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UAE CHILDREN'S DENTAL ANXIETY (SELF AND PROXY REPORTED) AND THEIR DENTAL BEHAVIOR

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ABSTRACT

UAE Children's Dental Anxiety (Self and Proxy Reported) and their Dental Behavior

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Background: Child dental anxiety and uncooperative behavior in dental practice are common and intertwined.

Aim: To assess the prevalence of dental anxiety (self and proxy reported) in a subgroup of 7–16-year-old children and to evaluate both child-self and parent-proxy reported child dental anxiety in relation to child dental behavior in the United Arab Emirates (UAE).

Methods: Data were collected from a sample of 156 parent/child pairs (child mean age 9.95 ± 2.17 years) attending a UAE postgraduate pediatric dentistry clinic in 2017. Demographics, self and proxy reported dental anxiety scores using a six-questions, five-point Likert scale, faces version of the Modified Child Dental Anxiety Scale (MCDAS scores from 6 to 30, where ≥ 19 was severely dentally anxious) in addition to dentist recorded numerical Frankl Behavior Rating Scale scores (FBRS: 1 to 4 where 1 was extremely uncooperative) were recorded and compared. Chi square test, Pearson's correlation, Kappa-coefficient, one-way ANOVA and independent t-test statistical analysis were used ($p < 0.05$).

Results: The prevalence of self and proxy severe dental anxiety was 22.40% ($n=35$) and 33.30% ($n=52$) respectively, while only 9.00% ($n=14$) were dentally uncooperative. In both groups, tooth extraction caused the highest anxiety followed by injections and fillings ($p < 0.001$). The mean

score for self-reported dental anxiety was (15.02±4.90) and for proxy reported dental anxiety was (15.70±6.07). There was a positive linear correlation between self and proxy reported dental anxiety scores and a negative linear correlation between self/proxy reported dental anxiety scores and the FBRS ($p < 0.001$). Self/ proxy concordance of severe-anxiety/none-to-moderate-anxiety was fair (68.60%, kappa=0.23, $p = 0.003$). Both self/FBRS and proxy/FBRS concordance of severe-anxiety/none-to-moderate-anxiety/behavior was fair (78.80%, kappa=0.23, $p = 0.001$) and (71.80%, kappa=0.22, $p < 0.001$) respectively.

Conclusion: In the UAE sample studied, the dental anxiety is not uncommon. There was a fair agreement between child-self and parent-proxy reported dental anxiety. Increased dental anxiety led to uncooperative dental behavior.

DEDICATION

I would like to dedicate this thesis to

My father whose love for me knew no bounds and who taught me the value of hard work. Although he is no longer of this world, his memories continue to regulate my life.

My mother without her endless love and encouragement I would never have been able to complete my graduate studies. I love you and I appreciate everything that you have done for me.

My husband who has been a constant source of support and encouragement during the challenges of graduate studies and life. I am truly thankful for having you in my life.

My children “Abdullah, Abdulaziz, Reem and Abdulrahman” You have made me stronger, better and more fulfilled than I could have ever imagined. I love you to the Moon and back.

DECLARATION

I declare that all the content of the thesis is my own work. There is no conflict of interest with any other entity or organization.

Name: Safeya Algharebi

Signature:

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TABLE OF CONTENTS

ABSTRACT	I
DEDICATION	III
DECLARATION	IV
ACKNOWLEDGEMENTS	V
LIST OF TABLES	IX
LIST OF FIGURES	X
ABBREVIATIONS	XI
1.00 INTRODUCTION	1
2.00 LITERATURE REVIEW	4
2.1 Emotions and the emotional development theory	4
2.2 An introduction to fear, anxiety, and phobia	6
2.3 General anxiety in children, adolescents, and adults	8
2.4 Dental anxiety in children, adolescents, and adults	10
2.5 Prevalence of dental anxiety in children, adolescents, and adults	12
2.6 Etiology of dental anxiety	13
2.6.1 Factors affecting dental anxiety	15
2.7 Assessing dental anxiety in children	17
2.7.1 Parents' ability to assess dental anxiety in their children	18
2.7.2 Behavior of anxious children in the dental clinic	20
2.80 Management of fear and anxiety in the dental clinic	20
2.9 Aim and objectives of the study	23
2.9.1 Aim of the study	23
2.9.2 Specific objectives	23

3.00 MATERIALS & METHODS	24
3.1 Study design	24
3.2 Study population/ location	24
3.3 Study inclusion and exclusion criteria	24
3.3.1 Inclusion criteria	24
3.3.2 Exclusion criteria	25
3.4 Data collection	25
3.4.1 Calibration of dentists for the use of FBRS	26
3.5 Sample type and size	26
3.6 Questionnaire	26
3.6 Statistical analysis	27
3.7 Permission and ethical approval	28
4.00 RESULTS	29
4.1 Demographics	29
4.2 Self and Proxy MCDASf-OHAR responses per question	34
4.2.1 <i>Post Hoc</i> multiple comparisons of self-reported MCDASf readings per question	37
4.2.2 <i>Post Hoc</i> multiple comparisons of proxy-reported MCDASf readings per question	39
4.3 Correlation between overall self-reported MCDASf-OHAR and proxy reported MCDASf-OHAR scores.	42
4.4 Correlation between self-reported MCDASf-OHAR scores with children’s behavior	43
4.6 Concordance between self-reported and proxy reported MCDASf-OHAR per category of anxiety	47
4.7 Concordance between self-reported and proxy reported MCDASf-OHAR per question	48
4.8 Concordance of self and proxy MCDASf-OHAR with childrens’ behavior as measured by FBRS.	50
4.9 MCDASf-OHAR as a predictor of FBRS; who predicts best the child or parent?	51
5.00 DISCUSSION	53
5.1 Introduction	53
5.2 The cutoff point for MCDASf-OHAR	54

5.3 Dental anxiety and demographics	55
5.3.1 Sample size and setting	55
5.3.2 Age and dental anxiety	57
5.3.3 Dental anxiety in relation to gender	57
5.3.5 Patient’s nationality and ethnicity	58
5.3.6 Educational level and occupational status of the parents	59
5.4 The prevalence of dental anxiety	60
5.5 Dental anxiety per procedure	61
5.6 Parents’ ability to assess their children’s dental anxiety	62
5.6.1 Correlation between self and proxy scores	62
5.6.2 Concordance/discordance of scores of anxiety	63
5.6.3 Agreement of parents and children per question/procedure	63
5.7 Dental anxiety and dental behavior	64
5.7.1 Concordance/discordance between self/proxy reported dental anxiety and FBRs	65
5.7.2 Self-reported or proxy reported which is a better predictor of dental behavior?	66
5.8 Limitations of the study	68
6.00 CONCLUSIONS AND RECOMMENDATIONS	69
6.1 Conclusions	69
6.2 Recommendations:	70
7.00 REFERENCES	71
APPENDIX I. MCDASF-OHAR QUESTIONNAIRE	89
APPENDIX II. INFORMED CONSENT	91
APPENDIX IV FBRs	100
APPENDIX V. TRANSLATED MCDASF-OHAR	101
APPENDIX VI. ETHICAL APPROVAL	103
APPENDIX VII. BSPD ABSTRACT	104

LIST OF TABLES

Table 4. 1. Demographical characteristics of the study group in relation to self-reported dental anxiety.	31
Table 4. 2 Demographical characteristics of the study group in relation to proxy-reported dental anxiety.	32
Table 4. 3 Overall prevalence of anxiety in the sample (N=156) and mean MSCDAS-f scores.....	33
Table 4. 4 The FBRS results and distributions of the children between the groups.	34
Table 4. 5 Self and proxy reported mean MCDASf-OHAR individual question scores.	36
Table 4. 6. Post Hoc multiple comparisons of the self and proxy responses (questions compared to each other within each of the two groups-one way ANOVA $p<0.001$)	42
Table 4. 7 Count and percentage of parent/child dyads by none to moderate anxiety and severe anxiety scores (kappa= 0.230).	48
Table 4. 8 Measure of concordance between child's self-reported and parent's proxy reported dental anxiety scores.....	49
Table 4. 9 The comparison between self and proxy reported MCDASf-OHAR and FBRS.....	51

LIST OF FIGURES

Figure 1.1 Five Areas approach of dental anxiety (adapted from Williams and Garland's ⁽¹¹³⁾ Five Areas approach of CBT assessment and management).....	22
Figure 4. 1 The correlation between self-reported MCDASf and proxy reported MCDASf.....	43
Figure 4. 2 The correlation between self-reported MCDAS-f and FBRS.....	44
Figure 4. 3 The correlation between proxy-reported MCDASf-OHAR and FBRS.....	45
Figure 4. 4 Overall pattern of correlation between self (blue) and proxy (red) reported MCDASf-OHAR scores (out of 30, where >19 indicates severe dental anxiety) with FBRS scores (green- range from 1 to 4 where 1 indicates very negative behavior).....	46

ABBREVIATIONS

- MCDAS – Modified Child Dental Anxiety Scale
- MCDASf – Modified Child Dental Anxiety Scale with faces
- FBRS – Frankl Behavior Rating Scale
- BPRS – Behavior Profile Rating Scale
- VABRS – Venham Anxiety and Behavior Rating Scale
- CFSS-DS – Children’s Fear Survey Schedule Dental Subscale.
- VAS – Visual Analogue Scale
- DA5 – Dental Anxiety Scale for 5-year-old children
- SDCEP - The Scottish Dental Clinical Effectiveness Programme
- OHAR - Oral Health Assessment and Review guidelines
- DAS - The Dental Anxiety Scale
- FIS - The Facial Image Scale
- VPS - Venham Picture Scale
- DBMP - Dental behavior management problems
- CBT - Cognitive Behavioral Therapy
- DDH - Dubai Dental Hospital
- ROC - Receiver Operating Curves
- AUC - Area Under the Curve
- BSPD – British Society of Pediatric Dentistry

1.00 INTRODUCTION

Anxiety is a multi-system response to a believed danger or threat. Dental anxiety is a specific form of anxiety that can have a serious effect on individual's life and is considered to be a significant obstacle to seeking and accepting normal dental care in anxious patients⁽¹⁾. In pediatric patients, dental anxiety can lead to disruptive behavior during treatment and might manifest as dental avoidance in adult life leading to poor oral health outcomes. Therefore, it is not surprising that dental anxiety has been studied extensively.

The term dental anxiety encompasses anxiety, fear and phobia. The differentiation between them is complicated. Dental anxiety is a reaction to unknown danger which is extremely common especially when the treatment proposed never experienced before while dental fear is a reaction to a known danger which involves a fight-or-flight response when provoked with the threatening stimulus⁽²⁾. Dental phobia is the same as fear but much stronger, it classified as a 'Specific Phobia' which is a 'marked and persistent fear of clearly discernible, circumscribed objects or situations'⁽³⁾. Patients are aware that their fear is excessive and irrational and the phobic stimulus is avoided at all costs or endured with great distress.

Fear of dentistry and the inability to receive routine dental treatment due to dental anxiety are widespread phenomena that rank the fifth among the most commonly feared situations for individuals⁽³⁾. It has been reported in adults, adolescents and children. The prevalence of dental anxiety from 12 populations in Australia, Canada, Europe, and the United State of America (USA) averaged 9.4%⁽⁴⁾. Similarly, the prevalence of adult's dental anxiety in the United Kingdom (UK) was found to be 36% among those who had experienced moderate dental anxiety and 12% who

had experienced extreme dental anxiety⁽⁵⁾. This area has been poorly studied in the United Arab Emirates (UAE).

Dental anxiety can occur at any age but around half of adult patients with dental anxiety report childhood onset of their anxiety and most of them relate this to negative experiences during dental treatment⁽³⁾⁽⁵⁾. Moreover, the etiology of dental anxiety is not always clear, no single biological or psychological theory fully explains the development of anxiety disorders. It is generally accepted that phobias are learned fears that has been linked to early (usually childhood) conditioning experiences, such as traumatic or painful dentistry, or vicarious learning (when the fear is learned by observing the fear of others)⁽³⁾.

Measurement of dental anxiety in children is important not only for providing high quality of clinical care but also for research purposes. Understanding the level of anxiety before treatment and the factors responsible for it will allow the dentist to identify the anxious child in order to provide better management for the anxiety and reshape such patients' perceptions of dentists and dental visits. Thus, behavioral science is a vital part in dentistry to concentrate on and quantify the behavior of patients toward dental treatment. The most common method used to assess the dental anxiety in pediatric patients is a questionnaire-based assessment⁽⁶⁾⁽⁵⁾, several types of questionnaires have been used which can be categorized into the observer-reported scales such as Frankl Behavior Rating Scale(FBRS)⁽⁷⁾, Behavior Profile Rating Scale (BPRS)⁽⁸⁾, Venham Anxiety and Behavior Rating Scales (VABRS)⁽⁹⁾ and the self-reported scales such as Children's Fear Survey Schedule Dental Subscale (CFSS-DS)⁽¹⁰⁾, Visual Analogue Scale (VAS)⁽¹¹⁾, Dental Anxiety Scale for 5-year-old children(DA5)⁽¹²⁾, Modified Child Dental Anxiety Scale (MCDAS)⁽¹³⁾, Modified Child Dental Anxiety Scale with Faces (MCDASf)⁽¹⁴⁾. The Scottish Dental Clinical Effectiveness Programme (SDCEP) produced Oral Health Assessment and Review

(OHAR) guidelines which proposed the use of (MCDASf) version without the last two questions (on dental sedation and general anesthesia) for all anxious children⁽¹⁵⁾. Studies validated most of the dental anxiety measurements outlined above, although some authors had cast a doubt a such a validity⁽¹⁴⁾.

