuries). One family did not provide a specific reason for refusal to consent. In total, 57 families were included in the final analysis, 27 of whom received the music intervention.

Intervention

All consenting families were met by a Child Life Specialist (CLS), who provided pre-procedural teaching to the parent and child. The pre-procedural teaching was standardized between the two groups. Children assigned to the intervention group had audiorecorded children's songs played to them during the procedure. The song choices included lullabies, educational songs, and songs performed by popular television characters in both English and French. Three songs were selected by the CLS and the parents prior to the procedure. These were played throughout the procedure on a repeating basis, from the start of the procedure (child placed on bed) to the end of the procedure (bandage placed over laceration). The parents were encouraged to sing along with the music during the procedure. Participants in the non-intervention group (usual care) had no music played. All laceration-repair procedures were videotaped. The research assistant accompanied the physician, patient, and parents at

all the procedures and was responsible for proper positioning of video equipment and for starting the music at the beginning of the procedure.

Approval for the study was obtained from both the Nurse Manager and the Medical Director of the ED. Ethical approval was obtained from the ethical review board prior to implementation. Informed consent was obtained by the research assistant prior to videotaping the procedure. All taped procedures were transferred to a dedicated hard drive in a locked office at the end of each study week. Videotapes were accessed and viewed only by the researchers and objective scorers. Patient confidentiality was ensured through the replacement of patient names with codes on all study materials. Consent forms were kept separate from other study materials at all times.

Instruments

Parental participation. The video scorers determined the amount of time a parent spent distracting the child during the procedure. They were trained to recognize behaviours that distracted the child. Behaviours such as singing to the child, diverting the child's attention away from the laceration repair, or encouraging the child to sing were considered to be parental participation. The video scorers recorded the number of seconds spent on each distraction event. For example, they timed exactly how long a parent would sing along with the music being broadcast. A parental participation score was then derived by determining the proportion of time spent on distracting the child (time distracting/total procedure time). Interrater reliability for proportion of parental participation was determined (0.767, $p < 0.01$, CI 95% 0.632, 0.923) and judged to be acceptable.

Since the scores given by the two raters were similar, they were averaged to create an objective distress score and a parental participation score (in seconds), which were used in the subsequent analysis.

Procedure Behavior Check List. Videotapes of all laceration repairs were objectively scored using the Procedure Behavior Check List (PBCL) (LeBaron & Zeltzer, 1984). The PBCL is an observational measure of distress that scores the presence and intensity of eight behaviours associated with child pain and anxiety (e.g., muscle tension, verbal stalling, crying). Each behaviour is rated on a Likert-type scale ranging from 0 to 5 (0 = no distress; 1 = very mild distress; 5 = extremely intense distress), for a score ranging from 0 to 40. This tool was originally used to measure observable distress during lumbar punctures in 67 pediatric oncology patients between the ages of 6 and 18 years. Concurrent validity was found to be acceptable, with a correlation of 0.80 ($p < 0.001$) to the children's self-reports of pain and anxiety (Lebaron & Zeltzer, 1984). Subsequent studies have shown the PBCL to be a reliable and valid

measure of behavioural distress in children (Cavender, Goff, Hollon, & Guzzetta, 2004; Luhmann, Schootman, Luhmann, & Kennedy, 2006), with observed distress significantly correlated with patient ratings of pain and anxiety (Langer, Chen, & Luhmann, 2005). Finally, a recent review of observational measures of pain rated the PBCL one of the most accurate measures of pain-related distress currently available, with a good balance of evidence, burden, and content validity (von Baeyer & Spagrud, 2007).

Videotapes were scored by two reviewers naive to the study purpose using the PBCL. The reviewers were trained in the use of the PBCL by study investigators prior to the study start date. Interrater reliability was established prior to the study by comparing rater and investigator scores on sample videotapes. Coding of the videotapes was begun by the raters only when reliability was greater than 0.80 on sample videotapes. Following data collection, interrater reliability was strong for the two video scorers on the objective measure of distress (0.884, $p < 0.01$, CI 95% 0.81, 0.93) and the time to complete the procedure (0.995, $p < 0.01$, CI 95% 0.991, 0.997).

