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Dental fear with and without blood-injection fear: implications for dental health and clinical practice

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Abstract

The relation between dental, blood and injection fear and oral health was examined in 936 New Zealand 18-year-olds. Of the approximately ten percent ($n = 96$) of the sample who reported a dental fear, 1 in 10 also reported a fear of blood and 53% a co-morbid fear of injections. Study members with dental fear alone or co-morbid dental and blood or injection fear had significantly worse oral health (i.e. greater caries experience) than a no-fear comparison group or individuals with blood-injection fear only. Further, individuals with dental *and* blood or injection fear had a significantly higher level of recent tooth decay than individuals with dental fear alone. Time since last dental treatment also tended to be highest in this group. Implications for dental health and practice were discussed. © 1998 Elsevier Science Ltd. All rights reserved.

1. Introduction

Despite continued interest in the relation between dental fear and blood-injury-injection (BII) fears, their combined impact on dental health is not well understood. Past research has examined overlap among these fears in an attempt to explain fear of the dentist (e.g. Fiset et al., 1989). That is, does dental anxiety result from specific learning experiences (e.g. dental trauma) or is it part of a more generalized anxiety syndrome (e.g. Fiset et al., 1989; Roy-Byrne et al., 1994; Weiner and Sheehan, 1990)? More recently, the nature and extent of this co-morbidity has been examined in the hope of improving clinical practice. Locker et al. (1997) hypothesized that patients with dental anxiety *and* blood-injury (BI) fears may be more difficult

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to treat than those with dental fear alone due to the potential for more extreme fear reactions in those with multiple fears. This was expected due to the characteristic fainting response seen in most individuals with BII fears (Kleinknecht et al., 1990).

The Locker et al. (1997) study investigated the relation between dental anxiety (defined by Corah's Dental Anxiety Scale scores >13, 8 or above on the Gatchel Fear Scale or self-reported high fear or terror of dental treatment) and blood-injury fears in a large epidemiological sample over the age of 18 years. Results showed very few differences between dental anxiety *Ss* with and without BI fears with respect to fear-evoking stimuli or fear reactions. Based on their findings, they concluded that 'BI fears do not complicate dental anxiety to any great degree in the sense that they do not appear to give rise to more extreme or unique [anxiety] response patterns' (Locker et al., 1997, p. 589). However, because their survey was based on self-report measures, clinical assessment of dental health was not conducted. Hence the relation between dental fear, BII fears and clinically assessed dental health remains unknown.

Understanding this relationship is important for several reasons. First, co-morbid dental and blood-injection fear (vs dental fear only) may be related to particularly poor oral health (i.e. greater caries experience). If this were so, provision of appropriate support/intervention would be required to minimize adverse dental outcomes in this group. Second, identification of a 'high-risk' dentally fearful group may help target public health messages more effectively. Further, this information may enable dental practitioners to accurately screen patients in need of treatment to reduce fear and avoidance of dental treatment. To address these issues the present study explored the relation between dental fear, with and without blood-injection fear, and dental health (i.e. caries experience, treatment behavior) in a large sample of New Zealand 18-year-olds.

2. Method

2.1. Participants

The sample consisted of members of the Dunedin Multidisciplinary Health and Development Study, a longitudinal investigation of young people's health, development and behavior from birth to adulthood. The study and sample members have been described in detail elsewhere (Silva and Stanton, 1996). Briefly, 1,037 members of a cohort born in Dunedin between 1st April, 1972 and 30th March, 1973 have been assessed with a diverse array of psychological, medical and sociological measures. Participation rates have been high at age 3 ($n = 1037$), 5 (96%, $n = 991$), 7 (92%, $n = 954$), 9 (92%, $n = 955$), 11 (90%, $n = 925$), 13 (82%, $n = 850$), 15 (95%, $n = 976$), 18 (97%, $n = 1008$), and most recently 21 (97%, $n = 992$). The present data were from the assessment conducted at age 18.

2.2. Dental health (DMFS scores)

Dental caries is a chronic, progressive disease which may ultimately result in loss of teeth if allowed to progress unchecked. Teeth which have been irreversibly affected by caries can either

be restored to normal form and function by the placement of dental fillings, or extracted. In dental epidemiology, the DMF (decayed, missing and filled) index (Klein et al., 1938) is used to provide a point estimate of the dental caries experience of an individual and can be presented using whole teeth (DMFT) or tooth surfaces (DMFS) as the units of analysis. It is computed by summing the number of decayed, missing and filled teeth (or surfaces, usually scoring five surfaces per posterior tooth and four per anterior tooth). For example, a tooth which is affected by caries (or is restored) on three surfaces contributes three to the DMFS score for that individual, but only one to the DMFT score. Due to the increased precision associated with the former, we confined our analyses to surface measures.