Most of the information used in the self-reported surveys comes from adults; either the parents or the referring dentists rather than the children themselves which might not be an accurate representation of the level when it is not self-reported and more dependent on predictions of others⁽¹⁶⁾. Children are considered to be able to self-report their anxieties by questionnaires from age of five^(6,17) but usually healthcare providers depend on their parents to provide the accurate information about the dental anxiety of their children. The correlation between child's self-reported dental anxiety and proxy-reporting of the carer/parent has been assessed in various studies in UK, USA and Europe, which revealed poor agreement between the two, favoring the child's self-reporting^(18,19). In the UAE, and to our knowledge, no studies have been conducted to explore the accuracy of parents' ability to assess dental anxiety in their Children.

Therefore, the aim of this study was to assess the relationship between UAE children's self-reported and their parents' proxy-reported dental anxiety using the validated SDCEP-OHAR recommended MCDASf questionnaire and to compare it to the behavior of the children during dental treatment using the FBRS as reported by their treating dentists.

2.00 LITERATURE REVIEW

In this chapter, a background on dental anxiety in general and specifically in children will be presented.

2.1 Emotions and the emotional development theory

Anxiety is an emotion that is rooted in the development of an individual. There are multiple theories to how emotions develop in humans. The Bowlby's theory of attachment is one of the theories of emotional development that offers a framework for understanding children's behavior. The theory explains the behavior of children when near a perceived protective figure⁽²⁰⁾. A child, according to the attachment theory, may cry or try to approach a retreating caregiver because of the effect of an attachment to the caregiver. One of the concepts of the theory is the attachment system, a behavior-motivational system that children develop around some people because of developed attachments. The system regulates the proximity of a child about a caregiver and the behavior of the child in response to changes in the distance from the caregiver. The attachment system, therefore, offers a behavior-based survival value to children in the area of perceived dangers⁽²⁰⁾. The system is further a construct of intrinsic models that develop from children's interactions with their external environments. The interaction between the internal and external environment of a child, through the availability of a protective figure, also influences a child's perception of self. Perceived negative attachments, such as the feeling of rejection, can create the sense of unworthy while perceived positive attachment can develop a positive self-concept such as the perception of competence and being accepted by other people⁽²⁰⁾. Caregiver's attention and sensitivity to children influence the security of formed attachments and are likely to moderate the attachment-based behaviors⁽²¹⁾. The theory of attachment's concept of the interaction between a child's internal and external environment is consistent with other theories of emotional

development. Jean Piaget, for example, argued for the role of meaningful relationships in the development of social-emotional potential⁽²²⁾. People in a child's social environment such as family members and friends define relationships around children and socio-emotional competencies that children can develop. Children, based on their developed cognitive capacity, conceive people's perspectives and emotions and apply the conception to develop perception of the people and associated relationships to the people. The developed perception informs children's categorization of people, by attributes, and construction of emotional behavior. The relationship between a child's internal and external environment, according to Piaget, influences emotional development by triggering a transition from a child's self-centeredness to the awareness and sensitivity of other people's emotions. Empathy, morality, and cooperation with others, therefore, emerges from the interaction between a child's internal and external environment⁽²²⁾. Erikson's psychosocial theory that provides for the role of the interaction between a person's internal system and the person's external environment in personality development also supports the concepts of the attachment theory. Psychosocial development, according to the theory, occur in stages in which interactions with the external environment develops a person's sense of coexistence with other members of the society⁽²³⁾. Children, from the age of six years, learn to work with others in frameworks that could reflect the transition from self-centeredness^(22,23). Saarni's theoretical perspective to child development, coined from the functionalist and dynamic systems theories, also identifies the significance of the attachment system at children's initial stage of life⁽²⁴⁾. Awareness of own emotions, ability to manage emotions, self-consciousness, and the ability to cope with emotional situations then develop in later stages of a child's life⁽²⁴⁾.

Emotional development, therefore, occurs in stages and influence behavior. It begins with a high level of self-centeredness and emotional dependence on people, to which a child is attached,

towards the ability to understand own and others' emotions for the management of emotions. Behavior, in response to a child's environment, therefore, is a likely factor of a child's level of emotional development, which is subject to the child's interaction with its environment⁽²⁴⁾. Environmental factors to emotional stability are also likely to influence children's dental behavior when the children face dental anxiety⁽⁴⁾.

2.2 An introduction to fear, anxiety, and phobia

Dental *fear*, *anxiety*, and *phobia* are sometimes used interchangeably⁽⁵⁾, though they have different meanings in the dental setting. People associate dental treatment with pain because of the ancient invasive approaches to treatments, and the association leads to fear, anxiety, and even phobia when dental patients face the probability of treatment.

Fear is an emotional response to phenomena or an object that is associated with danger to a person⁽²⁵⁾. It is a rational response, emanating from the nervous system, which prepares an individual to respond to the perceived threat through counteracting the threat or escaping from it. It has been considered an ordinary preventive response⁽²⁵⁾.

Anxiety, however, is an emotional reaction that occurs in the absence of danger⁽²⁵⁾. The reaction could be in anticipation of a danger, and is considered irrational. In addition, strong levels of anxiety are considered a disorder in the dental setting⁽²⁵⁾. Anxiety, unlike fear that leads to defensive actions, leads to a state of helplessness that 'worry, hyper-vigilance, cognitive distortions, arousal of the automatic nervous system, and avoidant behavior' characterize⁽²⁶⁾. Some of the specific clinical signs of dental anxiety are questioning intended treatment plan, nervous discussions with others before treatment, and cold and sweaty hands⁽²⁷⁾. Patients with dental anxiety also have histories of seeking emergency dental care and cancelling appointments when

treatments are not needed urgently. A stiff posture, quick responses to prompts, inability to cooperate, and the white coat syndrome while a patient is on the dental chair are other symptoms of dental anxiety⁽²⁷⁾.

Dental phobia, however, is a mental disorder. A persistent demonstration of a high level of fear of recognized objects or events, the avoidance behavior, and disruption of daily life are the defining characteristics of phobia⁽²⁵⁾. The main difference between dental anxiety and dental phobia is the impact it has on normal functioning. In order to be classified as a dental phobia, the avoidance, anxious anticipation or distress in feared situations has to interfere significantly with the individual's occupational or social functioning⁽⁵⁾. In brief, a phobia is a clinical diagnosis which refers to a significant fear that interferes with a person's normal life, while fear is not always extreme⁽²⁸⁾. Development of phobia in an individual is an unwanted outcome that should be avoided at all costs.

Dental fear, anxiety, and phobia have negative effects on people. One of the implications of the fear, anxiety, and phobia is the failure to receive dental treatment⁽²⁵⁾. People with dental anxiety report high rates of cancelled or missed appointments for dental treatments⁽²⁵⁾. The avoidance of dental treatment then translates to poor oral health, which can cause pain in the mouth and damage the teeth. The poor oral health due to dental fear, anxiety, and phobia also leads to embarrassment, poor quality of health, and undermined social functionality⁽²⁵⁾. Dental fear and anxiety have also been associated with behavioral management problems during treatments, which undermine effectiveness of treatments⁽²⁶⁾. Avoiding treatments due to fear, anxiety, and phobia also leads to teeth extraction as the possible dental intervention, as care is sought at advanced stages of dental deterioration. Dental stress and anxiety also induces stress on children that then extend to the children's parents or caregivers⁽²⁶⁾.

2.3 General anxiety in children, adolescents, and adults

The incidence of general anxiety is significant among children, adolescents, and adults. A longitudinal study of 816 primary and secondary school children in the Anhui province of China notes the prevalence rate of elevated social anxiety symptoms at between 15.20 and 16.40 per cent⁽²⁹⁾. The average anxiety level, established across groups within the study's population was 5.30 for two groups and 5.60 for one group out of 20 in which the scores of more than 9 were considered as suggesting significant social anxiety symptoms, though the difference was not significant. Age, according to the results, is one of the factors to the social anxiety, indicating possible differences in the incidence and levels of social anxiety across age groups. Other factors such as quality of life, self-esteem, and family dysfunction also affect childhood elevated-anxiety that was considered volatile⁽²⁹⁾.

A systematic review of literature, however, reported the worldwide pooled prevalence of general anxiety problems in children at 6.50%, with an upper confidence limit of 9.10⁽³⁰⁾. Adolescents also experience anxiety. In a sample of 125 adolescents 46 % reported at least an anxiety disorder, and multiple anxiety disorders were reported in 49% ⁽²²⁾. Forty-three per cent of the adolescents with anxiety disorders, according to the study that considered adolescents in the clinical setting, had homotypic comorbidity while 91 per cent had heterotypic comorbidity⁽³¹⁾. Essau *et al.* ⁽²³⁾ confirm the observed the significance of age on the incidence of anxiety⁽²⁰⁾, but identified a nonlinear relationship for the first incidence. The first incidence of anxiety differed across age groups, with higher incidence rates in childhood and the adult population segments compared to adolescent and emerging adulthood segments⁽³²⁾. Previous experiences of anxiety, especially at childhood and the adolescent stage, however, increased the likelihood of experiencing anxiety in the later stages of life. The effect of previous experiences meant increasing risks of recurrent

anxiety with a person's age⁽³²⁾. Situational factors, however, moderated the incidence and level of anxiety. Anticipated surgical experiences, for example, increase people's levels of anxiety⁽³³⁾. A study that compared anxiety levels before general surgery indicated increased levels among children scheduled for operations and the children's parents on the operation day⁽³⁴⁾. A measure to introduce children and their parents to the operation environment, for alleviating anxiety, failed to reduce anxiety levels in the experimental trial. The pre-examination period has also been associated with increased prevalence of anxiety in students⁽³⁵⁾. In another example, the incidence rate of anxiety among people with chronic fatigue syndrome was reported at 42.2 %, a rate that Jo *et al.* consider high, due to the patients' physical symptoms⁽³⁶⁾. The level of education, marital status, area of residence (urban or rural), and family income were other situational factors that had been associated with the incidence of anxiety⁽³⁶⁾. Higher levels of education, according to Lejtzten *et al.* were associated with lower rates incidence rates of anxiety⁽³⁷⁾. The incidence rate, according to the results from the study by Lejtzten *et al.* was 3.0 per 1000 person years for people with more than 12 years of education, compared to the rates of 4.1 for people with 10 to 12 years of education and 4.9 for people with nine or less years of education. Married people also had a lower incidence rate of anxiety (3.1 per 1000 person-years) compared to those who were single, widowed, or divorced (IR= 3.9). People living in large cities also had the lowest level of anxiety (2.5) and those living in middle-sized towns (3.4) and small towns or rural areas (3.6) followed respectively in the incidence rate of anxiety. Family income also moderated the level of anxiety such that the higher the income, the lower the level of anxiety⁽³⁷⁾.

Anxiety, therefore, occurs in children, adolescents, and adults, at different rates and subject to situational factors. The effects of the situational factors were consistent with the provisions of the Bowlby's theory of attachment that the interaction between a person's internal and external

environment in the development of survival responses⁽²⁰⁾.

2.4 Dental anxiety in children, adolescents, and adults

Dental anxiety is significant phenomenon, by incidence and consequence. A study on the anxiety levels of children at school and in a dental clinic reported negative facial expressions of children in the clinical environment, unlike in the school environment⁽³⁸⁾. A study that sought to investigate causes of dental anxiety in girls from the age of six to 14 years established a high prevalence rate of dental anxiety rate in the population segment⁽³⁹⁾. This cross-sectional study used a random sample of 118 girls and established a prevalence rate of dental anxiety of 47.6 % among the girls. Girls aged from seven to nine years reported the highest levels of dental anxiety among the investigated population. A significant percentage of the seven to nine-year-old had never visited dental clinics, a factor that could explain the high levels of anxiety during their initial visit. The level of dental anxiety in children, according to the study, was also associated, negatively, with age, an indication of the increasing ability to manage anxiety as children grow⁽³⁹⁾. The negative correlation between anxiety level and age is consistent with the consideration of anxiety as an irrational response⁽²⁵⁾. Cognitive development in children, which occurs with age explained the reduction of the level of dental anxiety in older children.

