

The Child Dental Control Assessment (CDCA) in youth: reliability, validity and cross-cultural differences

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ABSTRACT. *Aim* The Child Dental Control Assessment (CDCA) measures children's preferred control strategies in the dental situation. Three studies are reported, assessing aspects of this instrument in youths from the USA, Japan and Australia. In particular, measurements were made as to the reliability and validity of this instrument in this age group in the three cultures, as well as comparing some results across cultures. *Study design* These studies used a questionnaire design. *Methods* Questionnaires (including the CDCA and other measures) were given to youths aged 11-15 in the three cultures. In one culture, youths received the questionnaire twice, to compute test-retest reliability. *Results* The measure's reliability and validity were similar to those of other measures. The CDCA behaves similarly to the Revised Iowa Dental Control Index (R-IDCI). Youths in all three cultures showed similar responses, although the Japanese were less likely to endorse items. *Statistics* Internal reliability of the scale ranged from 0.74 to 0.85. Test-retest reliability was 0.74. Participants in the High Desire/Low Predicted classification on the R-IDCI scored higher on the CDCA ($t(73) = 2.9, p < .01$). In the Japanese and Australian samples the correlation between CDCA and dental fear was 0.29-0.33 ($p < .001$). The Australian and USA samples scored significantly higher than the Japanese sample (overall $F(2,1544) = 383.98, p < .001$, followed by Tukey's HSD, $p < .001$). *Conclusions* These results provide evidence for the reliability and validity of the CDCA in youth. It appears to measure the discrepancy between Desired and Predicted Control identified in the Revised Iowa Dental Control Index (R-IDCI). Responses of the youth in all three cultures were similar, indicating common dental control preferences for individuals of this age. However, consistent with cultural values, Japanese youth were less likely to endorse the control strategies. These results underline the need to develop culturally-specific, as well as situationally-specific control measures.

KEYWORDS: Control, Dentistry, Adolescents, Japan, Australia.

Introduction

A personal sense of control has been linked to physical and emotional health, and perhaps to evolutionary survival itself [Shapiro et al., 1996; Thompson, 2002]. Feelings of loss of control have been linked to physical illness as well as psychological dysfunction, including anxiety and depressive reactions. Indeed, achieving and maintaining a sense of control is a central motivation for human beings.

Control assessment has become increasingly situation-specific, as it has been recognized that the same individual

may be able to successfully manage some stressors but not others. In addition, some measures have also been developed specifically for children, as investigators have realized that children may respond quite differently to stressors than adults do. For example, young children's fewer cognitive capacities may mean that they are more easily overwhelmed by stressors. Such capacities may also mean that they attend differentially to stimuli and therefore react with heightened arousal [Cohen et al., 1986; Peterson et al., 1997].

Compared with children, adolescents are more likely to use cognitive, approach-oriented control strategies, such as information seeking, positive self talk, and cognitive distraction [Band and Weisz, 1988; LaMontagne et al., 1996; Hodgins and Lander, 1997; Fields and Prinz, 1997]. In addition, adolescents have been found to display different control strategies in different situations [Compas et al., 1991; Frydenberg and Lewis, 1994]. While increased life experience undoubtedly contributes to these

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developments, an additional source is the increased cognitive capacities of adolescents [Juszczak and Sadler, 1999; Williams and McGillicuddy-De Lisi, 2000]. Thus, it is important to study adolescents' performance on coping measures, and not assume that they behave similarly to children or adults.

The importance of control in coping with painful medical procedures is well documented. Consistent with the literature on adults, adolescents who use more advanced control strategies experience fewer amounts of anxiety and pain [LaMontagne et al., 2003]. In dentistry, adolescents with higher perceptions of loss of control in the dental situation report higher levels of dental fear as well as a greater reluctance to return to the dentist [Milgrom et al., 1992]. Thus, assessing control beliefs in the dental situation is important.

At times, demands exceed resources. This situation occurs when control is desired, but is (or is perceived to be) unattainable for some reason [Shapiro et al., 1996]. When there are insufficient control strategies to meet the stressor, a variety of unpleasant and maladaptive effects, beliefs, and behaviours are likely to be the result. As noted above, in the dental situation these include fear, perceptions of lowered control, and a reluctance to return to the dentist. If the stressor cannot be managed by available control strategies, relinquishing of control may be the best option. If, on the other hand, the individual mistakenly perceives his/her resources to be inadequate, the result may also be relinquishment of control, but in this case unnecessarily so. Perhaps the most well known example of such unnecessary relinquishment of control is the phenomenon of "learned helplessness" [Seligman and Maier, 1967].

