A videotaped intervention to enhance child control and reduce anxiety of the pain of dental injections

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ABSTRACT. Aim While the psychological literature shows that perceptions of uncontrollability contribute to anxiety and other pathologies, interventions that enhance perceived control have been shown to reduce anxiety. This study attempted to assess a brief videotape to enhance child perceived control in a dental setting. Methods 101 children aged 7-9 years completed warm-up procedures and viewed either: a) the experimental intervention, a 2 minutes video of a dentist explaining what an injection will feel like and proposing hand raising as a signal mechanism; or b) the control condition, a 2 minutes video of Disneyland. Fear of dental injections was assessed on a 10 cm visual analogue scale before and after the intervention. Results In the experimental group there was a significant fear reduction from pre- to post-intervention, while this was not the case in the control group. Children with higher pre-existing levels of fear benefited more from the intervention than children with lower levels of fear. Conclusion The results of this pilot study suggest that intervention packages that impact child control have promise in lowering anxiety.

KEYWORDS: Child, Behaviour management, Anxiety, Dental injections.

Introduction

Dental and medical procedures are often invasive and generate considerable anxiety for children. For over 30 years there has been recognition of the need to help children cope. In recent years there have been a number of medical studies demonstrating that cognitive behavioural intervention packages reduce anxiety and procedural pain in children [Powers, 1999]. While early work in this area focused on providing information to children, there has been little attention to the construct of control.

There is a large literature that highlights the role of uncontrollable and unpredictable events in the development of anxiety and other psychopathology. Evidence from many sources suggests that childhood experiences with diminished control may create a vulnerability for anxiety [Chorpita and Barlow, 1998]. Perceived control is believed to moderate the aversiveness of an event [Thompson, 1981]. Control may be especially important when procedures are perceived of as aversive or painful. Corah [1973] studied the effects of a device given to children to signal the dentist to stop treatment and also found those children with the device had lower arousal during high stress procedures than controls. Only one half of the children used the device.

A more recent study showed a similar result and found that the use of the signal was associated with age and perceived aversiveness of present and past experiences [Weinstein et al., 1996]. These results are in contrast with the findings of Blount et al. [1989], in which vocal behaviours of residents, nurses and parents, indicating an attempt to provide behavioural control during bone marrow aspirations and lumbar puncture typically, preceded child distress.

In a study on adolescents, Milgrom et al. [1992] found that those who reported painful treatment were 4.9 times less likely to be willing to return to the dentist than those who reported their treatment was not painful. Those who reported pain and perceived lack of control were 15.9 times less likely to return than those who did not experience pain and lack of control.

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Carpenter [1992], in a study of blood drawing, found children with lack of perceived control interfered with the procedure more than those with a perceived source of control (41 versus 13%, respectively). Carpenter focused on the non-behavioural aspects of control. Similarly, Mahajan et al. [1998] in a study of gastrointestinal endoscopy found that psychological preparation, sensory and procedural information resulted in less child anxiety than those in the control condition. Other recent reports with informational intervention components were found to reduce distress and increase child cooperation [Zelikovsky et al., 2000; Schiff et al., 2001].

There is a need for closer scrutiny of the concept of control in settings that result in procedural-related distress in children. The aim of this study was to attempt to pilot test a simple, brief video intervention package that addressed a child’s need for control in a stressful dental situation. A school setting was chosen because of the access to children and the lowered threat the setting provided for the initial study.

**Materials and methods**

**Subjects.** Subjects were a convenience sample of 101 public school children in rural southwestern Washington State. The children were aged 7-9 years, (second and third grades); 63% were female.

**Measures**

- **Warm-up Questionnaire.** The purpose of this questionnaire was two-fold: to introduce the Likert and visual analogue scale formatting that would be in the study proper and also to assess the ability of the subjects to comprehend and follow instructions. The warm-up included 5 pre-tested ‘practice’ questions. The first two questions were in the Likert scale format of 1-5 (not afraid at all - very afraid). An example was: “How afraid are you of eating your lunch?” The next three questions were in the form of a visual analogue scale (VAS) combined with the facial analogue scale (FAS) [McGrath, 1990]. The scale was 10 cm long with a smiley face at the zero mark and a sad face at the 10 cm mark. Children had to mark a vertical line to cut the horizontal line at a point representative of their feelings. An example was “Imagine that you see a poisonous spider... let us know how you would feel about touching the spider.”

