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Parental quality-of-life impacts following children's dento-alveolar trauma

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Abstract – *Background/Aim*: The aim of this longitudinal study was to investigate the impacts of children's dental injuries on parents and explore how demographic, clinical and psychosocial characteristics influence parental adaptation to dental injuries over time. *Materials and methods*: A total of 244 families attending a UK-based Dental Hospital, for management of their child's traumatized permanent teeth, were invited to participate. Clinical information relating to the child's injury was collected from patient notes. Self-report questionnaires collected baseline information on children's oral health-related quality-of-life (OHRQoL), parental satisfaction with dental treatment and parental health-related quality-of-life (HRQoL) and worry. Parental outcomes were assessed again at a six-month follow up. *Results*: 108 children and 113 parents participated in the baseline study (44% and 46% response rates), and of this group, a total of 73 parents completed follow-up questionnaires (65% response rate). Parents reported improved HRQoL at follow up; however, parental worry did not decrease over time. Parental satisfaction with treatment and children's OHRQoL were the only significant predictors of parental HRQoL at the six-month follow up. *Conclusions*: The findings highlight the inter-relationship between child and parental outcomes following their children's dental injuries and the importance of the dental team delivering a family-centred approach for the management of their children's dental injuries.

Introduction

Dento-alveolar trauma occurs commonly in childhood and may necessitate demanding courses of treatment. In the United Kingdom, the Children's Dental Health Survey (1) found that 13% of 15-year-olds had sustained accidental damage to their permanent incisors. However, some research has revealed as many as one in two children sustain a dental injury before reaching adulthood (2). Dental treatment for traumatically injured teeth aims to restore the normal aesthetics and function of the teeth and mouth and prevent long-term complications such as pain and infection (3). Whilst treatments for complex dental injuries often involve lengthy and complex procedures (4) (for example, re-implantation of the tooth and root canal therapy) the long-term prognosis of treatment for dental injuries can be difficult to predict (5).

Previous research has revealed that childhood dental trauma has the potential to influence children's oral health-related quality-of-life (OHRQoL) (6–8). However, the majority of the studies that have investigated the impact of dental injuries have neglected to study the psychosocial impact of these injuries on the family unit. Understanding the impact of dental injuries on the family unit is very important because it is proposed that illnesses and injuries in children have the potential to influence the family's emotional health (9). Indeed, treatments for dental injuries can be anxiety provoking and time-consuming for both the child and their parent. Accompanying children to dental appointments has also been found to have financial implications for families through transport costs and lost working time (8, 10).

It is surprising therefore that the emotional and social impacts children's dental injuries may have on the family unit have received scant attention to date. One study that did explore the emotional impacts of their children's dental injuries on parents found that 70% of parents whose young children had sustained dental injuries reported feeling upset immediately after their child's dental injury (8). The findings of this study revealed that the impacts reported by the parents did not significantly decrease over the one-year follow up, suggesting that there can be considerable persistent impacts on families as a result of their children's dental injuries. However, little is known about the nature of the concerns experienced by parents following their children's dental injuries and no studies have explored the variation in parental responses to such injuries.

It is proposed that a number of variables may influence how dental injuries impact on parents. It has been proposed that family demands may be directly related to the severity of the patient's injury (11). The treatment demands placed on the family are likely to be influenced by the type of injury the child has sustained because this

determines the complexity of the treatment required and its prognosis (12), with success rates ranging from 58% for complicated dental trauma to 97% for uncomplicated dental trauma (4). It was therefore hypothesized that parents of children who had sustained severe dental injuries and who were undergoing complex treatment programmes would report more impacts than parents whose children had sustained uncomplicated injuries, which required simple restorative interventions.

In addition, given evidence that parents of younger children report greater emotional impacts as a result of their child's injury than parents of adolescents who had sustained comparable injuries (8), it was hypothesized that demographic characteristics, such as the child's gender and age, may also influence the impact the dental injury has on the child's parents.