Results

The intervention and control groups were similar for age, location of laceration, length of laceration, and family member present, but dissimilar for gender. Children in the intervention group more frequently required sutures to repair the laceration (26% vs. 7%) (Table 1); however, this difference was not statistically significant.

Linear regression analysis was performed to determine whether parental involvement predicted distress scores and the degree to which age affected distress. In the control group ($n = 30$), 18 parents participated in distracting the child (60%) and the mean proportion of time spent participating in the laceration repair was low (0.0647). Of the 27 parents in the intervention group, 15 distracted their child (56%), with a similar mean proportion of time spent distracting the child (0.0669). There was no significant difference between the two groups in terms of parental participation.

There was no significant difference in distress scores based on parental participation. The greatest predictors of child distress were age ($\beta = -0.434$, $t = -4.017$, $p < 0.01$), with younger children being more distressed, and the presence of the father in the procedure room ($\beta = -0.419$, $t = -3.888$, $p < 0.01$). Children had a significantly higher mean distress score when the father was present (43/100) than when only the mother was present (23/100) ($F(1, 54) = 18.452$, $p < 0.01$). (See Table 2 for descriptive and comparative data on distress scores.)

	Control	Intervention	Chi-squared <i>p</i>
Age of child (months)	43.5 ± 14.4	39.9 ± 18.7	ns
Sex (<i>n</i>)			0.047*
Male	24	15	
Female	6	12	
Parent present (<i>n</i>)			ns
Father	4	4	
Mother	19	16	
Both	6	7	
Other	1	0	
Location of laceration (<i>n</i>)			ns
Scalp	9	3	
Face	17	21	
Other	3	3	
Length of laceration (mm)	13.2 ± 7.6	14.5 ± 7.7	ns
Type of repair (<i>n</i>)			ns
Tissue adhesive	28	20	ns
LET ^a + sutures	1		1
LET + lidocaine + sutures	1		6
N	30	27	
*Significant at 0.05. ^a Topical anesthesia			

	Control	Intervention	Mean	F	<i>p</i>
Mean distress (<i>n</i>)	33.1 (29)	28.6 (26)			ns
Parent present					
Mother (<i>n</i>)	27.1 (19)	19 (16)	23.05	(2,52) 9.516	< 0.01
Father (<i>n</i>)	40.2 (4)	44.7 (4)	42.5		
Both (<i>n</i>)	48.1 (6)	43.4 (6)	45.8		
<i>Note:</i> Two cases were excluded; one child was accompanied by an aunt and one child was missing objective data.					

Discussion

There is a paucity of research on distress during laceration repair. Although this is a relatively simple, quick, and painless procedure, it is perceived by observers as extremely distressing (Babl, Mandrawa, O'Sullivan, & Crellin, 2008). As resolution of pain is an important predictor of high patient satisfaction in children (Magaret, Clark, Warden, Magnusson, & Hedges, 2002), it may be inferred that effective resolution of distress during simple laceration repair may also increase patient satisfaction. Further, reducing distress during laceration repair may decrease the need for sedatives such as midazolam, the use of which increases observation time (post-intervention) and the incidence of sequelae (Luhmann, Kennedy, Porter, Miller, & Jaffe, 2001). Our results indicate that the strongest predictors of distress are age and the parent who accompanies the child in the treatment room. The finding that distress is strongly correlated with age is in concordance with the results of several other studies examining pediatric distress (Carr et al., 1998; Goodenough et al., 1999).

Although the intervention did reduce distress in children (see Bhatt, Sobieraj, & Johnston, 2009), in the present study parental participation was not higher in the intervention group. Although parents were encouraged to distract their child during the procedure, the proportion of time spent distracting the child, regardless of condition, was extremely small (6.6% of total procedure time). The intervention may not provide sufficient stimulus to overcome the unpleasantness of seeing one's child in distress. In the future, more time with parents in pre-procedural teaching, to stress the importance of distraction, may serve to increase the proportion of time spent participating. If the proportion of time spent participating is increased, we might observe a lowering of distress scores, as had been expected, since the parents will have less opportunity to engage in distress-promoting behaviours.