- **Pre-test Questionnaire.** This included 5 items from the Child Fear Survey Schedule (CFSS-DS), which has been shown to have high validity for dental anxiety in children of similar ages [Melamed and Lumley, 1988; Raadal et al., 1995]. The questions were: “How afraid are you of... dentists, doctors, injections (shots), having a stranger touch you, choking”. Subjects rated their level of fear on a 5-point Likert scale, from 1 (not afraid at all) to 5 (very afraid). Examples were ‘injections (shots)’, ‘dentists’ and ‘choking’. The items were summed to create a ‘Dental Fear Score’, which ranged from 5 to 25, where 25 indicated maximal fear. The children were asked if they had “ever been to the dentist” and whether they “ever had a dental shot”. Response alternatives were yes, no, and don’t know. A visual analogue scale anchored with smiley and sad faces assessed “how afraid you are of having a shot” (VAS1).

- **Post-test Questionnaire.** After seeing the video the children were once again asked how afraid they were of a dental shot. The response was then to be rated on the visual analogue scale (VAS2).

**Intervention and procedure.** The whole class was gathered together and given the warm-up and pre-test questions. The warm-up questions were explained to the whole class with the use of an overhead projector. Detailed instructions were provided on how to fill out the warm-up and pre-test questions.

After the pre-test, groups of four boys or four girls were called out of the classroom by the experimenters into other rooms. Each group was shown either the experimental or control video. The experimental video was a 2 minutes film depicting a 60 years old female dentist and either a third-grade boy or girl, according to whether the group was all female or all male. The video began with a child sitting in the waiting room of a dental office (surgery). His/her thoughts of being unsure and anxious were vocalized by the child in the film. In the next scene the child was sitting comfortably in the operator/surgery and the dentist was very sympathetic and acknowledged the child’s apprehension. The dentist explained the procedure of having an injection and indicated the level of pain they might feel by gently pinching the child on the back of his/her hand. The dentist also explained to the child the ability to have control over the situation by being able to raise his/her hand. The procedure began with the application of topical analgesic and then the dentist administered an injection. The cartridge was visible in the video, but the needle was never in view. The child began to raise his/her hand and then put it down when she/he realized that the ‘shot’ (injection) was not really that painful. Once again the child’s thoughts were heard as she/he said that the ‘shot’ was not at all as bad as she/he thought. The child becomes very relaxed and comfortable and the video ends with the dentist...
telling the child about the nitrous oxide (relative analgesia) mask and placing it over the child’s nose.

Subjects in the control condition were shown a 2 minutes video unrelated to dentistry. In this case it was an advertisement for a visit to Disneyland.

Following the video, the questionnaires were administered to each child. To enhance control and standardization four children were assessed at a time. All children sat separately and were not allowed to confer or compare answers.

**Statistical procedures.** Possible differences with regard to gender, previous experience with dental care and with dental injections, dental fear and pre-intervention fear of injections between the groups were assessed by means of a two-tailed t-test for independent samples. Possible changes in fear of injections were evaluated with a One-way ANOVA for repeated measures, with ‘group’ as the between factor and ‘fear of injections’ at pre- and post-intervention as the within factor. Any possible relationships between changes in ‘fear of shots’ and pre-intervention ‘fear of shots’ as well as ‘dental anxiety’ were analyzed with Pearson’s correlations. The relationship between changes in fear of injections and a set of possible predictor variables were analyzed by Multiple Linear Regression (Stepwise) with an inclusion level of 0.05. Two-tailed tests were performed, and the significance level was 0.05. The statistical program SPSS 11.0 for Windows was employed.

**Results**

Twenty one out of 101 subjects’ responses to the warm-up items indicated a lack of understanding or an inability or unwillingness to respond to the task in a reality-based manner. For example, an answer of 4 or 5 (very afraid) of eating lunch would be considered problematic. The responses of these subjects were not included in the data analyses. The responses of 8 of 51 third-graders and thirteen of 50 second-graders were eliminated, giving a total sample of 80 (51 girls and 29 boys). Sixty-two of the children were assigned to the intervention group and 18 to the control condition.

**Pre-test dental experiences and dental anxiety.** Some 90% of the sample (n=72) had previous experience with dental care. Almost one third (n=26) reported having had an injection, slightly over 40% (n=33) indicated they had not experienced an injection before, and about a quarter (n=21) of the children did not know whether or not they had such an experience.

There were no significant group differences regarding previous experience with dental care [t(78)=0.18, p=0.86], or with having dental shots [t(78)=0.39, p=0.70]. The mean Dental Fear Score was 14.7 (SD±4.3) for the whole group of children, and there were no statistically significant differences between test (mean=14.5, SD±4.1) and control (mean=15.7, SD±4.8) groups [t(df)=1.11, p=0.28]. The two groups were also similar regarding their mean on the pre-intervention ‘fear of shots’ (VAS1), which was 63.22 (SD±36.9) for the whole group, 61.2 (SD±37.1) for the test group and 72.2 (SD±35.9) for the control group [t(df)=1.12, p=0.27].