A study on the prevalence of and contributing factors to dental anxiety in children, using a convenience sample and a survey in Hong Kong, confirmed the significance of dental anxiety in children⁽⁴⁰⁾. A majority of children, according to the study, had moderate anxiety levels (mean=1.16) on the Clinical Anxiety Rating Scale out of 6. A small percentage of children (8%) was further associated with behavioral problems, however, they had higher levels of dental anxiety⁽⁴⁰⁾. In addition to the correlation between anxiety and age and previous experience⁽³⁹⁾, parental proximity influences children's levels of anxiety⁽⁴⁰⁾. The effects of parental presence on

anxiety level are consistent with the provisions of Bowlby's attachment theory that provides for a positive self-concept and potential in the presence of a positive attachment⁽²⁵⁾. Ljiljana *et al.* also reported a moderate average level of dental anxiety among children, but noted that age and sex are not significant factors to the level of dental anxiety in children⁽⁴¹⁾. According to Ljiljana *et al.*, a significant percentage of children (18.57 %), had severe dental anxiety⁽⁴¹⁾. The negative correlation between dental anxiety and age⁽³⁹⁾ suggested lower levels of anxiety among adolescents and adults than among younger children. The correlation further indicated that the possible lower levels of incidence of dental anxiety in adolescents and adults related to an increase in age. Parental proximity also affected levels of anxiety in children⁽⁴⁰⁾ and emotional development that occurred at later stages of life, increasing the ability to cope with emotional situations⁽²⁴⁾, and this suggested a greater ability to overcome dental anxiety at the adolescent and adult stages of life. A majority of late teenagers (60.75%), according to a study by Rahul *et al.* reported moderate levels of dental anxiety while five per cent report very high levels of anxiety⁽⁴²⁾. The population of late teenagers that Rahul *et al.* investigated rarely sought dental consultation and in those who experienced dental treatment, about 78 per cent experienced dental anxiety when prompted with a general check-up⁽⁴²⁾. Initial visits to a dentist also induced dental anxiety on adolescents and increased dental anxiety levels by about 5.6 % ⁽⁴²⁾. Tooth removal or injections were the most significant triggers of dental anxiety in the population segment studied. Behaviors that undermined oral hygiene also increased the level of dental anxiety in this population⁽⁴²⁾. In another study, by Meira *et al.* 90% of children and adolescents, compared to 76 per cent of adults, were identified with moderate levels of anxiety⁽⁴³⁾. Deogade and Suresan noted that a majority of adults (53.20) had a moderate to extreme levels of dental anxiety to support the significance of dental anxiety in the population segment⁽⁴⁴⁾. A significant correlation also existed between dental anxiety and

general anxiety in children and adults, though not in adolescents⁽⁴³⁾. A sample of adolescents from Jonkoping in Sweden and Belgrade in Serbia also identified the significance of dental anxiety by incidence^(45,46). Dental anxiety, according to results from the Belgrade sample, affected daily activities of adolescents⁽⁴⁶⁾.

Dental anxiety, like general anxiety, therefore, was a significant issue among children, adolescents, and adults as a majority of the population segments reported in the literature experienced moderate to high levels of dental anxiety.

2.5 Prevalence of dental anxiety in children, adolescents, and adults

Empirical data exist with a variety of prevalence rates for dental anxiety in children, adolescents, and adults across the globe. The prevalence of dental anxiety among a representative sample of children in the UK was determined in the Children's Dental Health survey of 2013. In 15 year old, 30% of those with extreme dental anxiety do not attend the dentist for a check-up, compared to 15% of other children⁽⁴⁷⁾.

Soares *et al.* in a pilot study of 100 Brazilian (from Recife) children aged five to eight years reported a dental anxiety rate of 46 per cent in the population segment⁽⁴⁸⁾. A longitudinal study that investigated 784 children aged five to seven years in Brazil, reported the anxiety rate to be at 17.4 %⁽⁴⁹⁾. Another study on children aged six and seven years, which used a sample of 1367 children from Recife, Brazil, established the prevalence rate of dental anxiety, among children, at 54.4 %⁽⁵⁰⁾. The different values for the prevalence rate of dental anxiety identified variability in the rate across population segments and time.

The prevalence rate for dental anxiety in children was reported at 22.68 per cent among Romanian children aged from six to 12 years⁽⁵¹⁾. Girls aged seven to nine years in the Kingdom of Saudi

Arabia, however, had a prevalence rate of 47.6 per cent⁽³⁹⁾, while school-going children in Knezevo (Croatia) had a prevalence rate of 18.57 per cent for severe dental anxiety⁽⁴¹⁾. The prevalence rate of dental anxiety in children, therefore, varied, and the differences could be attributed to such factors as family income^(48,49), geographical area⁽⁵⁰⁾, gender⁽³⁹⁾, and place of measure^(39,41,48-50).

The prevalence rate of dental anxiety also varied across different population segments of adolescents. The rate was reported at 6.50 % among 15 year olds from Jonkoping in Sweden⁽⁵²⁾ and 60.75 % among senior adolescents (17 to 20 year olds) from Delhi University⁽⁴²⁾. The rate had also been reported at 36.60 % among six to 16 year old Brazilians from low income communities⁽⁵³⁾ and 58.80 % in referral patients at Isfahan Dental School in Iran⁽⁵⁴⁾. The prevalence of moderate level of anxiety of 90 per cent for children and adolescents suggested very high prevalence rates of dental anxiety, even before mild and severe forms of the anxiety were considered⁽⁴³⁾. An established prevalence rate of 53.20 % for Indian adults, with a corresponding rate of 41.80 % for mild dental anxiety and 5 % for dental phobia shows that almost all Indian adults suffer from dental anxiety⁽⁴⁴⁾.

A cross sectional study conducted in UAE among students of Sharjah University reported a dental anxiety rate of 36 % (MDAS score of 13 or more), with overall severity represented by a mean score of (11.52)⁽⁵⁵⁾.

Dental anxiety, therefore, was significant in children, adolescents, and adults.

2.6 Etiology of dental anxiety

There is no single explanation for the development of dental anxiety, and a variety of different mechanisms had been applied to understanding the etiology of dental anxiety. Rachman proposed three different possible mechanisms of fear acquisition, which included: (i) exposure to threatening

information, (ii) vicarious learning (e.g., observing others displaying anxious behaviors), and (iii) direct experience⁽⁵⁶⁾. Pain or the fear of pain is one of the reported causes of dental anxiety and an established correlation between levels of anxiety and sensitivity to pain explains this. Hypersensitive people to pain record high level of dental anxiety. Previous experience with pain or exposure to conversations on regarding pain, and the fear of pain cause dental anxiety through developing the fear of pain in a person⁽³³⁾. An experience with abuse is another cause of dental anxiety. Abuses are traumatizing and the perception of the dental treatment process can trigger a suppressed or repressed experience⁽⁵⁷⁾. The trigger then evokes fear that translates anxiety in the dental setting. An establishment of higher levels of dental anxiety among people with post-traumatic stress disorder supports the theory of the causal effects of experience with pain on dental anxiety⁽⁵⁷⁾. A painful experience during a previous dental visit is a specific of the events that cause dental anxiety⁽⁵⁸⁾. Patients' observation of painful encounters of other patients can also cause dental anxiety⁽⁵⁸⁾. Dental extraction and the numbness that follows the administration of anesthesia are some of the pain-related causes of dental anxiety following a person's past experience⁽³⁹⁾. A survey of perceptions among girls aged six to 14 years revealed that dental extraction was the most significant cause of dental anxiety, reported among 18.6 % of the study's participants⁽³⁹⁾. Al-Zaed *et al.* also identified the role of anesthesia as well as drilling as pain-based causes of dental anxiety⁽⁵⁹⁾. The sense of numbness that follows the use of anesthesia, reported among 17.8 % of the survey's participants, and anxiety arising from an anticipated use of anesthesia, reported among 16.90 % of the participants were other experience-based causes of dental anxiety⁽⁵⁹⁾. This was highlighted by Deogade and Suresan who supported the role of negative dental experience on dental anxiety⁽⁴⁴⁾. However, not all children who had a negative dental experience developed dental anxiety. Davey's latent inhibition hypothesis proposes that people who had a series of

painless appointments, before they experienced a traumatic event, were less likely to develop dental anxiety than those people who experienced a traumatic dental experience early in their lives, and previous research supports this^(60,61).

Although there is limited support for the informational pathway in the acquisition of children's dental fear^(62,63), research has revealed that child and parental dental anxiety are closely linked and there was a significant relationship between parental and child dental fear, especially in children eight years and younger⁽⁶⁴⁾, providing some support for the argument that the modelling pathway may be important in the development of children's dental anxiety^(61,65,66).

2.6.1 Factors affecting dental anxiety

Empirical results identified the effects of different factors on dental anxiety. Gender, according to some studies, was one of the factors affecting dental anxiety. Results from a study of 122 males and 124 females revealed that the female gender was more susceptible to higher levels of dental anxiety than was the male gender. The difference in the levels of anxiety between males and females was significant ($p= 0.037$) and this showed the role of gender as a factor to the level of dental anxiety⁽⁶⁷⁾. Many studies supported the significance of gender as a factor to the level of dental anxiety where the females had higher anxiety scores than males^(68,69).

A child's gender, and the gender of the accompanying parent to a dental clinic, also affected children's levels of corporation during the dental visits and identified the role of anxiety that influenced behavior⁽⁷⁰⁾. Conflicting results, however, exist on the significance of gender on the prevalence of dental anxiety. Gender, for example and according to results from the study by Mehta *et al.* ⁽⁶⁹⁾, did not affect the prevalence of dental anxiety while Deogade and Suresan⁽⁴⁴⁾ identified its significance as a factor to the occurrence of the anxiety. Dental anxiety, according

to Deogade and Suresan was more prevalent among males (65.1 %) than it was among females (34.9 %).

Past negative dental encounters, which was associated with the causal effects of painful experiences on dental anxiety, was another factor to the anxiety. The negative experiences influenced the experienced level of anxiety⁽⁷¹⁾. Employment status was another factor to dental anxiety, students and homemakers reported the highest levels of dental anxiety. The retired, unemployed, and self-employed people, however, had low levels of dental anxiety⁽⁶⁷⁾. Age also affected dental anxiety and it had been associated with effects on both the prevalence and the level of dental anxiety⁽⁶⁹⁾. Dental anxiety was more prevalent among young people (64% for 21-35 year old), than it was among 36-50 years old (26%) and 51-65 year old (10 %) ^(69,72). A study on the determinants of dental anxiety in pre-school children also identified a significant increase in anxiety as the children grew from three to five years of age⁽⁷³⁾, a transition that was consistent with the emotional development that is expected at childhood⁽²²⁾. Emotional development, which occurs alongside cognitive development, informs children's emotional behavior. The increasing significance of age from three years to five years⁽⁷³⁾ was consistent with the expected cognitive and emotional development over the period, and their effects on response to a child's environment⁽²²⁾. A person's area of residence and level of education had also been associated with effects on dental anxiety levels⁽⁷⁴⁾, though Fayad *et al.* reported insignificance of education level to dental anxiety⁽⁷⁵⁾. Levels of income and support from friends are other factors to dental anxiety such that low levels of income and lack of support from friends lead to higher levels of dental anxiety⁽⁷⁶⁾. Effectiveness of communication from dental teams and parents, existence of negative stimuli, and distraction measures that can suppress past negative experiences also influence the likelihood of occurrence of dental anxiety and the level of anxiety that can be realized⁽³³⁾.

2.7 Assessing dental anxiety in children

The type of a child's dental problem may determine the child's level of anxiety⁽⁷⁷⁾. The relationship between dental anxiety in children and children's long term dental health⁽⁷⁸⁾ identifies the need for assessment of anxiety levels during children's dental visits. Children with cleft lip and palate, for example, had lower anxiety levels in the dental chair than they had in the waiting room⁽⁷⁷⁾. The children with cleft lip and palate also had lower levels of dental anxiety in the dental chair than did children without cleft lip and palate⁽⁷⁷⁾. Anxiety is significant to children's willingness to revisit dental clinics⁽⁷⁸⁾, a factor that identifies the need for assessing dental anxiety in children.

The assessment of dental anxiety can be realized through different methods which include (i) direct observation of the child's physiological state or behavioral response in the dental context (usually by either dental personnel and/or researchers), (ii) the completion of a questionnaire by the parent as a proxy measure of how anxious the child is, and (iii) self-reported scales completed by the child⁽⁷⁹⁾. Some studies using clinical observations alone showed poor to moderate agreement when dentists' ratings were compared to the child's self-reported dental anxiety ratings^(80,81). Children with dental anxiety may be more likely to show negative behavior and emotional reaction in the dental clinic^(82,83). While, on the other hand, some children do not show overt presentations of anxiety; behavioral reactions, which sometimes are translated as manifestations of anxiety, can be due to other reasons, such as behavioral management problems⁽⁶⁾. Physiological measurements (such as cortisol and salivary alpha-amylase measures from saliva⁽⁸⁴⁾) can also be used to assess dental anxiety levels in children but is costly and cannot be used for routine dental visits. Therefore, self-reported measures of dental anxiety completed by the children themselves (where this is applicable) are considered the most reliable and valid method⁽⁶⁾ as evidence showed that

children from age of seven to eight can be reliable in reporting all aspect of their health⁽⁸⁵⁾. There are different kinds of questionnaires which are used to assess dental anxiety such as:

1) The children's fear survey schedule dental subscale (CFSS-DS) which is a dental-specific measure that requires children to rate how frightened they are in response to 15 dental-related situations/treatments (e.g. 'dentists', 'injections' and 'having somebody examine your mouth')⁽⁸⁵⁾.