Thus far, relinquishment of control is thought to be adaptive when the individual truly has no control and maladaptive when that individual falsely perceives that he/she has no control. Might there be an alternative? Shapiro et al. [1996] point out that much of the literature on control shares a Western bias that activity is the preferred type of response to stress, while inactivity is seen as inappropriate. This can be seen in the choice of control terminology, in which the less active control strategies receive a more negative label: primary vs. secondary control, approach vs. avoidance, and the like. By drawing on Eastern cultural norms, these authors suggest that "positive yielding", or "acceptance" (as opposed to "negative yielding", or being overly passive), be included as an adaptive method of control [Shapiro, 1982].

Similarly, Weisz et al. [1984] argued that the values given to primary vs. secondary control may be culturally-influenced. In a review of Japanese and American expectancies, philosophies of child-rearing, work, and

other activities, these authors point out that Americans are socialized to act autonomously, while Japanese are socialized to subordinate their own individual wishes to those of the family or group. Weisz et al. [1984] suggested that Japanese individuals may be likely to learn that control strategies which involve changing oneself to accommodate to the stressor (secondary control) are preferable to strategies in which one alters the stressful environment (primary control). These considerations indicate that we should be cautious in assuming that control strategy research from the West can be unilaterally applied to individuals in other cultures.

The Child Dental Control Assessment (CDCA) was developed to assess control strategies that a child might use in the dental setting [Weinstein et al., 1996]. The 20 items in the CDCA were drawn from the practical experience of several paediatric dentists, and reflect the variety of strategies that children might choose to utilize. Sample strategies include "I want to hold the suction" and "I want to think of something else while the dentist works". While the child is asked to rate each strategy twice on a 3-point scale (False = 1, Sometimes = 2, or True = 3), first for what happened at the last dental visit (Last Time), and again for what the child would like to have happen at the next visit (Next Time), the authors report that only the Next Time items are scored. In two samples of American schoolchildren (aged 8 to 10 in the first sample, and 3rd and 5th graders, aged 9 to 11 years, with a mean age of 10.8 in the second sample), higher Next Time scores were correlated with higher scores on the Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) [Cuthbert and Melamed, 1982], a self-report measure assessing children's dental fear. This indicates that higher levels of dental fear are associated with greater preferences for having a variety of strategies at hand the next time one encounters the feared situation, and thus provides evidence for the validity of the CDCA in this age group. In addition, in general CDCA scores were not found to be related to high levels of trait anxiety (measured by the trait subscale of the State Trait Anxiety Inventory for Children, STAI-C [Spielberger, 1973]), indicating that the instrument is not merely assessing higher levels of general anxiety.

This paper describes several investigations with the CDCA in early adolescence. In the first study, we examined the internal consistency and test-retest reliability of the measure in a sample of USA youths aged 11 to 15 years, and also assessed the construct validity of the measure by simultaneously administering scales that assess dental fear and what appears to be a similar construct of control.

In the second and third studies we administered the CDCA and a different measure of dental fear to groups of

Japanese and Australian youths aged 11 to 15 years old to gain an understanding of cross-cultural similarities and differences. We reasoned that Australian youth would be similar to American youth, in that both are raised in Western cultures, but that Japanese youth might be different. These studies might help elucidate the extent to which use of control strategies is uniformly desirable. In both of these studies, we also measured the internal consistency of the CDCA.

Materials and methods

For all studies, parents gave informed consent and youth participants gave assent. All studies were approved by institutional review boards. In all studies, questionnaire data were entered into the computer, checked for accuracy, and analyzed by SPSS Version 11.5 for Windows. When two answers were marked for an item, the mean value was substituted. In each analysis, only completed scales were used.

CDCA in youth living in the USA. This study was conducted with young adolescents in the United States of America and was designed to measure the reliability and validity of the CDCA in this age group. Questionnaires were given to participants twice, one to two weeks apart.