It has also been proposed that the health care a family receives can be an important practical resource which enables the family to effectively manage their child's injury stressor (9). Indeed, research has identified healthcare satisfaction to be an important predictor of health outcomes (13–15). Parents who are highly satisfied with the care their child has received may therefore feel more able to deal with their child's injury and report fewer impacts than parents who are less satisfied with the dental care their child has received.

In summary, whilst there is emerging research into the impacts associated with childhood dental injuries, there is very limited knowledge about how these injuries impact on the emotional well-being of the family. To date, no research has investigated the potential predictors of parental impacts following their children's dental injuries. Thus, the aim of this study was to investigate parental experiences of their children's dental injuries. The specific research questions were as follows: (i) what are the family experiences and impacts associated with children's dental injuries?; (ii) how do the parental impacts associated with children's dental injuries change over time and throughout treatment?; and (iii) what are the clinical, demographic and psychosocial predicts of parental HRQoL and worry following their children's dental injuries?

Material and Methods

Participants

Following ethical approval from the South Sheffield Research Ethics Service, participants were recruited from a UK Dental Hospital. The target population included families whose children who were receiving treatment for a dental injury sustained to one or more of their permanent incisors. Families were approached in the waiting room of the dental clinic and informed consent (parents) and assent (children) were obtained prior to parents and children completing self-report questionnaires. Parents who agreed to take part in the follow-up study were posted out repeat self-report questionnaires approximately 6 months after they completed the first set of questionnaires. This study formed part of a larger investigation that also sought to determine their children's impacts associated with dental injuries (16).

Materials

Clinical and demographic information was collected from child patients' dental records and included: postcode; gender; age when child sustained their dental injury; number of teeth injured; type (classification) of dental injury and treatment received at the dental hospital.

Information on the family's level of deprivation was calculated from the postcodes obtained from patients' notes using the Geo-convert tool (Crown Copyright 2006). This system uses the National Statistics/Ordinance Survey (2007) and deprivation ranks were recoded into deprivation fifths based on population norms. The severity of the child's dental injury was categorized using clinical criteria and classification systems which distinguish between uncomplicated and complicated injuries according to the involvement of the tooth's pulp (nerve) and periodontal ligament (17). The three categories for injury severity were the following: 1 = low severity (uncomplicated crown fractures); 2 = moderate severity (complicated crown fractures, root fractures and luxation injuries); and 3 = high severity injuries (avulsion injuries). All children participating in the study had completed at least one treatment episode for their dental injury and a review of the patients' notes enabled the researchers to identify those children whose injured tooth/teeth could not be re-implanted and/or restored and who were required to wear a removable/fixed prosthesis (1 = no prosthesis required and 2 = prosthesis required).

Children's OHRQoL was measured using the ISF-16 short form of the Child Perceptions Questionnaire ($CPQ_{11–14}$) and this measure was completed by children (18). The ISF-16 $CPQ_{11–14}$ is composed of 16 items encompassing four oral health domains (oral symptoms, functional limitations, emotional well-being and social well-being). The participant is asked 'In the past few weeks how often have you (had/been) because of your teeth or mouth?' Example items include 'Pain in your teeth or mouth' and 'Felt shy'. The response options are as follows: *never* = 0; *once/twice* = 1; *sometimes* = 2; *often* = 3; *everyday/almost everyday* = 4. Within the current study, the internal reliability for the measure was excellent, with a Cronbach's alpha of 0.90.

Parental healthcare satisfaction was measured using the PedsQL^{TM} Family Healthcare Satisfaction Generic Module which is composed of 24 items comprising six domains (information, inclusion of family, communication, technical skills, emotional needs and overall satisfaction)(19). Participants were asked 'Were/are you happy with?' and an example item is 'How much information was provided to you about your child's diagnosis'. The module uses a 5-point Likert scale ranging from 0 = *Never happy* to 4 = *Always happy* and 'Not applicable'. Permission was obtained from Dr James Varni, the developer of the measure, to modify the language of certain items so that they were appropriate to the context of the study. Items are scored and linearly transformed to a 0-100 scale (0 = 0, 1 = 25, 2 = 50, 3 = 75, 4 = 100), with a higher score indicating a higher level of healthcare satisfaction. The internal

reliability in the current study was excellent, with a Cronbach's alpha of 0.98.