**Changes in ‘fear of shots’ from pre- to post-test.** In the total sample, the ANOVA showed that there was no significant overall change in ‘fear of shots’ from pre- to post-intervention [F(1.78)=2.89, p=0.09], neither was there a significant interaction between group assignment and assessment occasion [F(1.78)=2.22, p=0.14]. However, as can be seen in Figure 1, this result is partly due to a lack of change in the average ‘fear of shots’ from pre- to post-intervention in the control group [t(17)=0.13, p=0.92 (mean pre=72.22, SD±35.9, mean post=71.22, SD±39.47]. In the experimental group there was, however, a significant reduction in ‘fear of shots’ from pre- to post-intervention [t(61)=3.13, p=0.002 (mean pre=61.18, SD±37.12, mean post=45.76, SD±36.9)].

There was a significant correlation between pre-intervention ‘fear of shots’ and change in ‘fear of shots’ from pre- to post-intervention (VAS1-VAS2) (r=0.44, p=0.00) for the whole sample. This relationship was however not evident in the control group alone (r=0.36, p=0.14), but became stronger in the intervention group (r=0.50, p=0.00). There was no significant correlation between ‘dental fear’ and changes in ‘fear of shots’ from pre- to post-intervention, neither for the whole sample nor for the two groups separately.

**FIG. 1 - Mean values of ‘fear of shots’ before and after the intervention (VAS1-VAS2) in the two groups.**
stepwise multiple regression with change in 'fear of shots' from pre- to post-intervention as the dependent variable and group assignment, dental fear, gender, grade, previous dental experience, previous experience with an injection, and pre-intervention 'fear of shots' as predictors, three variables were entered in the model (Table 1). The first variable entered was pre-intervention ‘fear of shots’, explaining slightly less than 20% of the variance (R²=0.19). ‘Dental anxiety’ was entered as the second variable, explaining additional 6% of the variance and ‘group assignment’ as the third variable, explaining additionally 5% of the variance. The three-step model explained nearly 30% of the variance (R²=0.29).

**Discussion**

The results of this study are encouraging as the video intervention package seemed to have had an influence on the fear of injection pain. The intervention package (sensory information and instructions to signal), was very brief and was accomplished in a school setting. The brevity of the package has a virtue; such brief interventions can be readily used in waiting rooms and other clinical settings, with a minimum of cost and interruption to the normal clinical course of events.

On the other hand, subjects were asked to attend to the videotape, a passive activity. While observing a model master a stressful situation presents an opportunity to learn and enhance self-efficacy in that setting [Bandura, 1999]. This is an active experience, in which the child is encouraged to engage in the desired behaviour, i.e. practice signaling and focus on imagined sensations or even actual ‘pinches’ may enhance learning and lower fear and pain report even more [Zelikovsky et al., 2000]. The video package can be used to help coach the child. This may be accomplished by dental staff or by a parent. There is an existing literature on the use of parents trained as coaches [Blount et al., 1991].

These results also support the use of behavioural control to reduce the fear of procedural pain. In a naturalistic study of the interaction of children and dental personnel, Weinstein et al. [1982] found that the use of signal mechanisms was followed by reduced fear-related behaviours. Blount et al. [1989], in a similar naturalistic study in medical settings, found that “giving control to the child” was followed by child distress. However, these authors noted that the type of behavioral control that most often preceded distress took the form of “tell me when you are ready”. It is not surprising that such an open-ended opportunity for the child to escape prior to engaging in the procedure would be followed by distress. All forms of behavioural control are not equal. Providing children an opportunity to signal when something is bothering them may function as reassurance; someone is concerned about their feelings and will be responsive. They will be safe during the procedure.

The results of stepwise regression suggest the importance of the preexisting level of fear. Children with higher levels of fear appear to benefit more from the intervention than children with low levels of fear. The latter may become mildly sensitized to the potential stressfulness of a dental injection. Screening these children out may be useful in the future and is easily accomplished. Moreover, while our very short group intervention had an effect, this should be strengthened, perhaps by adding an activity component.

The age of the children presents challenges to investigators. The ability and willingness of children to comprehend and follow instructions appears to increase with age. Work with individuals, not groups of children, may increase attention and cooperation.

**Conclusion**

This paper presents the results of our initial study. There are some limitations that should be pointed out: the study used a relatively small number of children and relied on children’s self-report; some children, especially younger ones, were lost at the pre-test. However, the results of the study are interesting, as they suggest intervention packages that can affect child control have promise in lowering anxiety.
References