The families of children aged 11 to 15 years attending summer day camps in the Seattle area were invited to participate in this study. The camps enroll children from a variety of racial and ethnic backgrounds, and the families have a broad diversity of income levels. In order to be eligible for this study, children needed to have received parental permission and have been present for at least one questionnaire administration. Approximately 93 youths were eligible, and 78 participated. These represented 84% of the eligible youth of this age group. The mean age of the sample was 13 years ($SD \pm 1.0$); 49% were males. Most (53) of the participants, were present for both questionnaire administrations.

The questionnaire contained three scales, including the CDCA and two practice items. The second scale was a variation of the Modified Dental Anxiety Scale (MDAS) [Humphris et al., 1995; 2000]. Items are based on the Dental Anxiety Scale (DAS) [Corah et al., 1978] with one additional item assessing dental injections (local analgesia, LA), for a total of 5 items. A sample item is "If you went to your dentist for treatment tomorrow, how would you feel?" Each item was answered on a 5-point scale, ranging from "Not Anxious" (score = 1) to "Extremely Anxious" (score = 5). Total scores might range from 5 to 25. For this study, one item was rewritten in simpler language: "If you were about to receive a 'shot' in the mouth, how would you feel?" replaced "If you were about to have a local anaesthetic injection in your gum,

above an upper back tooth, how would you feel?". The MDAS was included here to assess the convergent validity of the CDCA. This was selected over the CFSS-DS because of its relative brevity.

The third scale was the R-IDCI. This scale was included to further assess the convergent validity of the CDCA. To date, no alternative measure to the CDCA has been developed for children or youth. There is, however, a measure developed for adults which appears to tap a similar construct: the Revised Iowa Dental Control Index (R-IDCI) [Brunsman et al., 2003; Coolidge et al., 2005]. This 9-item scale measures both how much control an individual wishes to have in the dental setting (Desired Control, 4 items) as well as how much control he/she believes that he/she has in that setting (Predicted Control, 5 items). Each item has a 5-point scale, ranging from "None" (score = 1) to "Total" (score = 5). Thus, the total scores on Desired Control may range from 5 to 25, and the total scores on Predicted Control may range from 4 to 20. In both cases, higher scores indicate greater endorsement of the control items. Using median splits, respondents are assigned to High vs. Low on both Desired and Predicted Control, and are then categorized into one of four possible combinations on these two factors. Those who are assigned to the High Desired/Low Predicted Control category have been found to show greater dental fear and distress than those in the other three categories [Brunsman et al., 2003]. Such individuals are likely to be experiencing a subjective state of lack of control in the dental situation. We felt that such individuals would show a greater tendency to endorse the CDCA items.

Each summer camp's director compiled a packet of information available to parents in advance of the days on which the questionnaire was administered. These packets contained a letter of invitation from the camp director, describing the study and procedures and informing parents where they could see a copy of the questionnaire if desired, parental consent form, participant assent form written in age-appropriate language, and a "secret code" key sheet for the participant to complete so that pairs of questionnaires could be matched while keeping the questionnaires anonymous. The invitation letter asked parents to review the materials, and to have interested participants bring the relevant forms to camp on the next camp day.

Participants met in groups with their regular camp counselors. The questionnaires were administered in these groups by the researchers. Afterwards, the participants received passes to attend films to thank them for taking part. The second administration was carried out one or two weeks later, in the same manner. At one site, toothbrushes were also given to the participants.

CDCA in Japanese and Australian youth. Participants completed a number of questionnaires including the CDCA and CFSS-DS. The latter replaced the MDAS in these two samples, as the MDAS did not perform according to prediction (see Discussion below).

As part of a larger study of 8 to 15 year old school children in Japan, participants completed a number of questionnaires including the CDCA and CFSS-DS. We present the CDCA data for the 11 to 15 year old Japanese youth here. In addition, archival data from a larger study conducted with adolescents in Australia [Milgrom et al., 2002] were assessed and we analysed the CDCA data for the 11 to 15 year old adolescents. Our aims were to establish the reliability and validity of the CDCA in non-USA cultures, and also to explore the similarities and differences between youth in all three cultures.

The Japanese sample consisted of 759 schoolchildren aged 11 to 15 years. All students in several rural and urban schools that had agreed to participate in the study were eligible to participate. Of 761 eligible youth, 2 declined to participate. The mean age of the Japanese adolescents was 13 (SD±1.1) years old and 50% were males. The Australian sample consisted of 759 adolescents aged 11 to 15 attending schools served by the Westmead Centre for Oral Health in Sydney. These adolescents came from lower to middle class backgrounds, and were of mixed ethnic backgrounds. Of 774 eligible adolescents, 10 were excluded because they did not read English, 3 were absent on the day of the study, and 2 did not receive parental consent. The mean age of the participating adolescents was 13 (SD±1.0) years old and 52% were male.