Parental impacts were measured using the PedsQL™ 2.0 Family Impact Module. This generic measure was chosen because the questionnaire has the advantage of assessing many different aspects of family functioning which may be affected by a child's injury stressor (20). Parental HRQoL and worry and were the primary outcomes of interest within this study. The parental HRQoL score is calculated by combining the parent's cognitive, emotional, physical and social functioning (total of 20 items) and parental worry is assessed by five items which specifically relate to the concerns the parents have as a result of the child's dental injury. Parents were asked 'As a result of your child's dental health how much of a problem have you had with…'. The module uses a 5-point Likert scale ranging from 0 = *Never* to 4 = *Almost always*. Items were reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), with lower scores indicating greater impacts on HRQoL and increased worry. Within the current study, Cronbach's alpha indicated good internal reliability; 0.97 for parental HRQoL and 0.86 for parental worry.

Analysis

Research question 1: item impact analysis was conducted to investigate which items within the Family Impact Questionnaire reflected the main concerns of parents. This procedure involves multiplying the percentage of participants who reported an impact, on each of the individual items within the questionnaire (all responses above neutral), with the item's mean. *Research question 2*: Wilcoxon signed ranks tests were conducted to investigate changes in Parental HRQoL and worry over time. *Research question 3:* Spearman's correlation coefficients were examined to identify possible predictors of baseline and follow-up outcomes. A significance value of $P < 0.20$ was used to preselect the baseline variables that were entered into the multiple linear regressions for follow-up parental HRQoL and worry. Time since injury was entered into the regression analysis in block 1; preselected clinical variables were entered into block 2; and preselected psychosocial variables were entered into block 3. Scores for child OHRQoL, parental healthcare satisfaction and parental impacts were skewed and therefore square root transformations were conducted. This resulted in the Family Impact and Healthcare Satisfaction scales being reversed within the analysis, with higher scores reflecting a greater amount of parental impacts and lower levels of healthcare satisfaction.

Results

In total, 244 families were invited to take part in the study. The sample who responded consisted of 108 children (44% response rate) and 113 parents (46% response rate), two of which were parents of the same child but were separated. Thus, in total, 136 children did not respond and 132 families did not respond. Details regarding the demographic and injury characteristics of the child participants and nonresponders are provided in Table 1. Chi-square and *t*-tests revealed that there were no significant differences in characteristics between responders and nonresponders.

A total of 98 (87.5%) parents who completed the questionnaires were women: 95 (84.8%) of participants were mothers, 13 (11.6%) were the child's father, four (3.6%) questionnaires were completed by legal guardians or other significant members of the child's family and one individual did not indicate their relationship with the child. The mean age of children at the time of the baseline study was 12 years (range = 7.4 to 16.8 years, SD = 2.4), and 67 (62%) of the children were men.

Research question 1: What are the family experiences associated with their children's dental injuries?

The distances that families had to travel to the dental clinic ranged between 0.9 miles and 80.7 miles (mean = 18.3 miles, SD = 16.5) and the families had attended between one and 32 appointments at the dental hospital (mean = 6.8, SD = 5.7).