2) The dental anxiety scale (DAS) and modified DAS which are a four-item measure and a five-item measure, respectively. Both are used to assess dental anxiety in adults.

3) Modified child dental anxiety scale (MCDAS) which contains eight questions, four of which are based on the original DAS⁽¹³⁾. The additional anxiety-provoking dental situations assessed by the MCDAS include dental injections, general anesthesia, extraction and sedation.

4) There is also a faces version of the MCDAS (MCDASf)⁽¹⁷⁾ which incorporates faces within the response format. The faces version of the measure was developed to be more suitable for children as young as three years old and those with limited cognitive functioning. However, the two questions it contains on sedation/anesthesia may limit its possibilities in situations where the child is unfamiliar with these procedures.

5) The Facial Image Scale (FIS)⁽⁸⁶⁾ consists of one item with response of five faces (ranging from a very sad to a very smiley face).

6) Venham picture scale (VPS)⁽⁸⁷⁾ incorporates eight pictures with each showing two cartoon boys displaying different emotions. The patient is required to indicate which of the boys, within the eight pictures, most accurately reflect their feelings at that time⁽⁶⁾.

2.7.1 Parents' ability to assess dental anxiety in their children

The availability of data collection instruments, which have objective properties, for the assessment of dental anxiety in children suggests the ability of parents to assess dental anxiety in their children.

The knowledge and competence required for the administration of the tools, together with the ability to avoid bias in the administration of the instruments and the evaluation of assessment results are necessary. On occasion, parents, however, seem unable to use the available assessment tools to measure anxiety levels in their children, a factor that further undermines the parents' ability to assess their children's dental anxiety, therefore proxy measures have some limitations. It has been shown that parents often reflect their own anxiety, rather than reflecting their children's anxiety⁽⁸⁸⁾. Previous research had revealed that parents are not able to reliably assess children's levels of dental anxiety⁽⁸⁹⁾ with studies showing only moderate agreement between child and parental ratings^(16,19,90). While some other studies showed fair agreement between children's self-reported and parent's proxy-reported dental anxiety⁽¹⁸⁾. A study that compared parents' anxiety scores and their children's score showed that parents overestimated their children's anxiety levels for children with low dental anxiety levels and underestimated the anxiety levels for children with high levels of dental anxiety. Parents also scored lower than did their children in the assessment of the children's dental anxiety⁽¹⁹⁾. The parents' inaccurate estimation of their children's anxiety levels is consistent with the findings that parents' ratings of their children's anxiety levels depend on such factors as the child's age and gender, as well as the parent's level of education⁽⁹¹⁾. The factors moderate parents' ratings to yield overestimation for children with low anxiety levels and underestimation for children with high anxiety levels.

Wong *et al.*⁽⁹²⁾ compared the agreement between the rating of dental anxiety between children's rating of their anxiety levels and ratings by parents, dentists, and dental surgery assistants. Results showed weak agreements between the children's FIS scores and the scores that the other stakeholders offer, and indicated an inability to assess children's dental anxiety based on parents'

perceptions⁽⁹²⁾. Consequently, parents cannot be considered a reliable source to assess the dental anxiety in their children.

2.7.2 Behavior of anxious children in the dental clinic

Dental behavior management problems (DBMP), are defined by the dentist's experience when treating the patient. It is a collective term for uncooperative and disruptive behaviors, which result in delay of treatment or render treatment impossible, regardless of the type of behavior or its underlying mechanism(s)⁽⁹³⁾.

Previous research had revealed that dental anxiety was the single most important predictor of children's behavior in the dental setting and that there were strong associations between dental anxiety and perceived uncooperative and problem behaviors^(83,94). Typically, dental anxiety correlated positively with a child's behavior during dental treatment. The more fearful a patient is, the more behavioral problems can be expected: 61% children with dental anxiety had DBMP, but only 27 % of children with DBMP had dental anxiety⁽⁹⁵⁾. According to a study by Gustafsson *et al.* and compared to a reference group (N = 245), dental anxiety and general fears were significantly higher in 230 patients who were referred to pediatric dentistry specialists due to DBMP⁽⁸³⁾. One of the more reliable and frequently used behavior rating systems in both clinical dentistry and research is the FBRS. This scale (see Appendix IV) separated observed behaviors into four categories ranging from definitely negative to definitely positive⁽⁷⁾.

2.80 Management of fear and anxiety in the dental clinic

Dental fear and anxiety are prevalent among patients⁽⁹⁸⁾ and have been associated with avoidance of dental clinics⁽⁹⁹⁾. At least 20 per cent of dental patients have either moderate or high levels of fear or anxiety and the degree of fear or anxiety are strongly correlated with the tendency to avoid

dental care⁽⁹⁸⁾. Intra-oral injection is an example of dental care measures that cause fear and it has been associated with a 6.52 odds ratio of avoiding dental treatment⁽⁹⁹⁾.

Dental fear and anxiety can be managed by using pharmacological and non-pharmacological behavior management techniques. Pharmacological techniques include treating the patient while using sedation or under general anesthesia ⁽⁹⁸⁾.

There is some evidence that psychological therapies can be used to decrease the patient's dental fear and anxiety with good success, although most of the studies have dealt with adult patients ^(99–101). Psychological strategies can be used to enhance trust, increase feelings of control, and develop coping skills in children with dental anxiety^(102,103). Non pharmacological behavior management techniques like 'Tell-show-do', stop signaling methods /devices, positive reinforcement and distraction like audiovisual distraction ⁽¹⁰⁵⁾ are all techniques that can be used to help build-up trust and increase patient control and treatment predictability^(61,105). These techniques are regularly used by pediatric dentists, with 'Tell- show-do' being the most commonly used behavioral technique ⁽¹⁰⁷⁾. The use of these basic psychological techniques has been found effective in the reduction of children's dental anxiety during dental treatment ⁽¹⁰⁸⁾.

Although these techniques may be adequate for children with mild levels of dental anxiety, children with more pronounced fears may require additional psychological interventions to help them overcome their dental anxiety/fears. It is important that psychological interventions delivered by dentists are evidence based; however, there has been a lack of high-quality research (e.g., randomized control trials) investigating the effectiveness of interventions in the field of dental anxiety ^(61,108). There are, however, a number of empirically supported treatments for the management of anxiety problems in children, which are largely based on a cognitive behavioral therapy (CBT) model ⁽¹¹⁰⁾. CBT is a problem-focused psychological intervention, which seeks to

teach patients skills for the self-management of their anxiety. Williams and Garland⁽¹¹⁰⁾ developed the “Five Areas” model of CBT, which can be used in the assessment and management of anxiety problems (like graded exposure⁽⁵⁾ and cognitive restructuring) (Fig. 01.1)

Kani *et al.*⁽¹¹¹⁾ found that the average number of CBT appointments required before a patient received dental treatment without sedation was five. CBT offers an effective technique for helping dentally anxious patients receive treatment without sedation⁽¹¹²⁾.

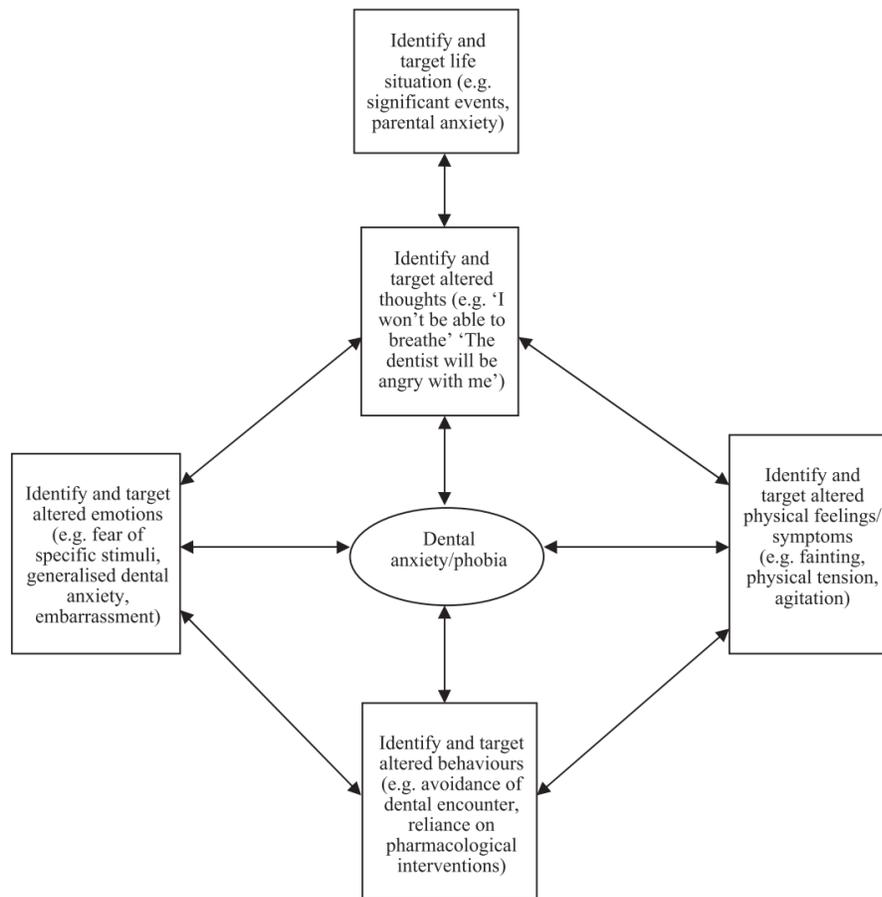


Figure 1.1 Five Areas approach of dental anxiety (adapted from Williams and Garland's⁽¹¹⁰⁾ Five Areas approach of CBT assessment and management)

2.9 Aim and objectives of the study

2.9.1 Aim of the study

The main objective is to assess the prevalence of dental anxiety (self and proxy reported) in a subgroup of 7–16 year-old children in the UAE.

2.9.2 Specific objectives

- To evaluate the correlation between the parental assessment of their children's dental anxiety and the children's self-reported dental anxiety.
- To determine the correlation of the aforementioned dental assessments (self and proxy) with the child's behavior at the pediatric dentist.
- To identify the relation between the gender, age, culture, ethnicity, nationality, and other demographics with the child-reported anxiety scores.

3.00 MATERIALS & METHODS

In this chapter, the study logistics will be presented, including the study design, criteria and statistical analysis.

3.1 Study design

A prospective cross-sectional survey design using two MCDASf-OHAR based questionnaires was conducted (see Appendix I). The questionnaires targeted child-parent/pairs and were completed at the dental appointment independently. The accompanying parent received a cover information sheet and consent form. In addition, following the appointment data about behavior (Using the FBRS) rating were collected from the digital records completed by seven dentists (calibrated in using the FBRS) treating the child (Dental 4 Windows SQL patient management software Version i4).

3.2 Study population/ location

All patients and parents attending the Dubai Dental Hospital (DDH) who met the criteria and accepted to participate were included in the study. We targeted children between the ages of seven to 16 and their parents/guardians attending the pediatric dentistry department in Dubai Dental Hospital between 1st of March 2017 and 30th November 2017. This included all patients attending for new patient exam or follow up appointments. Consecutive sampling was used to reduce selection bias.

3.3 Study inclusion and exclusion criteria

3.3.1 Inclusion criteria

- Seven to 16-year old children attending DDH with their parent(s)/guardian

- Patients for new or recall appointments regardless of dental history.
- Both UAE and non-UAE nationals were eligible to participate in the study.

3.3.2 Exclusion criteria

- Patients with learning difficulties or language problems.
- Patients who were escorted to their dental appointments by an adult other than parents.
- Children and parents who refused to consent.

3.4 Data collection

The parent and patient received a written explanation about the study (in English or Arabic) and were invited to participate. The parents and patients who accepted to participate were asked to sign the informed consent form (Appendix II).

Demographic data (Appendix III) collected included; age of the child, gender, ethnicity, the nationality, employment and education level of the attending parents, in addition to whether they were the father or mother. The parents and patients were asked to complete the questionnaires independently in the dental clinic before the examination at the start of the dental appointment and were collected by the dental assistant. The dental anxiety scores (self and proxy) were calculated out of 30. The questionnaires were numbered with the case file ID number.

In addition, the pediatric dentistry postgraduate residents, who were previously calibrated to assess child behavior assessed the child behavior and recorded it in the digital notes, blinded to the self and proxy reported anxiety scores. The behavior rating was according to FBRS. The FBRS is a widely-used tool in the field of pediatric dentistry for assessing the child's behavior (see Appendix

IV). The FBRS was recorded independently and matched to the surveys by the patients file ID number.