In Japan, participants completed Japanese versions of two scales: the CDCA and the CFSS-DS. The CDCA was translated into Japanese and then translated back into English by two different individuals. After pre-testing, slight modifications of wording were made. The CFSS-DS contains 15 items relevant to dental experiences, and the respondent is asked to rate his/her fear level for each item on a 5-point scale. Sample items include "dentist drilling", "injections", and "people in white uniforms". Scores can range from 15 to 75; higher scores are indicative of greater levels of dental fear. This measure has good internal and test-retest reliabilities, and adequate validity [Aartman et al., 1998]. A Japanese version of the questionnaire was made in the same manner as described for the CDCA. In Australia, participants completed the English versions of the CDCA and the CFSS-DS.

In Japan, researchers visited the classroom to administer the questionnaires. Because the larger study also involved younger children, the questionnaire was read aloud to the students. In Australia, teachers administered the questionnaires in the classroom, without reading them aloud.

Results

USA. Data from the first administration were used for all analyses except for the test-retest analyses, which were calculated with data from both administrations. In addition to frequencies on all scales, Cronbach's alpha was computed to determine the internal reliability of the CDCA, and the intra-class correlation coefficient was computed to determine its test-retest reliability. Pearson's correlation was used to examine the correlation between age and the CDCA. Since the distribution of MDAS was expected to be skewed (most youth scoring low), Spearman's rho was used to examine the correlation between the CDCA and this scale. Gender differences on the CDCA were examined with Mann-Whitney tests.

Median splits were used on the R-IDCI Desired Control and Predicted Control subscales to assign participants to High or Low on each of these; participants were then assigned to the High Desired/Low Predicted Control category (Category 1) vs. All Others (Category 2). T-tests were used to compare those in the High Desired/Low Predicted Control group with all others. Because neither the MDAS nor the R-IDCI has previously been used with youth, we also computed some psychometrics (internal and test-retest reliabilities) on these two measures.

The internal reliability (alpha) of Next Time scale was 0.78. The test-retest reliability for Next Time was 0.74 ($p < .0001$). Females scored significantly higher than males on the sum of the Next Time items, ($t(63.3) = -2.1, p < .05$) as well as on one item, "I will try hard to keep myself calm". Age was not related to the sum of the Next Time scores. Score distributions in percentages for Next Time items are shown in Table 1.

The mean score on MDAS was 11.0 (SD±4.7, range 5-24). The internal reliability (alpha) of this scale was 0.68. The test-retest reliability was 0.81 ($p < .0001$). The mean score on Desired Control was 14.1 (SD±4.1; median = 14, range 5-25). The internal reliability (alpha) was 0.69, and the test-retest reliability was 0.71 ($p < .0001$). The mean score on Predicted Control was 11.4 (SD±3.4; median = 11, range 4-20). The internal reliability was 0.69, and the test-retest reliability was 0.76 ($p < .0001$).

There was a trend for a significant correlation between Next Time and the MDAS ($r = .20, p = .08$). Age was not significantly correlated with Next Time ($r = .13$). Comparisons between Category 1 on the R-IDCI (High Desired/Low Predicted Control) and Category 2 (all others) revealed that those in Category 1 scored significantly higher on Next Time (means of 47.5 and 41.8, $t(73) = 2.9, p < .01$).

Japan and Australia. Summary scores were computed for the CDCA and CFSS-DS. Cronbach's alpha was used to compute the internal reliability of the CDCA. Pearson's correlation was used to measure the relationship between

age and CDCA. As scores on the CFSS-DS were expected to be skewed (most participants scoring low), Spearman's rho was used to compute the correlation between this measure and the CDCA. CDCA scores of males and females were compared with Mann-Whitney tests. While the items as a whole are conceptualized to tap a central construct of desire for control at the dentist (as measured by internal reliability), the original study [Weinstein et al., 1996] used factor analysis to determine that certain subsets of items were related to one another. We used the same factor analytic procedures (principal components, varimax rotation) to explore subsets of items in our samples of youth (such analyses could not be conducted in our sample of American youth due to its size). Finally, an ANOVA was used to compare youth in all three cultures.