The majority of parents were very satisfied with the dental care their child received (mean parental healthcare satisfaction score = 87.8, SD = 20.4). A total of 31 parents reported that the highest level of satisfaction possible and only one parent reported the lowest level of satisfaction possible. In relation to the specific items within the healthcare satisfaction questionnaire, parents were most satisfied with the friendliness and helpfulness of the staff (mean score = 93.8, SD = 17.0) followed by the way their child was treated at the dentist/dental hospital (mean score = 91.9, SD = 20.5). Parents were least satisfied with the amount of time spent attending to their emotional needs and the emotional needs of their child (mean score = 77.7, SD = 31.8; mean score = 82.9, SD = 29.0, respectively) and the amount of information that was provided to them about the

Table 1. Characteristics of child participants and nonresponders

Characteristics	Participants N = 108	Nonresponders N = 136
Mean age of child at baseline	12.0 (SD = 2.4)	12.2 (SD = 2.5)
Mean age when injury sustained	10.2 (SD = 2.5)	10.5 (SD = 2.4)
% Boys/Girls	62.0/38.0	61.8/38.2
% White background	78.7	75.7
% Severity of injury (low/moderate/high)	21.3/53.7/25.0	23.2/56.8/20.0
% Deprivation 1(low)/2/3/4/5 (high)	13.0/17.6/25.0/16.7/27.8	9.6/18.4/14.7/16.2/41.2
Mean number of appointments	6.8 (SD = 5.7)	6.8 (SD = 6.7)

likely success of their child's dental treatment (mean score = 80.3, SD = 28.0).

The results from the item impact analysis are presented in Table 2 and reveal that the main concerns reported by parents were worry over their child's future (item impact score = 140.1), worry over whether their child's dental treatment was working (item impact score = 106.9) and feelings of anxiety (item impact score = 102.1). The area of least concern to parents was talking about their child's dental health with others (item impact score = 11.6).

Table 2. Item impact scores for items included in the Family Impact Module

Questionnaire item	Item impact	Rank
I worry about my child's future	140.1	1
I worry whether or not my child dental treatments are working	106.9	2
I feel anxious	102.1	3
I feel sad	96.9	4
I get headaches	90.4	5
I feel frustrated	78.0	6
I feel tired when I wake up in the morning	77.0	7
I worry about how others react to my child's dental condition	74.5	8
I worry about the side effects of my child's medication/dental treatments	71.5	9
I feel tired during the day	61.7	10
I feel angry	61.3	11
I feel that others do not understand my families situation	52.3	12
It is hard for me to remember what people tell me	50.7	13
It is hard for me to think quickly	49.0	14
I have trouble remembering what I was just thinking	48.1	15
I feel helpless or hopeless	47.4	16
I feel too tired to do the things I like to do	46.8	17
It is hard for me to keep my attention on things	46.0	18
Stress or tension between family members	43.1	19
I feel physically weak	41.0	20
It is hard for me to find time for social activities	40.5	21
I do not have enough energy for social activities	38.8	22
It is hard for me to remember what I just heard	37.6	23
Feeling too tired to finish household tasks	34.7	24
Conflicts between family members	31.5	25
I feel sick to my stomach	29.4	26
Lack of communication between family members	29.3	27
Difficulty finding time to finish household tasks	29.1	28
Difficulty making decisions together as a family	24.4	29
Family activities take more time and effort	23.2	30
It is hard for me to tell dentists and dental nurses how I feel	23.2	31
I feel isolated from others	21.2	32
I have trouble getting support from others	20.9	33
Difficulty solving family problems together	20.1	34
I worry about my child's dental condition affecting other family members	15.9	35
It is hard for me to talk about my child's dental health with others	11.6	36

Research question 2: How do the parental impacts associated with their children's dental injuries change over time and throughout treatment?

At baseline, a total of 95 parents indicated that they would be happy to participate in the follow-up study. Of the 95 parents who were sent questionnaires, 73 completed the follow-up questionnaire (76.8% response rate). Sixty-six of these parents (91.7%) were women: 63 (87.5%) of the participants were mothers, five (6.9%) were the child's father, four (5.4%) were legal guardians or other significant members of the child's family and one individual did not indicate their relationship to the child.