3.4.1 Calibration of dentists for the use of FBRS

Seven postgraduate residents, already familiar with the use of FBRS were further calibrated in using the FBRS by exposing them to 10 clinical cases in pediatric dentistry and asking them to rate the behavior according to FBRS as per Appendix IV. The agreement was 100% .

3.5 Sample type and size

A consecutive sample of all the children who attended Dubai Dental Clinic as new patient or for follow up appointment in the said period. A sample of 156 filled questionnaires from children and their parents was collected with criteria of inclusion; their data was collected from 1st of March 2017 and 30th November 2017. Total of 170 questionnaires were distributed one parent refused to participate, thirteen patients were excluded due to learning difficulties and language problems.

3.6 Questionnaire

The SDCEP has produced OHAR guidelines. The dental anxiety measure used in these guidelines for children is based on the MCDASf, which had previously been tested for reliability and validity in eight –12 year-old children ⁽¹⁷⁾. It is composed of six questions without the last two questions in the original MCDASf which are related to testing anxiety due to dental general anesthesia and sedation. The last two questions were removed due to the fact that children could be unaware of sedation and general anesthesia experience and may find it difficult to score these questions⁽⁶⁾. The SDCEP recommended the shortened MCDASf questionnaire, referred as MCDASf-OHAR; these were used in this study⁽¹⁵⁾. Each question has five faces ranging from a very happy face to a very sad face and score range of one to five. The total score range of MCDASf-OHAR is 6–30.

Children with a score ≥ 19 were considered to have severe dental anxiety while a score of < 19 were considered to have non to moderate anxiety. The same questionnaire was used for both children's self-reported and parents' proxy reported dental anxiety to allow accurate comparison. To make sure parents filled the questionnaires on behalf of their child and not themselves; in the questionnaires administered to all parents the text of the question 'how do you feel' was changed to 'how does your child feel'. This was followed by clear verbal instructions that they are filling the questionnaire for their children.

The MCDASf questionnaire was administered in English. However, Arabic language translated versions were used when required. The English version was translated into the Arabic language using the forward and backward translation method. Three pediatric dentistry residents (whose mother tongue is Arabic) translated the original questionnaire into the Arabic language and the translation was checked by an independent bilingual expert who resolved concerns and discrepancies. To make sure that the translation was effective a back translation to the English language was done by an independent translator who back translated the questionnaire and discrepancies in translation version were resolved. (See Appendix V)

3.6 Statistical analysis

The data was collected using the data sheet, transferred to computer-spread sheets and analyzed using computerized Statistical Package for Social Sciences (SPSS, version 20, Chicago, SPSS Inc). MCDASf-OHAR anxiety categorized according to scores and various variables were determined by using Chi-square test and Fischer exact test when appropriate. Differences in the mean MCDASf-OHAR scores between parents and children via one way analyses of variance (ANOVA) model and *Post Hoc* for pairwise comparisons. Self and proxy reported mean MCDASf-OHAR individual question scores were compared using independent t-test. Assessment of the correlations

of the self and proxy anxiety scores were conducted by using Pearson's correlation coefficient. Scatter plots were used when assessing correlation. Assessment of agreement between the parent and child rating of dental anxiety, and agreement between them per question was performed via Kappa analysis. The interpretation of k-coefficient was as follows: < 0.20 = poor agreement, $0.21-0.40$ = fair agreement, $0.41-0.60$ = moderate agreement, $0.61-0.80$ = substantial agreement, $0.81-1.00$ = almost perfect agreement and 1.00 = perfect agreement. Logistic regression was used to analyze self or proxy scores as predictors of FBRS using Receiver Operating Curves (ROC) and Area Under the Curve (AUC). Statistical significance was set at <0.05 in all the tests.

3.7 Permission and ethical approval

A research protocol was reviewed locally by the MBRU Pediatric Dentistry Department. The Research Protocol was then submitted to the Research and Ethics Review Committee of MBRU, and approval was obtained to conduct the study (Appendix VI).

This study was conducted in full conformance with principles of the "Declaration of Helsinki", Good Clinical Practice (GCP), and within the laws and regulations of the UAE/DHCC. All data collected was anonymous and no patients' identifiers were used.

4.00 RESULTS

4.1 Demographics

One hundred and fifty-six completed questionnaires by children and their parents were returned. The data were collected from 1st of March 2017 and 30th November 2017. A total of 170 questionnaires were distributed. One parent refused to participate, thirteen patients were excluded due to incomplete fields and language issues thus the response rate was 99.40%.

Demographic data of the sample included in study are shown in Tables 4.1 and 4.2. The children in our sample were between 7 and 16 years old, with a mean age of 9.95 (± 2.17) years. The study population consisted of a much larger proportion of 7-11-year-old children (n = 121, 77.60%) compared to 12-16-year-old children (n = 35, 22.40%). Child's age was a significant variable; self-reported severe dental anxiety (MCDAS-f ≥ 19) was more in 7-11-year-old children (23 out of 121, 29.50%) in comparison to 12-16-year-old children (12 out of 35, 15.40%). The difference was statistically significant (p=0.027) while the proxy reported severe dental anxiety was not statistically different between both groups (p=0.87).

Other variables (gender, nationality, parent type, ethnic background, parent's education, and parent's employment status) were also assessed. The majority of the children were males (n=84, 53.80%). More females had severe anxiety according to self and proxy reported dental anxiety scores (17 out of 72, 23.60%) and (26 out of 72, 36.10%) respectively than males but this was not significant (p=0.45) and (p=0.50) respectively. Self-reported severe dental anxiety distribution was higher in UAE nationals (13 out 44, 30.20%) than non UAE nationals (21 out of 112, 18.70%) but this again was not statistically significant (p=0.09). A large proportion of proxy reported questionnaire was filled by mothers (n = 98, 62.80%), followed by fathers (n=58, 37.20%) and the severe dental anxiety was higher when the questionnaire was filled by the mothers (63 out of 98,

36.70%) but it was not statistically significant ($p=0.29$). The background of most of the children in the sample was Arab ($n=104$, 66.70%) while non-Arabs (Asians, White Caucasians, Africans, and other ethnicities) formed 33.30% ($n=52$) with no statistical significant difference in the self and proxy reported dental anxiety among them ($p=0.06$, $p=0.46$ respectively). A tendency of the presence of severe dental anxiety was found in children whose parents' educational level was at college level or more (26 out of 106, 24.50%) but this was statistically insignificant ($p=0.191$). Also proxy reported severe dental anxiety was higher in parents with college level and more educational level (36 out of 106, 34%) but was statistically not significant ($p=0.58$). The majority of the parents in our sample were employed ($n=116$, 78.40%). Dental anxiety among the children of employed parents (28 out of 116, 24.10%) tended to be higher than the children of unemployed parents (5 out of 32, 15.60%) however again this finding was statistically not significant ($p=0.22$). It is important to highlight that two levels of anxiety scores were assessed; an overall (for six questions) MCDASf score (out of 30) and a singular question score (out of 5) and they were for both self (child) and proxy (parent). This will be the basis of the further results presented below.

Variables		N (%)	None to moderate dental anxiety MCDASf<19	Severe dental anxiety MCDASf \geq 19	p-value (Chi square)
Gender of the children	Male	84 (53.80%)	66(78.60%)	18(21.40%)	0.45
	Female	72 (46.20%)	55(76.40%)	17(23.60%)	
Parents	Father	58 (37.20%)	43(74.1%)	15(25.90%)	0.28
	Mother	98 (62.80%)	78(79.60%)	20(20.40%)	
Nationality	UAE nationals	44 (28.20%)	30(69.80%)	13(30.20%)	0.094
	Non UAE nationals	112 (71.83%)	91(81.30%)	21(18.70%)	
Ethnicity	Arab	104 (66.70%)	76(73.10%)	28(26.90%)	0.060
	Non-Arab	52 (33.30%)	42(85.70%)	7(14.30%)	
Educational level of the parents	High school	48 (31.20%)	40(83.30%)	8(16.70%)	0.191
	College and college+	106 (68.80%)	80(75.50%)	26(24.50%)	
Occupational status of the parents	Unemployed	32 (21.60%)	27(84.40%)	5(15.60%)	0.22
	employed	116(78.40%)	88(75.90%)	28(24.10%)	
Age	7-11 years	121(77.60%)	55(70.50%)	23(29.50%)	0.027*
Mean(SD)	12-16 years	35 (22.40%)	66(84.60%)	12(15.40%)	
9.95 (2.17)					

Table 4. 1. Demographical characteristics of the study group in relation to self-reported dental anxiety

Variables		N (%)	None to moderate anxiety MCDASf<19	Severe anxiety MCDASf \geq 19	p-value (Chi square)
Gender of the children	Male	84 (53.80%)	58(69.00%)	26(31.00%)	0.50
	female	72 (46.20%)	46(44.20%)	26(36.10%)	
Parents	Father	58 (37.20%)	42(72.40%)	16(27.60%)	0.29
	Mother	98 (62.80%)	62(63.30%)	36(36.70%)	
Nationality	UAE nationals	44 (28.20%)	28(65.10%)	15(34.90%)	0.85
	Non UAE nationals	112 (71.83%)	76(67.90%)	36(32.10%)	
Ethnicity	Arab	104 (66.70%)	67(64.40%)	37(35.60%)	0.46
	Non-Arab	52 (33.30%)	35(71.40%)	14(28.60%)	
Educational level	High school	48 (31.20%)	34(70.80%)	14(29.20%)	0.58
	College and college+	106 (68.80%)	70(66.00%)	36(34.00%)	
Occupational status	Unemployed	32 (21.60%)	24(75.00%)	8(25.00%)	0.30
	employed	116(78.40%)	75(64.70%)	41(35.30%)	
Age	7-11 years	121(77.60%)	51(65.40%)	27(34.60%)	0.87
Mean(SD) 9.95 (2.17)	12-16 years	35 (22.40%)	53(67.90%)	25(32.10%)	

Table 4. 2 *Demographical characteristics of the study group in relation to proxy-reported dental anxiety.*

	MCDASf <19 (None to moderate anxiety)	MCDASf ≥ 19 (Severe dental anxiety)	Mean MCDASf score (SD) (Independent t-test)
Self (child) reported MCDASf	77.60% (n=121)	22.40% (n=35)	15.02 ±4.87
Proxy (parent) reported MCDASf	66.70% (n=104)	33.30% (n=52)	15.70 ± 6.10
p-value			p=0.28

Table 4. 3 Overall prevalence of anxiety in the sample (N=156) and mean MSCDAS-f scores.

The prevalence of severe dental anxiety (MCDAS-f ≥19) self-reported by children was 22.40% while the prevalence of severe dental anxiety proxy reported by parents was 33.30% (see Table 4.3). The mean MCDAS-f score of the 156 children was 15.01 (±4.87) out of 30 and the mean proxy score was 15.70 (±6.10). According to the FBRS as measured by dentists, most of the children were cooperative (n=142, 91.00%) and only (n=14, 9.00%) were uncooperative. (See Table 4.4).

FBRS (dentist recorded)	Frequency	Percentage %	Outcome
--ve (category 1)	7	4.50%	Uncooperative (n=14, 9%)
-ve (category 2)	7	4.50%	
+ve (category 3)	38	24.40%	Cooperative (n=142, 91%)
++ve (category 4)	104	66.70%	

Table 4. 4 *The FBRS results and distributions of the children between the groups.*

4.2 Self and Proxy MCDASf-OHAR responses per question

Using six questions covering various dental situations (Table 4.5), the children and parents were asked to rate the child’s anxiety using a 5 point-likert scale. Thus for each question, the score ranged from 1 (not worried) to 5 (extremely worried). Table 4.5 presents children’s and parent’s mean dental anxiety scores on individual questions of self and proxy reported MCDASf-OHAR (see Appendix I). Comparison of both self and proxy reported MCDASf-OHAR means’ scores per question with each other (Table 4.6) *within* the “self” and “proxy” groups and also *between* them was conducted. Significant differences were found within and between both groups (one-way ANOVA test $p<0.001$). This will be detailed below.

In the **self-reported** responses, the first three questions; “going to the dentist”, “having teeth looked at” and “having teeth cleaned and polished” had the least anxiety mean scores (out of 5), (1.89 ± 0.95 , 1.93 ± 1.08 , 1.69 ± 1.02 respectively), followed by “having a filling” (2.46 ± 1.25). Questions 4 and 6: “having injection in the gum” and “having a tooth taken out” scored the highest mean anxiety scores (3.49 ± 1.28 , 3.56 ± 1.49 respectively) ($p<0.001$). Similarly, the **proxy**

reported scores showed that the highest mean anxiety scores were also for “*having a tooth taken out*” and “*having a gum injection*” (3.54 ± 1.43 , 3.37 ± 1.31 respectively) followed by “*having a filling*” (2.83 ± 1.34) while on the other hand proxy means scores were lowest for the second and third questions; “*having teeth looked at*” and “*having teeth cleaned and polished*” (1.99 ± 1.07 , 1.95 ± 1.03 respectively) while “*going to dentist*” scored slightly higher (2.04 ± 1.11) ($p < 0.001$). From the most anxiety producing to the least anxiety producing, both children and parents had a similar anxiety ranking for the dental situations/ procedures (Table 4.5 columns 7 and 8) except for the fourth and fifth position where “*going to the dentist*” scored more than “*having the tooth looked at*” in parent’s group and the opposite in children’s group. Thus, in terms of ranks, one (I) ranked most anxiety causing while six (VI) was the least anxiety causing procedure. Both groups scored the highest level of children’s anxiety for “*having a tooth taken out*” and the lowest level of anxiety in “*having teeth cleaned and polished*”.