In Japan, the total CDCA scores ranged from 20-55, with a mean of 34.2 and a standard deviation of 7.3. The internal reliability (alpha) of the CDCA was 0.85. Females scored significantly higher on the total Next Time score ($t(722) = -5.7, p < .001$), and also on 14 of the 20 items. Age was not related to CDCA scores. The mean CFSS-DS score was 27.4 ($SD \pm 9.9$, range = 15-75). The correlation between CDCA and CFSS-DS was 0.29 ($p < .001$). Using Eigen values as the criterion, 5 factors were identified. The factors appear to be characterized by Information and External Responsiveness, Cognitive Distraction and Affect Control,

Verbal Reassurance, Withdrawal and External Distraction, and Family in Room. Together, these account for 51.4% of the variance. Tables 2 and 3 show the CDCA item distributions in percentages and factor analysis.

In Australia, the mean sum of the CDCA Next Time scores was 44.2 (range = 20-60, $SD \pm 6.7$). The internal reliability (alpha) of this scale was 0.74. There was no gender difference on the sum of the Next Time scores, but females scored significantly higher on three of the items. Age was not related to the CDCA scores. The mean CFSS-DS score was 32.0 (range = 15-72, $SD \pm 11.0$). The correlation between CDCA and CFSS-DS was 0.33 ($p < .0001$). Seven factors were identified by the factor analysis: Cognitive Distraction and Affect Control, Information, Verbal Reassurance, Withdrawal, External Responsiveness, External Distraction, and Family in Room. Together, the factors accounted for 55.6% of the variance. Tables 4 and 5 show the CDCA item distributions and factor analysis for the Australian sample.

There was an overall difference in CDCA scores between the three samples of youth ($F(2,1544) = 383.98, p < .001$). Tukey's HSD tests revealed that the Australian and USA samples did not differ significantly from one another, but both samples had significantly higher Next Time scores (greater desire for control) than the Japanese sample ($p < .001$).

CDCA Item Next time, ...	Total			Males			Females		
	F ^a	S ^b	T ^c	F	S	T	F	S	T
1. I want the dentist to tell me everything will be okay	17	15	68	19	17	64	15	13	73
2. I want the dentist to ask me how I feel	13	30	57	17	33	50	10	28	63
3. I want the dentist to answer my questions	13	12	75	22	11	67	05	13	83
4. I want to have a rest	26	09	65	33	11	56	20	08	73
5. I want the dentist to stop when I ask	20	03	78	25	06	69	15	00	85
6. I want someone in my family in the room with me	66	12	22	78	03	19	55	20	25
7. I want them to ask me to breathe the special stuff	62	12	26	61	17	22	63	08	30
8. I want to be sleepy again	75	08	17	78	08	14	73	08	20
9. I want them to let me watch what is going on	33	20	47	33	19	47	33	20	48
10. I want them to tell me how long things will last	13	13	74	17	19	64	10	08	83
11. I want the dentist to tell me what will happen	04	08	88	03	17	81	05	00	95
12. I do not want to think about what the dentist is doing	42	22	36	47	19	33	38	25	38
13. I want someone to tell me a story	78	07	16	86	03	11	70	10	20
14. I want the dentist to tell me I am doing a good job	13	17	70	17	17	67	10	18	73
15. I want to think about something else while the dentist works	32	22	46	28	28	44	35	18	48
16. I want to hold the suction	30	16	54	28	14	58	33	18	50
17. I will try to keep myself from getting scared	51	11	38	58	08	33	45	13	43
18. I will try hard to keep myself calm	43	05	51	56	06	39	33	05	63^d
19. I want to listen to music	32	03	66	39	06	56	25	00	75
20. I'll want to leave if I feel sick	62	06	32	61	11	28	63	03	35

a = False b = Sometimes c = True d = Females higher than males, $p < .05$ N=76

TABLE 1 - US youth: distribution of CDCA Next Time items in percentages for all participants, males and females.