The mean scores for parents who completed the Family Impact Module at baseline and at follow up are presented in Table 3. Independent *t*-tests revealed that there were no significant differences in baseline parental worry or HRQoL between those who only participated in the baseline study (mean worry = 73.9 & mean HRQoL = 75.3) and those who participated in both baseline and follow-up study (mean worry = 69.8 & mean HRQoL = 76.4). Wilcoxon signed ranks tests revealed that parents reported significantly fewer impacts on their HRQoL at follow up. However, there was no significant reduction in parental worry over time.

Research question 3: What are the clinical, demographic and psychosocial predicts of parental HRQoL and worry following their children's dental injuries?

The only significant predictors of baseline worry and parental HRQoL were healthcare satisfaction and the child's OHRQoL. On the basis of the results of bivariate analysis (see Table 4), using the preselection criteria of $P < 0.20$, two multiple regression analyses were conducted to examine baseline predictors of follow-up worry and HRQoL (Table 5).

Time since injury predicted 1% of the variance of follow-up worry and that this increased to 12% when the clinical variables of injury severity, and number of teeth injured were entered into the model and 13% when child OHRQoL was added to the model. An examination of the final coefficients model showed that number of teeth injured ($t(67) = 2.04$, $P < 0.05$) was the only significant predictor of follow-up worry when all the variables were included in the model ($\beta = 0.24$), with greater number of injured teeth predicting higher levels of parental worry at follow up.

With respect to HRQoL, time since injury was found to predict 1% of the variance of follow-up HRQoL and that this increased to 21% when the variables of child OHRQoL and healthcare satisfaction were entered into the model. Examination of the final model revealed that healthcare satisfaction ($t(67) = 3.03$, $P < 0.01$) and child OHRQoL ($t(67) = 2.55$, $P < 0.05$) were the only significant predictors of follow-up HRQoL when all the variables were included within the model. Healthcare satisfaction was found to make the largest contribution within the model ($\beta = 0.33$), followed by child OHRQoL ($\beta = 0.28$). Parents who reported high levels of healthcare satisfaction at baseline and parents who had children who reported high levels of OHRQoL at baseline

Table 3. Parental outcome variables at baseline and follow up

Family outcome variables	Possible range 0 (high impacts) to 100 (no impacts)	Baseline *N*	Baseline study Mean (SD)	Follow-up study *N*	Baseline mean for follow-up participants (SD)	Follow–up mean (SD)	Wilcoxon test Z^1 (sig level)	Sig change
Parental HRQoL (total cognitive, physical, emotional &social functioning)	0–100	113	76.0 (19.8)	73	76.4 (20.2)	86.8 (16.5)	$Z = -4.57$ ($P < 0.05$)	↑
Parental worry	0–100	113	71.2 (21.2)	73	69.8 (22.9)	70.5 (22.0)	$Z = -0.25$ ($P = 0.80$)	↔

[1]Based on positive ranks (scores increase over time).
↑ = significant improvement at follow up; ↔ = no significant change.

Table 4. Correlations between baseline variables and parental quality-of-life impacts at baseline and follow up