Pre-procedural teaching has been demonstrated to reduce anxiety prior to a procedure (Claar, Walker, & Barnard, 2002; Spafford, von Baeyer, & Hicks, 2002). Presumably the older children in our sample had learned more from the pre-procedural teaching and applied the information more effectively. If distress is defined as the "sum of anxiety and pain" (Walco et al., 2005), then older children who are less anxious as a result of pre-procedural teaching will experience less distress. Therefore, we cannot rule out the possibility that the difference in distress levels between age groups is a result of an association between increasing age and pre-procedural teaching and is not in fact an accurate representation of distress scores. In the future it would be imperative to add a third group to the study, one in which no pre-procedural teaching has been

provided by a CLS, in order to control for this potential confounding variable.

A novel finding in our study was the difference in distress scores depending upon which family member accompanied the child during the procedure. Children were significantly more distressed if the father was in the treatment room. Although the mean age for the group in which the father was present was slightly lower (38.3 vs. 43.9 months), this is likely not a sufficiently large age difference to explain the stress differences. There are no prior studies reporting a similar finding. As different coping strategies are known to provoke varying degrees of distress (Manimala et al., 2000; McMurtry et al., 2006; Young, 2005), it may be that fathers in our study were using coping strategies known to increase distress, such as reassurance, criticism, or apologizing for the child's behaviour, more frequently than mothers, while mothers may have been using effective coping strategies, such as distraction, humour, or non-procedural talk, with greater frequency. Since families self-selected who would accompany the child in the procedure room, a second possibility for this difference in distress is that fathers chose to accompany "difficult" or expressive children more frequently than mothers alone did. Without collecting more data from parents regarding their relationship with the child, or their preferred method of coping, it is hard to draw conclusions with respect to this difference in distress. A secondary analysis of the videotapes would allow us to determine the frequency and type of coping strategies used by family members, and to validate the hypothesis that different family members use alternative coping strategies.

One study has suggested that distraction loses efficacy in reducing distress if the painful or unpleasant stimulus is prolonged (McCaul & Malott, 1984). Laceration repair in our study took several minutes to complete ($M = 328$ seconds), in stark contrast to immunization, heel sticks, or blood sampling, which may take only seconds. The degree to which a child is distracted may be further influenced by their degree of stimulation. As our intervention was fairly passive, it may not have provided a sufficiently strong stimulus to overcome the unpleasantness of the laceration repair.

The present study had several limitations. A non-randomized design was chosen for the study, because there were no differences expected in children presenting to the ED during the 2-week study blocks. Despite this expectation, groups differed on gender, family member present during the procedure, and type of laceration repair. A single-blind RCT may have prevented the skewing of groups and increased the generalizability of our results. We cannot conclude that the gender composition among groups affected our results, as the literature on gender differences

and distress in children is inconclusive (e.g., Carr et al., 1998; Goodenough et al., 1999).

Because audio was recorded and required for proper scoring of the videotapes, the objective scorers were not blind to group assignment. However, the scorers remained blind to study purpose throughout the study, which reduced the risk of bias in video scoring. In any future research it may be useful to apply a measure that does not require audio cues, such as the Child Facial Coding System (CFCS) (Breau et al., 2001), to reduce the risk of bias introduced by scorers who are not blind to group assignment.

The small sample size ($N = 57$) may be a further limitation. A larger sample size would have increased the power of the study and allowed us to detect a smaller clinical effect. Further, no qualitative data were collected from participating families and staff. Data such as satisfaction with the intervention, likelihood of adopting the intervention for future procedures, and parents' and staff members' perceptions of the effectiveness of the treatment might have allowed us to infer the clinical usefulness of the intervention.

Practice Implications

Our findings suggest that significant predictors of higher levels of distress during laceration repair are younger age and paternal accompaniment in the procedure room. This information could influence unit managers/team leaders to more effectively allocate available resources, such as CLSs, to families where there is greater need. Older children may require less attention by auxiliary staff. This finding suggests that auxiliary staff can spend more time attending to the needs of other patients on the unit. Further, the data suggest that the younger population may require more attention from support staff than they are currently receiving, to lower the increased level of distress experienced by these patients.

Conclusion

Although the provision of music and pre-procedural teaching did not increase the proportion of parental participation, the study did find that children are more distressed in the presence of fathers — an important finding not described in other studies. This finding will help inform future studies where parent gender may be an important covariate.

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