CDCA Item Next time, ...	Total			Males			Females		
	F ^a	S ^b	T ^c	F	S	T	F	S	T
1. I want the dentist to tell me everything will be okay	35	43	22	41	38	21	29	48	23^d
2. I want the dentist to ask me how I feel	58	33	10	61	30	09	55	35	11
3. I want the dentist to answer my questions	45	41	15	52	37	12	38	44	17^f
4. I want to have a rest	30	38	32	36	34	31	24	43	33^d
5. I want the dentist to stop when I ask	44	39	18	51	34	15	37	43	20^f
6. I want someone in my family in the room with me	76	20	04	78	19	02	73	22	05
7. I want them to ask me to breathe the special stuff	77	19	05	77	17	06	77	20	04
8. I want to be sleepy again	72	22	07	74	19	07	70	24	06
9. I want them to let me watch what is going on	50	27	23	57	24	19	43	30	27^f
10. I want them to tell me how long things will last	30	22	48	38	22	41	23	22	55^f
11. I want the dentist to tell me what will happen	32	29	38	42	27	31	22	32	46^f
12. I do not want to think about what the dentist is doing	38	46	16	43	43	14	33	49	18^c
13. I want someone to tell me a story	84	12	04	86	11	03	82	13	04
14. I want the dentist to tell me I am doing a good job	63	30	07	67	26	07	59	34	08^d
15. I want to think about something else while the dentist works	40	36	25	49	29	22	31	41	28^f
16. I want to hold the suction	70	20	09	69	20	12	71	21	07
17. I will try to keep myself from getting scared	29	44	28	34	42	25	24	46	31^c
18. I will try hard to keep myself calm	29	45	27	34	44	22	23	45	32^f
19. I want to listen to music	30	24	46	39	25	36	21	24	55^f
20. I'll want to leave if I feel sick	52	33	16	59	27	15	45	39	16^c

a = False b = Sometimes c = True d = Females higher than males, p<.05 e = p<.01 f = Females higher than males, p<.001 N=724

TABLE 2 - Japanese youth: distribution of CDCA Next Time items in percentages for all participants, males and females.

CDCA Item Next time, ...	Factor				
	I	II	III	IV	V
1. I want the dentist to tell me everything will be okay	0.19	0.16	0.67	0.01	0.08
2. I want the dentist to ask me how I feel	0.23	0.08	0.65	0.23	0.09
3. I want the dentist to answer my questions	0.33	0.20	0.47	0.18	-0.02
4. I want to have a rest	0.45	0.25	0.30	-0.06	0.20
5. I want the dentist to stop when I ask	0.55	0.18	0.22	0.08	0.07
6. I want someone in my family in the room with me	0.17	0.09	0.18	0.26	0.70
7. I want them to ask me to breathe the special stuff	0.26	0.09	-0.13	0.66	0.27
8. I want to be sleepy again	0.11	0.16	0.13	0.54	0.09
9. I want them to let me watch what is going on	0.59	0.04	0.26	0.24	-0.06
10. I want them to tell me how long things will last	0.73	0.14	-0.03	0.07	0.01
11. I want the dentist to tell me what will happen	0.63	0.10	0.36	0.09	-0.06
12. I do not want to think about what the dentist is doing	0.10	0.66	0.05	0.14	0.26
13. I want someone to tell me a story	-0.13	0.14	0.35	0.67	0.01
14. I want the dentist to tell me I am doing a good job	0.06	0.14	0.56	0.45	-0.02
15. I want to think about something else while the dentist works	0.27	0.66	-0.01	0.15	-0.03
16. I want to hold the suction	0.19	-0.05	0.22	0.52	-0.23
17. I will try to keep myself from getting scared	0.08	0.74	0.32	-0.01	-0.03
18. I will try hard to keep myself calm	0.10	0.72	0.31	0.07	-0.11
19. I want to listen to music	0.39	0.20	0.06	0.25	-0.51
20. I'll want to leave if I feel sick	0.29	0.40	-0.13	0.33	-0.13

N=724

TABLE 3 - Japanese youth: CDCA Next Time items and loadings.