	Parental baseline outcomes		Parental follow-up outcomes	
Baseline variables	Baseline worry[1]	Baseline HRQoL[1]	Follow-up Worry[1]	Follow-up HRQoL[1]
Child's gender	$r = 0.03$ $P = 0.77$ ($N = 113$)	$r = -0.05$ $P = 0.58$ ($N = 113$)	$r = 0.10$ $P = 0.38$ ($N = 73$)	$r = 0.06$ $P = 0.61$ ($N = 73$)
Child's age when injury sustained	$r = -0.04$ $P = 0.71$ ($N = 110$)	$r = 0.04$ $P = 0.71$ ($N = 110$)	$r = -0.04$ $P = 0.73$ ($N = 70$)	$r = -0.00$ $P = 0.98$ ($N = 70$)
Severity of injury (Low, moderate or high)	$r = 0.15$ $P = 0.12$ ($N = 113$)	$r = 0.10$ $P = 0.30$ ($N = 113$)	$r = 0.19$ $P = 0.11$ ($N = 73$)	$r = 0.12$ $P = 0.32$ ($N = 73$)
Number of teeth injured	$r = 0.12$ $P = 0.21$ ($N = 113$)	$r = 0.01$ $P = 0.96$ ($N = 113$)	$r = 0.20$ $P = 0.10$ ($N = 73$)	$r = 0.12$ $P = 0.33$ ($N = 73$)
Prosthesis required (No or yes)	$r = 0.03$ $P = 0.77$ ($N = 113$)	$r = -0.08$ $P = 0.38$ ($N = 113$)	$r = -0.00$ $P = 0.98$ ($N = 73$)	$r = -0.02$ $P = 0.85$ ($N = 73$)
Number of appointments attended	$r = -0.01$ $P = 0.91$ ($N = 113$)	$r = -0.05$ $P = 0.57$ ($N = 113$)	$r = 0.03$ $P = 0.80$ ($N = 73$)	$r = -0.09$ $P = 0.46$ ($N = 73$)
Healthcare satisfaction[+]	$r = 0.24$* $P = 0.01$ ($N = 112$)	$r = 0.22$* $P = 0.02$ ($N = 112$)	$r = 0.10$ $P = 0.42$ ($N = 72$)	$r = 0.33$** $P = 0.01$ ($N = 72$)
Child's OHRQoL	$r = 0.40$** $P < 0.01$ ($N = 106$)	$r = 0.34$** $P < 0.01$ ($N = 106$)	$r = 0.17$ $P = 0.16$ ($N = 73$)	$r = 0.25$* $P = 0.03$ ($N = 73$)

[1] Analysis based on square root transformations – Higher scores reflect greater number of impacts and lower levels of healthcare satisfaction
*$P < 0.05$,
**$P < 0.01$

were all more likely to report high levels of HRQoL at follow up.

Discussion

The majority of parents were highly satisfied with the dental care their child had received; however, parents reported a wide range of impacts associated with their child's dental injury. Worry over their child's future and uncertainty over whether their child's dental treatments were working were specific worries which concerned parents the most.

Interestingly, injury and treatment characteristics were not significant predictors of parental outcomes at baseline. This is surprising considering severe dental injuries often require more intensive treatment programmes than less complicated injuries (21, 22) and in the light of the findings from previous research which have found more severe oral health conditions are associated with greater impacts on children's OHRQoL (18, 23). However, the longitudinal analysis revealed that the number of teeth children had injured was a significant predictor of parental worry at follow up. This finding indicates that this clinical variable has the potential to

Table 5. Results of the linear regression analysis for follow-up parental worry and HRQoL ($N = 72$)

Outcomes	Baseline variables entered	R^2	*F* change	Significant Predictors[2]	β	*t*
Follow-up worry[1]	Block 1 Time since injury	0.01	0.7			
	Block 2 Injury severity, number of teeth injured	0.12	4.10*			
	Block 3 Child's OHRQoL	0.13	0.56	Number of teeth injured	0.24*	2.04
Follow-up HRQoL[1]	Block 1 Time since injury	0.01	0.40			
	Block 2 Child's OHRQoL, healthcare satisfaction[1]	0.21	8.87**	Healthcare satisfaction	0.33**	3.03
				Child's OHRQoL	0.28*	2.55

[1]Analysis based on square root transformations – Higher scores reflect greater number of impacts and lower levels of healthcare satisfaction. [2]Data presented is taken from the final model.
*$P < 0.05$,
**$P < 0.01$.

influence parental worry over time, possibly as a result of the greater impacts multiple injuries cause children or the anxieties associated with the complex treatment programmes required to restore multiple injured teeth.

The finding that children's OHRQoL was a significant predictor of parental HRQoL at follow up highlights how child and parental outcomes are intrinsically linked following dental injuries. Parental healthcare satisfaction was also found to be a significant predictor of parental HRQoL at baseline and follow up and this finding provides persuasive evidence that this is a particularly important characteristic in family adaptation to children's dental injuries. This finding is consistent with previous research that has shown effective communication, information provision and shared decision-making are all significant predictors of more positive health-related outcomes (24, 25). Therefore, it is suggested that attempts to maximize parental satisfaction with their child's dental care may have significant benefits for the family's well-being.