Overestimation by parents of their children’s anxiety was noted in the questions related to the third question “*having teeth cleaned and polished*” and the fifth question “*having a filling*” and this was statistically significant (Independent T-test, $p = 0.02$ and $p = 0.01$ respectively, Table 4.5). There was also a tendency for parents to overestimate their children’s anxiety in relation to “*going to the dentist*”, “*having teeth looked at*”, however this was statistically insignificant (Independent T-test, $p > 0.05$, Table 4.5). The parents tended to slightly underestimate children’s anxiety in relation to “*having an injection in the gum*” and *having a tooth taken out*” but this was statistically insignificant (Independent T-test, $p > 0.05$, Table 4.5).

Individual questions of MCDASf (Scale range 1-5 per question)	Children's Mean (SD)	Quality	Parent's Mean (SD)	Quality	Pairwise comparison (Independent T-test)	Rank of procedure from most anxiety (I) to least anxiety causing (VI)	
						Child	Parent
Q1. Going to dentist	1.89 (0.95)	Relax-slightly worried	2.04 (1.11)	Slightly worried - Fairly worried	0.21	V	IV
Q2. Having teeth looked at	1.93 (1.08)	Relax-slightly worried	1.99 (1.07)	Relax-slightly worried	0.64	IV	V
Q3. Having teeth cleaned and polished	1.69 (1.02)	Relax-slightly worried	1.95 (1.03)	Relax-slightly worried	0.024*	VI	VI
Q4. Having an injection in the gum	3.49 (1.28)	Fairly worried – worried a lot	3.37 (1.31)	Fairly worried – worried a lot	0.41	II	II
Q5. Having a filling	2.46 (1.25)	slightly worried - Fairly worried	2.83 (1.34)	Slightly worried - Fairly worried	0.013*	III	III
Q6. Having a tooth taken out	3.56 (1.49)	Fairly worried – worried a lot	3.54 (1.43)	Fairly worried – worried a lot	0.91	I	I

Table 4. 5 *Self and proxy reported mean MCDASf-OHAR individual question scores.*

4.2.1 *Post Hoc* multiple comparisons of self-reported MCDASf readings per question

Further to the one-way ANOVA test as above, *Post Hoc* multiple comparisons were conducted to find out exactly where the differences in the mean scores of the questions lie within the children's group (see Table 4.6).

The children's MCDASf-OHAR score for the **first question** related to "*going to the dentist*" (1.89 ± 0.95) was not statistically significantly different from the two questions scores related to "*having the teeth looked at*" (1.92 ± 1.08) and "*having teeth cleaned and polished*" (1.69 ± 1.01) ($p=0.776$ and $p=0.142$ respectively) while this score was statistically significantly different from those related to "*having an injection in the gum*" (3.48 ± 1.27), "*having a filling*" (2.46 ± 1.24) or "*having a tooth taken out*" (3.55 ± 1.49) ($p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The children's MCDASf-OHAR score for the **second question** related to "*having teeth looked at*" (1.92 ± 1.08) was not statistically significantly different from the two questions scores related to "*going to the dentist*" (1.92 ± 1.08) and "*having teeth cleaned and polished*" (1.69 ± 1.01) ($p=0.78$ and $p=0.14$ respectively) while this score was statistically significantly different from those related to "*having an injection in the gum*" (3.48 ± 1.27), "*having a filling*" (2.46 ± 1.24) or "*having a tooth taken out*" (3.55 ± 1.49) ($p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The children's MCDASf-OHAR score for the **third question** related to "*having teeth cleaned and polished*" (1.69 ± 1.02) was not statistically significantly different from the two questions scores related to "*going to the dentist*" (1.92 ± 1.08) and "*having teeth looked at*" (1.69 ± 1.01) ($p=0.14$ and $p=0.08$ respectively) while this score was statistically significantly different from those related to "*having an injection in the gum*" (3.48 ± 1.27), "*having a filling*" (2.46 ± 1.24) or "*having a tooth taken out*" (3.55 ± 1.49) ($p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The child's MCDASf-OHAR score for the **fourth** question related to "*having an injection in the gum*" (3.49±1.28) was not statistically significantly different from the question scores related to "*having a tooth taken out*" (3.56 ±1.49) (p=0.60) while this score was statistically significantly different from those related to "*going to the dentist*" (1.92 ±1.08), "*having teeth looked at*" (1.69 ± 1.01), "*having teeth cleaned and polished*" (1.69±1.02) and "*having a filling*" (2.46 ±1.24) (p<0.001, p<0.001, p<0.001 and p<0.001 respectively).

The child's MCDASf-OHAR score for the **fifth** question related to "*having a filling*" (2.46 ±1.24) was statistically significantly different from those related to "*going to the dentist*" (1.92 ±1.08), "*having teeth looked at*" (1.69 ± 1.01), "*having teeth cleaned and polished*" (1.69±1.02) "*having an injection in the gum*" (3.48 ± 1.27) and "*having a tooth taken out*" (3.55 ± 1.49) (p<0.001, p<0.001, p<0.001 and p<0.001 respectively).

The child's MCDASf-OHAR score for the **sixth** question related to "*having a tooth taken out*" (3.56 ±1.49) was not statistically significantly different from the question scores related to "*having a filling*" (2.46 ±1.24) (p=0.60) while this score was statistically significantly different from those related to "*going to the dentist*" (1.92 ±1.08), "*having teeth looked at*" (1.69 ± 1.01), "*having teeth cleaned and polished*" (1.69±1.02) and "*having an injection in the gum*" (3.49±1.28) (p<0.001, p<0.001, p<0.001 and p<0.001 respectively).

These results suggest that the self-reported anxiety of the children was similar when faced with either an injection in the gum or an extraction, but was less with the other aspects.

4.2.2 *Post Hoc* multiple comparisons of proxy-reported MCDASf readings per question

Further to the one-way ANOVA test as above, *Post Hoc* multiple comparisons were conducted to find out exactly where the differences in the mean scores of the questions lie within the parent (proxy) group (see Table 4.6).

The proxy reported MCDASf-OHAR score for the **first** question related to “*going to the dentist*” (2.04 ± 1.11) was not statistically significantly different from the question scores related to “*having the teeth looked at*” (1.99 ± 1.78) ($p=0.209$) while this score was statistically significantly different from those related to “*having teeth polished*” (1.95 ± 1.03), “*having an injection in the gum*” (3.37 ± 1.31), “*having a filling*” (2.83 ± 1.34) or “*having a tooth taken out*” (3.54 ± 1.43) ($p<0.001$, $p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The proxy reported MCDASf-OHAR score for the **second** question related to “*having teeth looked at*” (1.99 ± 1.78) was not statistically significantly different from the question scores related to “*going to the dentist*” (2.04 ± 1.11) ($p=0.72$) while this score was statistically significantly different from those related to “*having teeth polished*” (1.95 ± 1.03), “*having an injection in the gum*” (3.37 ± 1.31), “*having a filling*” (2.83 ± 1.34) or “*having a tooth taken out*” (3.54 ± 1.43) ($p<0.001$, $p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The parents proxy MCDASf-OHAR score for the **third** question related to “*having teeth cleaned and polished*” (1.95 ± 1.03) was not statistically significantly different from the two questions scores related to “*having an injection in the gum*” (3.37 ± 1.31) and “*having a tooth taken out*” (3.54 ± 1.43) ($p=1.00$ and $p=0.23$ respectively) while this score was statistically significantly different from those related to “*going to the dentist*” (2.04 ± 1.11), “*having teeth looked at*” (1.99 ± 1.78) and “*having a filling*” (2.83 ± 1.34) ($p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The parents proxy MCDASf-OHAR score for the **fourth** question related to “*having an injection in the gum*” (3.37 ± 1.31) was not statistically significantly different from the question scores related to “*having teeth cleaned and polished*” (1.95 ± 1.03) and “*having a tooth taken out*” (3.54 ± 1.43) ($p=1.00$ and 0.228) respectively, while this score was statistically significantly different from those related to “*going to the dentist*” (2.04 ± 1.11), “*having teeth looked at*” (1.99 ± 1.78) and “*having a filling*” (2.83 ± 1.34) ($p<0.001$, $p<0.001$ and $p<0.001$ respectively).

The parent proxy reported MCDASf-OHAR score for the **fifth** question related to “*having a filling*” (2.83 ± 1.34) was statistically significantly different from those related to “*going to the dentist*” (2.04 ± 1.11), “*having teeth looked at*” (1.99 ± 1.78) “*having teeth cleaned and polished*” (1.95 ± 1.03), “*having an injection in the gum*” (3.37 ± 1.31) and “*having a tooth taken out*” (3.54 ± 1.43) ($p<0.001$, $p<0.001$, $p<0.00$, $p<0.001$ and $p<0.001$ respectively).

The parent proxy reported MCDASf-OHAR score for the **sixth** question related to “*having teeth cleaned and polished*” (1.95 ± 1.03), “*having an injection in the gum*” (3.37 ± 1.31) ($p=0.228$ and $p=0.29$) respectively while this score was statistically significantly different from those related to “*going to the dentist*” (2.04 ± 1.11), “*having teeth looked at*” (1.99 ± 1.78) and “*having a tooth taken out*” (3.54 ± 1.43) ($p<0.001$, $p<0.001$ and $p<0.001$ respectively).

These results suggest that parents think that the anxiety of their children was similar when they were faced with either an injection in the gum, an extraction or a filling. They thought that they would be less anxious in relation to facing other aspects.

Individual questions of MCDASf	Compared with responses to ...	Children's answers P-value	Parent's answers P-value
Q1. Going to dentist	Q2	0.78	0.72
	Q3	0.14	< 0.001*
	Q4	< 0.001*	< 0.001*
	Q5	< 0.001*	< 0.001*
	Q6	< 0.001*	< 0.001*
Q2. Having teeth looked at	Q1	0.78	0.72
	Q3	0.08	< 0.001*
	Q4	< 0.001*	< 0.001*
	Q5	< 0.001*	< 0.001*
	Q6	< 0.001*	< 0.001*
Q3. Having teeth cleaned and polished	Q1	0.14	< 0.001*
	Q2	0.08	< 0.001*
	Q4	< 0.001*	1.00
	Q5	< 0.001*	< 0.001*
	Q6	< 0.001*	0.23
Q4. Having injection in the gum	Q1	< 0.001*	< 0.001*
	Q2	< 0.001*	< 0.001*
	Q3	< 0.001*	1.00
	Q5	< 0.001*	< 0.001*
	Q6	0.60	0.23
Q5. Having a filling	Q1	< 0.001*	< 0.001*
	Q2	< 0.001*	< 0.001*
	Q3	< 0.001*	< 0.001*
	Q4	< 0.001*	< 0.001*
	Q6	< 0.001*	< 0.001*

Q6. Having a tooth taken out	Q1	< 0.001*	< 0.001*
	Q2	< 0.001*	< 0.001*
	Q3	< 0.001*	0.23
	Q4	0.60	0.23
	Q5	< 0.001*	< 0.001*

Table 4. 6. *Post Hoc* multiple comparisons of the *self* and *proxy* responses (questions compared to each other within each of the two groups-one way ANOVA $p < 0.001$)

4.3 Correlation between overall self-reported MCDASf-OHAR and proxy reported MCDASf-OHAR scores.

To assess if there was a pattern, the overall self and proxy MCDASf-OHAR scores (out of 30) were assessed for correlations between them. The self-reported MCDASf-OHAR had a positive correlation with the proxy reported MCDASf-OHAR that was significant (Pearson correlation =0.40, $p < 0.001$). This means that on average when the self-reported score increased, the proxy reported score increased also (See Figure 4.1).