CDCA Item Next time, ...	Total			Males			Females		
	F ^a	S ^b	T ^c	F	S	T	F	S	T
1. I want the dentist to tell me everything will be okay	14	10	76	15	11	75	13	10	77
2. I want the dentist to ask me how I feel	24	28	58	22	21	57	25	16	60
3. I want the dentist to answer my questions	18	10	72	21	11	68	15	10	75^d
4. I want to have a rest	26	16	58	25	16	59	27	15	57
5. I want the dentist to stop when I ask	21	08	72	23	08	69	19	07	74
6. I want someone in my family in the room with me	34	16	51	38	17	45	29	15	56^e
7. I want them to ask me to breathe the special stuff	66	13	21	64	11	25	68	15	18
8. I want to be sleepy again	77	07	16	76	06	18	79	07	14
9. I want them to let me watch what is going on	20	14	66	20	15	66	21	14	66
10. I want them to tell me how long things will last	11	09	80	12	09	79	10	08	81
11. I want the dentist to tell me what will happen	06	04	91	06	05	90	06	03	92
12. I do not want to think about what the dentist is doing	41	17	42	44	17	39	39	17	44
13. I want someone to tell me a story	82	07	11	84	06	10	80	08	12
14. I want the dentist to tell me I am doing a good job	16	15	68	20	14	66	13	17	71
15. I want to think about something else while the dentist works	30	17	54	33	16	52	26	18	56
16. I want to hold the suction	62	12	27	60	11	29	63	13	24
17. I will try to keep myself from getting scared	35	09	56	38	09	53	32	09	59
18. I will try hard to keep myself calm	31	10	60	34	12	55	27	08	65^e
19. I want to listen to music	23	11	65	24	11	65	23	12	66
20. I'll want to leave if I feel sick	39	11	50	38	10	52	40	13	47

a = False b = Sometimes c = True d = Females higher than males, p <.05 e = Females higher than males, p<.01 N=747

TABLE 4 - Australian youth: distribution of CDCA Next Time items in percentages for all participants, males and females.

CDCA Item Next time, ...	Factor						
	I	II	III	IV	V	VI	VII
1. I want the dentist to tell me everything will be okay	0.11	0.05	0.70	-0.05	-0.12	0.10	0.22
2. I want the dentist to ask me how I feel	0.10	0.05	0.66	0.19	0.09	0.05	-0.10
3. I want the dentist to answer my questions	0.06	0.23	0.54	-0.03	0.38	-0.07	-0.08
4. I want to have a rest	0.04	0.07	0.25	0.47	0.39	-0.15	-0.05
5. I want the dentist to stop when I ask	0.04	0.33	0.20	-0.03	0.60	-0.06	0.06
6. I want someone in my family in the room with me	0.12	0.18	0.08	0.15	0.07	0.17	0.76
7. I want them to ask me to breathe the special stuff	-0.01	0.09	0.07	0.72	-0.02	0.19	0.02
8. I want to be sleepy again	0.11	-0.05	-0.05	0.77	0.01	-0.02	0.06
9. I want them to let me watch what is going on	-0.15	0.50	0.15	-0.11	0.01	0.38	-0.17
10. I want them to tell me how long things will last	0.18	0.68	0.05	0.13	0.15	-0.01	0.02
11. I want the dentist to tell me what will happen	0.04	0.71	0.13	0.01	0.08	-0.07	0.15
12. I do not want to think about what the dentist is doing	0.67	-0.15	0.07	0.07	0.14	0.00	-0.05
13. I want someone to tell me a story	0.05	-0.04	0.06	0.07	0.11	0.71	0.15
14. I want the dentist to tell me I am doing a good job	0.21	0.28	0.43	-0.04	-0.03	0.32	0.26
15. I want to think about something else while the dentist works	0.75	-0.06	0.08	0.06	0.06	0.03	0.11
16. I want to hold the suction	0.02	0.31	0.00	0.31	-0.07	0.42	-0.51
17. I will try to keep myself from getting scared	0.74	0.22	0.10	0.06	0.00	0.05	0.08
18. I will try hard to keep myself calm	0.74	0.25	0.08	-0.03	0.05	0.03	0.01
19. I want to listen to music	0.16	-0.10	0.10	0.09	0.47	0.42	-0.15
20. I'll want to leave if I feel sick	0.12	0.04	-0.20	0.04	0.69	0.23	0.17

N=747

TABLE 5 - Australian youth: CDCA Next Time items and loadings.

Discussion

The results from the USA sample indicate that the CDCA has internal and test-retest reliabilities equal to those of the other two scales in youth. We also found evidence for the construct validity of the CDCA, inasmuch as high scores were more likely to fall into the High Desired/Low Predicted Control category on the R-IDCI. The low correlation between the CDCA and the MDAS was contrary to prediction. As the MDAS was developed for adults, it may be that it is not an appropriate measure of dental fear in youth. The internal reliability of the MDAS found in the youth was considerably lower than most of those reported by Humphris et al. [1995] for adults aged 20 to 60 and older (e.g., alpha of 0.90 for adults assessed at their physicians' office); the lower alpha found in our sample may be related to the lower than expected correlation. Therefore, the CFSS-DS was employed as the measure of dental fear in the other studies.