Clinical and psychosocial variables included in the regression analysis accounted for 21% of the variance in parental HRQoL, however, only 13% of the variance in parental worry was explained in the current study. This is perhaps unsurprising considering that only one variable was found to be a significant predictor of follow-up worry (number of teeth injured). It appears, therefore, that there could be other factors contributing to parental worry following their children's dental injuries. For example, the parent's own anxiety levels (generalized or dental) could be influencing how likely they are to experience high levels of worry about their child's dental injury and its related treatment. It is recognized that a proportion of parents are anxious about the delivery of dental treatment to their child (26) and this could therefore be an interesting avenue for future research. The finding that worry did not significantly reduce over time supports previous research findings that have revealed there may be significant long-term emotional impacts experienced by families who have children with dental injuries (8). Providing reassurance and spending more time exploring parents concerns, within the treatment session, could therefore help families overcome some of the worries they have regarding their child's dental injury.

Whilst the current study provides new insight into the parental impacts associated with their children's dental injuries, the research had a number of acknowledged limitations. Firstly, without a trauma-free control group, it is impossible to determine whether the impacts parents reported were caused solely by children's dental injuries. However, within the questionnaire, parents were advised to report only the difficulties they had experienced as a direct result of their child's dental injury.

It should also be recognized that just under half of all children and parents who were invited to take part in the study participated at baseline, which could have introduced sample bias into the study. However, previous studies, which have investigated the psychosocial impacts of dental injuries using postal questionnaires, have reported lower response rates for baseline questionnaires (7) and similar response rates for follow-up participation (8). It is, therefore, suggested that the current study had a reasonable response rate considering the magnitude of information which was included within the questionnaires.

An additional point to consider is that the OHRQoL measure used within the current study ($CPQ_{11–14}$) has been previously validated only for use with children aged between eleven and fourteen years. However, the short form of the $CPQ_{11–14}$ (ISF-16) employed within the current study has the purported advantages of being easier to administer, placing less burden on respondents and reducing the risk of total and item nonresponse (18). The recall period of the questionnaire was also shortened to 'the past few weeks' to make it more appropriate for the younger children participating in the study. Within the current study, the measure was found to have excellent internal reliability.

Finally, children of the families who participated in this study were at different stages of their treatment pathway. Therefore, whilst parental worry did not significantly reduce over the six-month period, it may be the case that worry decreases most within the early stages of treatment (for example, the first 6–12 months). Within the current study, it was not possible to control for the prior treatment children had received because many of the children who took part in the study had previously received dental treatment from their General Dental Practitioner prior to their referral to the dental hospital. Therefore, further prospective longitudinal research that investigates the impacts parents experience from the start of their child's dental treatment, to their discharge from the dental clinic, is needed to validate the findings from

this study. To account for the potential confounder of time, time since injury was entered into the regression analysis. However, the results revealed that the amount of time which had passed because the child had initially sustained their dental injury was not a significant predictor of parental impacts.

Conclusions

To date, there has been a paucity of research investigating the psychosocial impact of their children's dental injuries on children's parents. This study used a longitudinal design to investigate the changes in, and predictors of, parental adjustment to their child's dental injuries over time. The study is the first piece of research to investigate how a variety of biopsychosocial variables contribute to parental adjustment to their children's dento-alveolar trauma. The findings from this study help to raise the dental team's awareness of the specific parental impacts that may result from children's dental injuries and the key factors which may be important in predicting positive family outcomes following this injury stressor. The findings from this study also highlight the importance of incorporating family-centred approaches within the treatment of their children's dento-alveolar trauma.

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Conflict of interest

There are no conflicts of interest to declare.

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