2.3. *Dental care*

As part of the dental assessment at age 18, Study members were asked “When did you last go to the dentist?”. Responses were coded as months since last visit. They were also asked “How often do you think you should visit the dentist?”. Again, responses were recorded in months.

2.4. *New Zealand dental health services*

In the past 40 years almost all children in New Zealand have regularly attended school dental clinics up to the age of 12 years, followed by free access to private dental care until the age of 18 under the Dental Benefit Scheme (88% of the present cohort used the Dental Benefit Scheme). Hence, differential access to dental services due to, for example, family income is less likely to have occurred, and ‘psychological/motivational’ factors may be especially relevant to understanding any differences observed in dental health among groups in our sample.

2.5. *Fear assessment*

As part of the Mental Health assessment at age 18, Study members were administered a modified version of the Diagnostic Interview Schedule (DIS; Robins et al., 1981). The four modifications made to the DIS for the Dunedin study were to: (1) limit questions to the assessment of DSM-III-R criteria only; (2) limit the assessment of symptoms to those occurring within the past 12 months; (3) limit assessment to only the most commonly occurring diagnoses in this age group; and (4) limit responses to ‘no’, ‘yes, sometimes’, and ‘yes, definitely’. A response of ‘yes, definitely’ was required before a diagnosis could be made (Feehan et al., 1994).

As part of the DIS interview, Study members were asked if, in the preceding 12 months, they had had a strong unreasonable fear that either resulted in avoidance or extreme discomfort when exposed to the following objects or situations: heights, seeing blood, any kind of insect, dogs, birds, rats or other animals, storms, thunder or lightning, going to the dentist, getting an injection, being in an open space, being in water. Study members who responded ‘yes, definitely’ to questions regarding fear of the dentist ($n = 96$, 10.3%), blood ($n = 48$, 5.1%) and injections ($n = 164$, 17.5%) provided the basis for our comparison groups. To ensure ‘purity’ of our target groups, co-morbidity was adjusted for, resulting in the following:

Group 1 — Controls: No dental, blood or injection fear ($n = 706$, 75.4% of the sample); Group 2 — fear of blood or injections (BI) but not dental fear ($n = 134$, 14.3%); Group 3 — Dental fear but not BI fear ($n = 44$, 4.7%); and Group 4 — Dental *and* blood or injection fear ($n = 52$, 5.6%). The group numbers described in Section 3 differ slightly from those presented here according to the availability of data for each dental outcome variable (e.g. surface caries scores).

3. Results

Approximately 10% of the sample reported a dental fear at age 18, 5% were fearful of blood and close to one-fifth reported a fear of injections. Nine study members (1.0%) reported co-morbid dental and blood fear, and 51 (5.1%) reported co-morbid dental and injection fear. This indicates that approximately 10% of those with dental fear also had a fear of blood whereas over half (53.1%) of those with dental fear also reported a fear of injections.

One-way ANOVAs demonstrated significant overall differences between fear groups in the number of decayed surfaces [$F(3,864) = 4.25$, $p < 0.01$]; number of filled surfaces [$F(3,864) = 7.85$, $p < 0.001$] and overall DMFS [$F(3,864) = 8.23$, $p < 0.001$]. Only one study member had a missing tooth, precluding analysis of group differences for this measure. As shown in Table 1, LSD post-hoc tests revealed that Group 3 (dental fear only) and Group 4 (dental and blood or injection fear) had significantly greater numbers of filled surfaces and DMFS scores than Groups 1 (control) or 2 (blood-injection fear only). Group 4 (dental and blood or injection fear) had a significantly greater number of decayed surfaces at age 18 than Groups 1, 2 or 3.

The groups were compared on two variables regarding use of dental services (Table 2). The groups differed in the number of months elapsed since the most recent dental visit [$F(3,823) = 2.74$, $p < 0.05$]. Post-hoc tests revealed that Group 4 reported significantly more time since last dental treatment than Groups 1 or 2. The groups did not differ in their beliefs about how often one should attend dental treatment [$F(3,807) = 2.23$, n.s.].

Table 1
Caries experience (mean and standard deviations) at age 18 by fear category in a longitudinal birth cohort

	Fear group			
	1 control	2 blood/injection (BI)	3 dental	4 dental and blood or injection
Decayed surfaces	0.51 (1.21)	0.21 (0.58)	0.41 (1.0)	1.06 (2.12) ^a
Filled surfaces	7.02 (6.42)	6.77 (7.91)	9.95 (7.62) ^b	11.33 (9.97) ^b
DMFS	7.55 (6.74)	7.18 (8.29)	10.16 (7.60) ^b	12.40 (10.70) ^b

^a Significantly different from Groups 1, 2 and 3 ($p < 0.05$).