With regards to all three samples, our results indicate that the CDCA is a reliable and valid instrument assessing the preferred control strategies of youth in the dental situation. First, the results from the USA youth sample confirmed our belief that the CDCA is tapping the same underlying construct as the R-IDCI, namely, situationally-specific perceptions and wishes for control which differentiate between those with higher dental fear and greater levels of distress at the dentist and those with lower levels. Secondly, in both the Japanese and Australian samples, the CDCA was correlated with an age-appropriate measure of dental fear. These results indicate that the scale has good construct validity. Finally, our results revealed that the scale has good internal and test-retest reliabilities.

Despite coming from different cultures, the three youth samples from Australia, Japan and the USA displayed several similarities. First, the most highly endorsed items tended to be the same: "I want the dentist to tell me what will happen" and "I want them to tell me how long things will last", reflecting a common desire for information about the kinds of experiences that adolescents will be facing in the dental chair, as well as how long he/she will have to endure them. As demonstrated in the preparation of children facing painful medical procedures [Mahajan et al., 1998; Zelikovsky et al., 2000], youths who receive information are more likely to successfully engage in strategies which will help them cope with the situation.

Secondly, across all three cultures the least endorsed items included "I want someone to tell me a story" and "I want to be sleepy again". It is interesting to note that the latter item, in particular, represents an avoidance strategy, and therefore its lack of popularity in youth is consistent with the literature [Band and Weisz, 1988;

LaMontagne et al., 1996].

The factor analyses also suggested some cross-cultural similarities. The Japanese and Australian samples revealed the same two subsets of items (Information, Cognitive Distraction and Affect Control) for the first two factors, although the order of these was reversed in the two samples. In addition, the same subsets of items, tapping Verbal Reassurance and Withdrawal respectively, were identified for the third and fourth factors in both samples. These similarities indicated that the scale's items were reflecting a set of control strategies important to youth, independent of culture. A comparison of these results with those of the younger sample in the original study [Weinstein et al., 1996] is also instructive. In that study, the items here termed Information and Verbal Reassurance were included in the first factor (described as "Dentist-Mediated Control"), the items here termed Affect Control were included in the second factor (described as "Active Coping"), and the items here termed Cognitive Distraction were included in the third factor ("Cognitive Withdrawal"). These results indicated that many of the youths' control strategies (Information, Affect Control, etc.) were consistent with those of younger children, although their relative importance varied as a result of their increased development (e.g. youth are more likely to seek information and use cognitive distraction, rather than to seek reassurance).

Nevertheless, our results also indicate that there are cultural dissimilarities in the preference for control strategies. In particular, Japanese youth were significantly less likely to endorse the CDCA items. Compared with individuals in so called Western societies, Japanese are socialized to minimize self-assertive behaviors, especially in public and/or with authority figures [Barnlund, 1975; Christopher, 1983]. For example, Japanese adolescents are less likely to display oppositional behaviours towards authority, compared with their American peers [Vaughn, 1996]. Such deference, together with an emphasis on thinking about one's group and on wishing to avoid offense, is also related to a preference for silence, as opposed to verbosity, in Japanese individuals [Lebra, 1976; Nishida, 1996]. Taken together, these cultural values create an atmosphere in which it is normative for youth to quietly accept direction from the dentist. As the Japanese level of dental fear is similar to that found in the Australians, the Japanese preference to not use many of the control strategies included in the CDCA is most likely due to culturally-appropriate "positive yielding" to the dental situation.

One limitation to our studies is that they were not longitudinal. Thus, our results do not indicate changes in dental control strategy preference from childhood through mid-adolescence.

Conclusion

Our results provide evidence for the reliability and validity of the CDCA in youth. In two Western countries, the USA and Australia, youths tend to respond to CDCA in similar ways. However, youths from a very different culture, Japan, are much less likely to endorse the control strategies. Consistent with the findings from other psychological and health research, this illustrates the continuing need to develop culturally-specific measures of preferred control strategies.

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