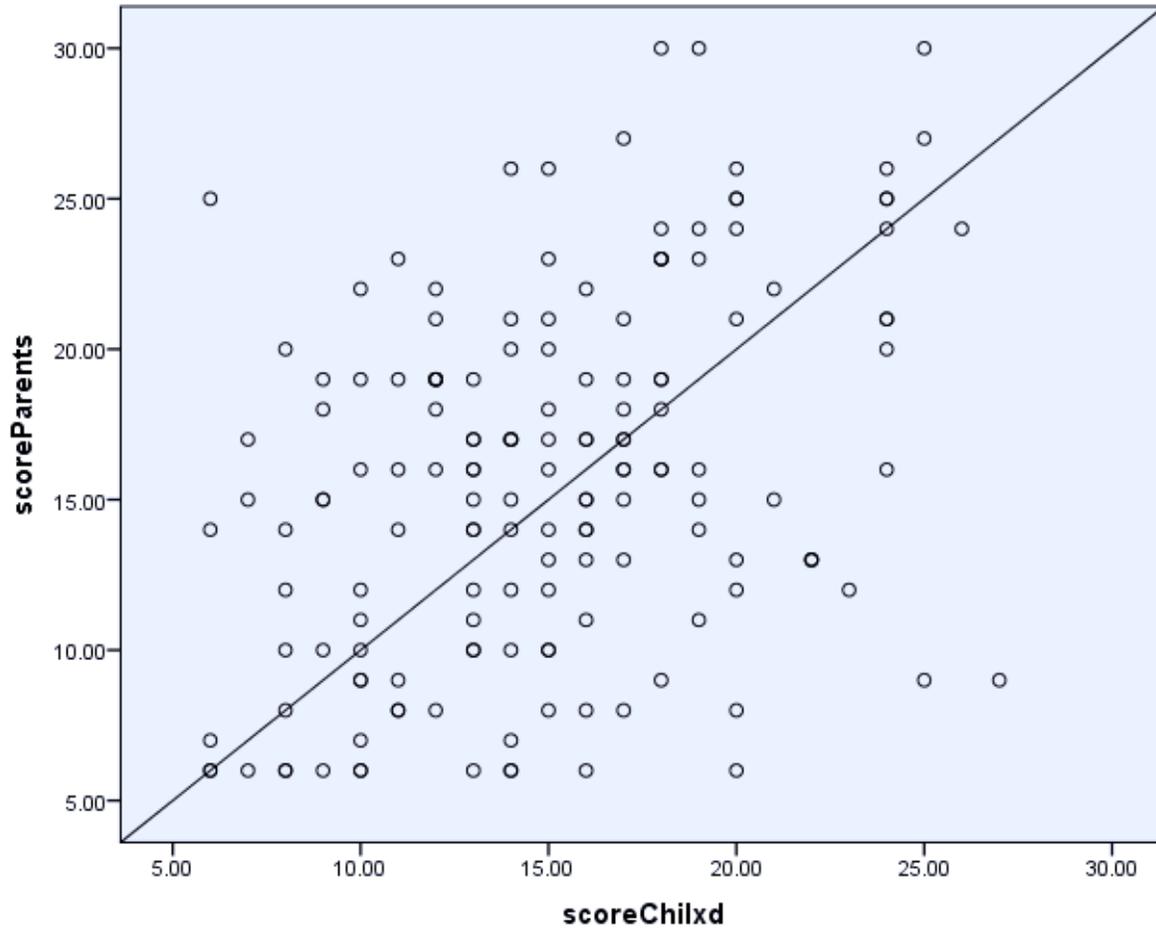


Figure 4. 1 The correlation between self-reported MCDASf and proxy reported MCDASf.

4.4 Correlation between self-reported MCDASf-OHAR scores with children’s behavior

The correlation between self-reported MCDASf-OHAR scores and child behavior in the dental setting was assessed and showed negative correlation between them which was significant (Pearson correlation= -0.39, $p < 0.001$, see Figure 4.2). This means on average when self-reported MCDASf increased the FBRS decreased (indicating uncooperative behavior).

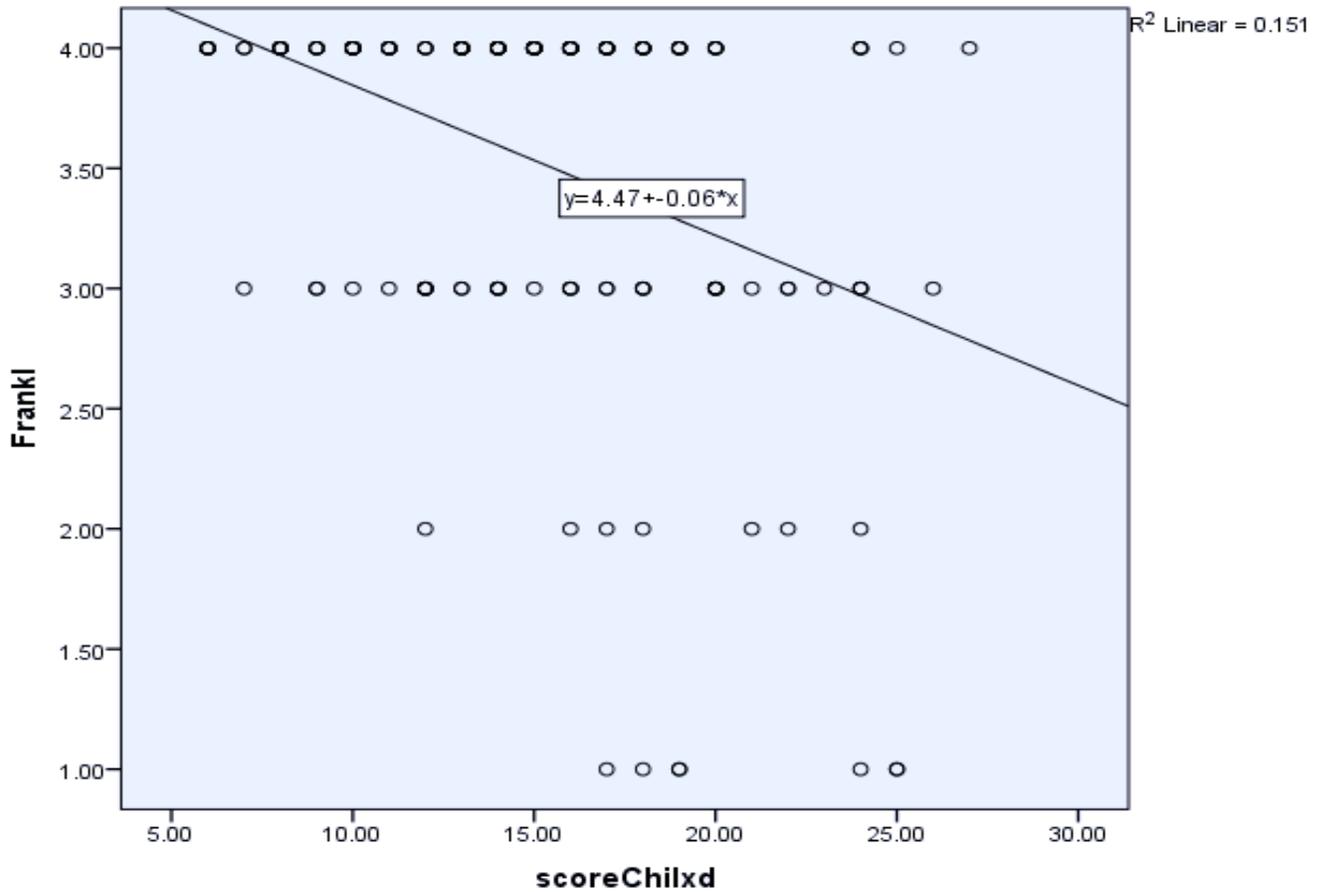


Figure 4. 2 The correlation between self-reported MCDASf and FBRS.

4.5 Correlation between proxy reported MCDASf-OHAR scores with children’s behavior

The correlation between parents’ proxy reported MCDASf-OHAR scores and children’s behavior (As assessed by FBRS) in the dental setting was assessed and showed a negative correlation between them which was significant (Pearson correlation= -0.49, $p < 0.001$, see Figure 4.3). This means when proxy reported MCDASf-OHAR increased the FBRS decreased (indicating uncooperative behavior).

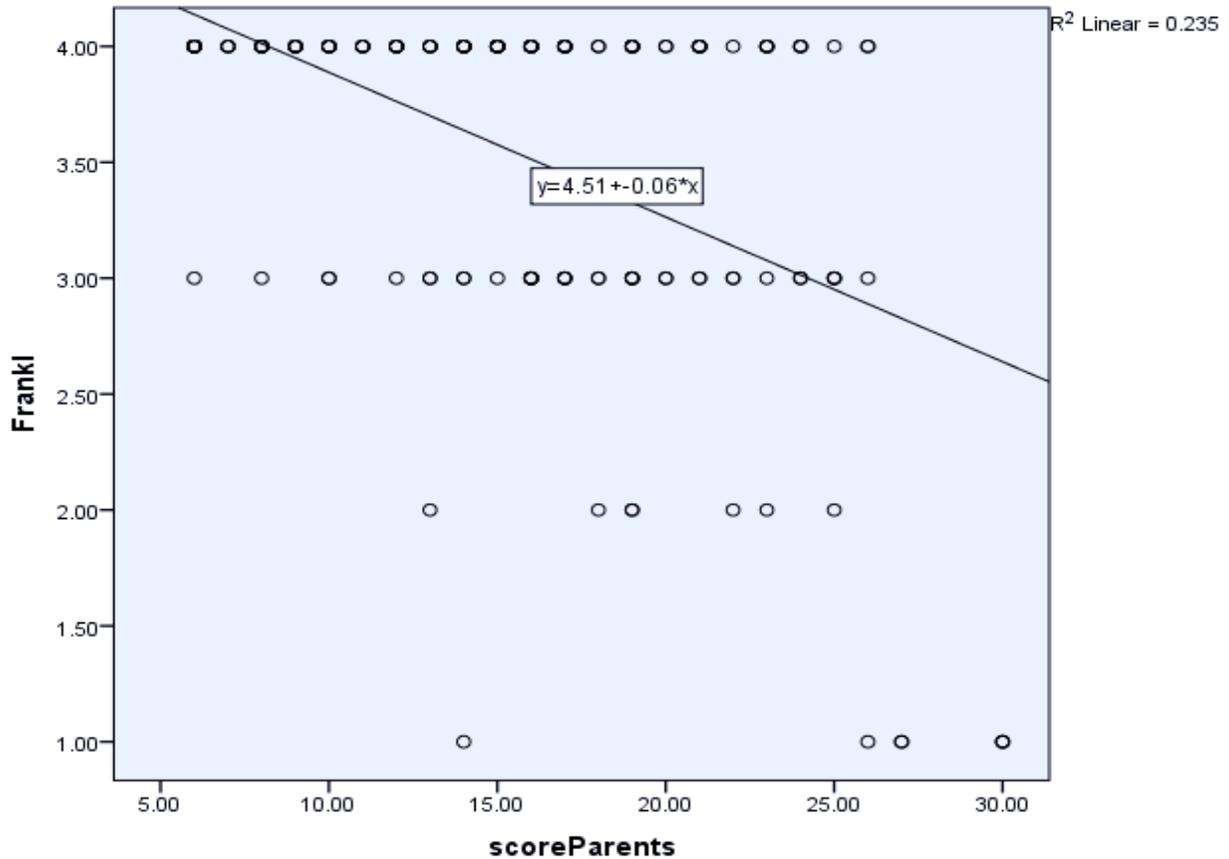


Figure 4. 3 The correlation between proxy-reported MCDASf-OHAR and FBRS.

The overall correlations between self and proxy MCDASf-OHAR scores in relation to FBRS are presented in (Figure 4.4) which revealed positive correlation between self and proxy reported MCDASf-OHAR and negative correlation between both self and proxy reported MCDASf-OHAR with FBRS. This shows a trend in that when the anxiety scores increases, uncooperative behavior also increases.