^b Significantly different from Groups 1 and 2 ($p < 0.05$).

Table 2
Behavior and attitudes toward dental treatment among 18-year-olds in a longitudinal birth cohort

	Fear group			
	1 control	2 blood/ injection (BI)	3 dental	4 dental and blood or injection
Months since last dental visit	9.13 (11.06)	8.86 (9.11)	9.69 (10.94)	14.09 (18.40) ^a
How often should check-ups occur (months)	7.76 (3.41)	7.80 (3.13)	8.55 (4.75)	6.60 (2.69)

^a Significantly different from Group 1 and 2 ($p < 0.05$).

4. Discussion

Study members who were fearful of the dentist, with and without blood-injection fears, had significantly greater caries experience than controls or individuals with blood-injection fear only. They did not differ appreciably from each other on a summary measure of tooth surface status (DMFS) or in the number of fillings received up to the age of 18. In contrast, the dentally fearful group with co-morbid blood or injection fear had a significantly higher rate of surface decay compared with the 'pure' dental fear group.

When interpreting these differences, we assume, *ceteris paribus*, that the number of fillings observed in an individual reflects accumulated dental caries experience up to the most recent dental visit, and the number of decayed surfaces reflects dental caries experience between the time of last dental treatment and the age 18 assessment. On this basis, our findings suggested that individuals with dental fear, with and without blood or injection fear, may have had a recent history of dental self-neglect including avoidance of treatment. We explored this possibility by comparing the groups on the self-reported time elapsed since their last visit to the dentist (in months). Group 4 (dental and blood or injection fear) reported a significantly longer time since last attending the dentist compared with groups 1 and 2. Although the difference between Group 3 (dental fear only) and Group 4 was not statistically significant, clinically meaningful differences were apparent (i.e. Group 3 reported an average of 9.7 months since their last dental visit vs Group 4 which reported an average of 14.1 months since last attending the dentist). No group differed in beliefs regarding how regularly dental check-ups should occur. Interestingly, there was a trend for Group 4 to report the shortest desirable time between regular dental check-ups and for Group 3 (dental fear only) to report the longest (Table 2).

While our findings are not directly comparable with those of Locker et al. (1997) due to the use of different comparison groups (i.e. blood-injury fear vs fear of blood or injections), it is important to note that DSM-IV (APA, 1994) categorizes blood, injection and injury fears together, implying strong similarities among these fears. Our results indicate that dental fear complicated by blood or injection fear is associated with more deleterious dental outcomes (i.e. higher levels of untreated caries, greater latency to most recent dental check-up). Injection fears appear to be the key factor involved in elevating risk as they frequently co-occur with dental fear (cf. Ost, 1992). To confirm the importance of injection fears, we compared the reactions of

those members of each of our fear groups who had received an injection at the dentist in preparation for a filling or extraction ($n = 679$). Study members were asked how they had felt about this experience; responses ranged from 'didn't mind' through to 'hated it'. As expected, there were significant differences between groups [$F(3,676) = 18.49, p < 0.001$] with post-hoc tests demonstrating that Groups 2, 3 and 4 rated this experience as more aversive than the no-fear control group. Perhaps more significantly, Group 4 (dental and blood or injection fear) rated this experience as more aversive than groups 1, 2, or 3 ($p < 0.05$).

Thus, dentally fearful patients who also fear injections are at particularly high risk of adverse dental outcomes. We strongly emphasize, however, that our results do not suggest that fear of the dentist and fear of injections are synonymous. Indeed, the findings suggest quite the reverse, as it is the combined or additive effects of these fears that appear to confer the greatest risk of poor dental health. Consistent with suggestions by Locker et al. (1997) and others (e.g. Berggren, 1992), it may be important for dentists to elicit information about the nature of fears held by their patients and, where appropriate, refer for specialized treatment. This treatment should incorporate specific cognitive-behavioral strategies designed to reduce *both* dental fear and fear of injections – focusing on one fear at the expense of the other may not be effective as these fears seem to be at least partially independent. Additionally, behavioral techniques for dealing with fearful and/or apprehensive patients should be taught to all dental undergraduates. A final point relates to the age at which screening should occur. Our sample was relatively young (age 18 years) compared with other population studies (e.g. Locker et al., 1997), and had only just assumed full personal and financial responsibility for their own dental care, yet clear differences in oral health and dental practices had already emerged. This suggests that screening for dental and injection fear should begin at an early age.

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