Figure 4.4
 Child and Parent Proxy Modified Dental Anxiety Score Vs Frankl Behaviour Scale Rating (N=156)

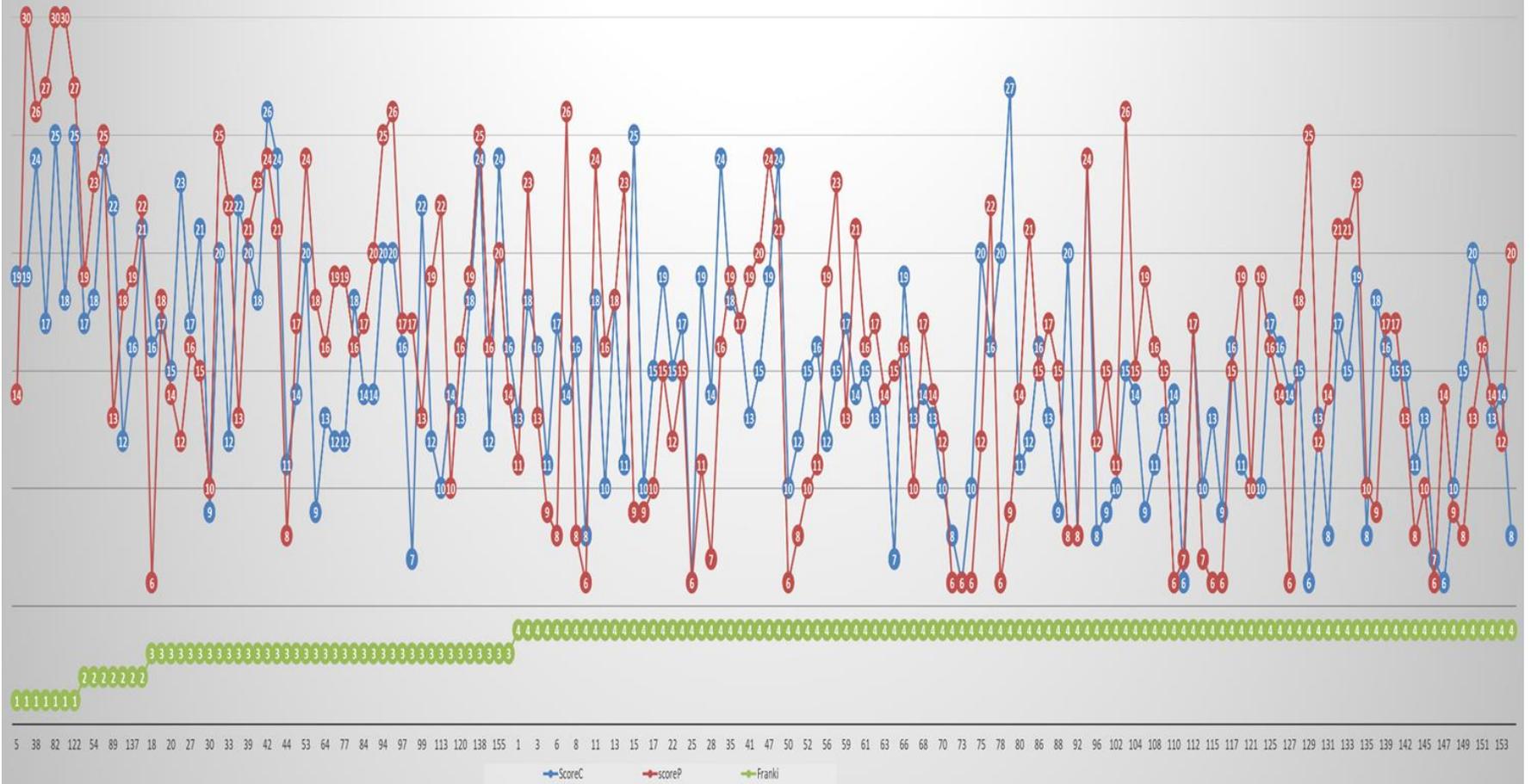


Figure 4. 4 Overall pattern of correlation between self (blue) and proxy (red) reported MCDASf-OHAR scores (out of 30, where ≥ 19 indicates severe dental anxiety) with FBRS scores (green- range from 1 to 4 where 1 indicates very negative behavior).

4.6 Concordance between self-reported and proxy reported MCDASf-OHAR per category of anxiety

When the overall MCDASf score whether self or proxy was ≥ 19 , this was categorized as *severe dental anxiety* while any score < 19 was categorized as *none to moderate anxiety*. As the child and parent form a dyad (pair), the overall concordance (agreement) between self-reported and proxy reported anxiety as per the MCDASf-OHAR was measured using Kappa test. Therefore, the following results represent where there was agreement between children and their parents in categorizing the anxiety. Table 4.7 displays the number and percentage of groups by none to moderate anxiety/severe anxiety ratings.

There was agreement in categorizing *none to moderate anxiety* in 88 dyads (56.40%), while there was an agreement in categorizing *severe anxiety* in 19 dyads (12.20%). Therefore, a total of 107 dyads (68.60%) indicated concordance while a total of 49 dyads (31.50%) indicated discordance in assessment of both none to moderate anxiety and severe anxiety (See Table 4.7 grey shaded areas). The agreement is described as fair (measure of agreement; kappa= 0.23) and this was statistically significant ($p= 0.003$). This suggests that there is a statistically significant overall fair concordance between self-reported and proxy reported MCDASf measured dental anxiety.

Parent's proxy-reported MCDASf-OHAR	Child self-reported MCDASf-OHAR		P-Value
	None to moderate anxiety N (%)	Severe anxiety N (%)	
None to moderate anxiety	88 (56.40%)	16 (10.30%)	0.003*
Severe anxiety	33 (21.20%)	19 (12.20%)	

Table 4. 7 Count and percentage of parent/child dyads by none to moderate anxiety and severe anxiety scores (kappa= 0.230).

4.7 Concordance between self-reported and proxy reported MCDASf-OHAR per question

Using the same principle as above, the dyads concordance and discordance per question was assessed and the following results are presented. The agreement between children's self-rated and parent's proxy-rated MCDASf-OHAR individual score was calculated using Chi-square with linear weighted k-coefficient (Table 4.8). There was statistically significant concordance ($p < 0.05$) in all the dyads responses to the questions except in question two ($p = 0.53$) and question four ($p = 0.55$).

The first question “going to the dentist” had the highest total concordance (n = 82, 52.60%) with fair agreement (kappa=0.314) and this was statistically significant (p<0.001) followed by in descending order; question three “having teeth cleaned and polished” (n=74, 47.40%, kappa=0.21, p<0.001); question six “having a tooth taken out” (n=50, 32.10%, kappa=0.102, p=0.015) and finally question five “having a filling” (n=48, 30.80%, kappa=0.121, p=0.003). Meanwhile, the anxiety scores for questions two “having your teeth looked at” and four “having an injection” in the concordance and discordance were statistically not significant, there was a tendency for poor agreement (kappa=0.03 and 0.02 respectively -see Table 4.8)

Questions	No of dyads agreements N=156	Percentage agreement	Weighted kappa coefficient	P-value	Agreement
Q1. Going to dentist	82	52.60%	0.31	<0.001*	fair
Q2. Having teeth looked at	52	33.30%	0.03	0.532	-
Q3. Having teeth cleaned and polished	74	47.40%	0.21	<0.001*	fair
Q4. Having injection in the gum	45	28.80%	0.08	0.55	-
Q5. Having a filling	48	30.80%	0.12	0.003*	poor
Q6. Having a tooth taken out	50	32.10%	0.10	0.015*	poor

Table 4. 8 *Measure of concordance between child’s self-reported and parent’s proxy reported dental anxiety scores.*

4.8 Concordance of self and proxy MCDASf-OHAR with childrens' behavior as measured by FBRS.

We were interested if MCDASf-OHAR scores provided by the parent and/or child would be useful in predicting the child's behavior, as measured by FBRS in the dental setting.

Starting with the children's scores, there was concordance between the self-reported MCDASf scores (in terms of severe anxiety/none to moderate anxiety) and the behavior of the patient according to FBRS (cooperative/non cooperative). This concordance occurred in 123 (78.80%) of the patients (see Table 4.9 grey shaded areas). This was a result of the combination of; 115 (73.70%) of patients having "none to moderate anxiety" *and* displaying cooperation and; 8 (5.10%) of patients having "severe anxiety" *and* displaying lack of cooperation. The level of concordance was fair (kappa=0.28) and this agreement was significant (p=0.001). There were areas of discordance noted too; self-reported MCDASf-OHAR failed to detect the FBRS in 33 (21.18%) of the patients.

With regards to parents scores, proxy reported MCDASf-OHAR detect the behavior of the patient according to FBRS in 112 patients (71.80%) (see Table 4.9, blue shaded areas). This was a result of the combination of; 101 (64.70%) of patients having "none to moderate anxiety" and displaying cooperation an; 11 (7.10%) of patients having "severe anxiety" *and* displaying lack of cooperation. The level of concordance was fair (kappa=0.22) and this agreement significant (p<0.001). There were areas of discordance noted too; proxy-reported MCDASf-OHAR failed to detect the FBRS in 44 (28.20%) of the patients.

		Cooperative	Non cooperative	Kappa value	Agreement	P-value
Child's anxiety score	None to moderate anxiety N (%)	115(73.70%)	6 (3.80%)	0.28	fair	0.001*
	Severe anxiety N (%)	27(17.30%)	8 (5.10%)			
Parents score	None to moderate anxiety N (%)	101 (64.70%)	3 (1.90%)	0.23	fair	<0.001*
	Severe anxiety N (%)	41 (26.30%)	11 (7.10%)			

Table 4. 9 *The comparison between self and proxy reported MCDASf-OHAR and FBRs.*

4.9 MCDASf-OHAR as a predictor of FBRs; who predicts best the child or parent?

We were interested to know if MCDASf-OHAR scores provided by the parent and/or child would be useful in predicting the child’s behavior, as measured via FBRs scores while in the dental clinic. Logistic regression results indicated statistically significant increases in the odds of uncooperative behavior per unit increase in the reported MCDASf-OHAR by either the parent or child. Specifically, for every additional MCDASf-OHAR point reported by the parent, the odds of uncooperative behavior increased by a factor of 2.201 (95 percent CI equals 2.396, 34.057;

$p=0.001$). A similar result was observed in children; an increase in the odds of F1/F2 behavior by a factor of 1.737 (95 percent CI equals 1.819, 17.730; $p=0.003$) per unit increase in the MCDASf-OHAR score.

To answer the question of whether the parent's or the child's scores were better at predicting uncooperative behavior, we compared the AUC from the two logistic regression models. It was 0.836 (95 percent CI equals 0.722, 0.949) for parents and 0.807 (95 percent CI equals 0.705, 0.909) for children. These numbers with Kappa score in (Table 4.9) suggest that parents' proxy reported of their children's anxiety were fair indicators of observed Frankl behavior, and patient self-reported of anxiety was also fair differentiating between cooperative and uncooperative behavior. So they were similar on average but a tendency for children to be better at predicting.

5.00 DISCUSSION

5.1 Introduction

This study investigated dental anxiety in a UAE population. Dental anxiety is a real and common phenomenon in children, adolescents and adults worldwide ^(112,113). Research had shown that the effects of child dental anxiety may well persist into adolescence and, in turn, may lead to avoidance of dental care or disruptive behavior during treatment ^(114,115). Therefore, dental anxiety may lead to neglect of dental care and consequently a problem to both dentists and patients. It was estimated that 9-15% of the people in the USA avoided seeing the dentist because of severe anxiety and fear ⁽¹¹⁶⁾. In the UK, 30% of those with extreme dental anxiety among 15 year old children did not attend the dentist for a check-up, compared to 15% of other children ⁽⁴⁷⁾. In the Dutch population, an estimated 14% of children suffered from dental fear. Six per cent of these children reported high levels of dental fear, likely to interfere with their treatment. Another 8% also suffered from some degree of dental fear or might have been at risk of developing high dental fear ⁽⁶¹⁾. In the UAE, despite some studies assessing dental anxiety ^(117,118), there is a lack of information related to dental anxiety in the child and parent population.

The aim of this study was to estimate the prevalence of dental anxiety among 7-16-year-old children attending Dubai Dental Hospital, a provider of primary and secondary dental care in Dubai. The study also aimed to assess the concordance between children's self-reported dental anxiety and parents' proxy-reported child's dental anxiety using a commonly used dental anxiety assessment tool (namely the MCDASf questionnaire) and to correlate it with the patient behavior during dental treatment. The present study is one of many that reported on dental anxiety using MCDASf as the dental anxiety measure ^(18,119). However, to date no studies have reported on

correlation between children's self-reported and their parents' proxy-reported dental anxiety in the UAE.

5.2 The cutoff point for MCDASf-OHAR

This present study identified a “severely dentally anxious” category using the MCDASf which had been proven to be a valid, reliable as well as a useful tool in the assessment of dental anxiety in a wide age range of children attending for dental care^(17,18,119,120).

MCDASf was one of multiple questionnaires used to assess dental anxiety in children, amongst many others (such as the MDAS, the CFSS-DS and others)^(12,121). Integral to its use was its ability to identify individuals who are severely dentally anxious⁽¹⁷⁾. Anyone scoring above a certain threshold was considered severely dentally anxious. However, this threshold was based on the number and type of questions used. An anxiety “cutoff point” or score was reported in different questionnaires^(17,18,119), and this matter may have created discrepancies and confusion about what represented the level at which someone was identified as severely anxious. For example, the MDAS, had five questions with scores ranging between five and 25; and an arbitrary cutoff point of 19 and more meant “dental phobia” according to Humphris *et al.*⁽¹²²⁾ while Hawamdeh *et al.*⁽¹¹⁷⁾ used the same MDAS score but the cut off point for their study was 13 with categories “anxious” and “non-anxious”. On the other hand, the CFSS-DS⁽¹²¹⁾ consisted of 15 items and the scores ranged from 15 to 75, the scores equal to or exceeding 32, 37, 38, or 39 had been used as cutoffs for parents who reported dental fear while scores equal to or exceeding 37 or 42 had been used as cutoffs for self-reported dental fear^(4,61,121).

The original MCDASf, per Howard and Freeman⁽¹⁷⁾, consisted of eight questions and the scores ranged from 8 to 40. Their standard cutoff point- validated statistically-, was 26 in which the score

of 26 or more was considered as extreme anxiety⁽¹⁷⁾, while the normative value for “dental anxiety” out of 40 was 19. So if the MCDASf questionnaire was based on 8 questions, the cut off point for severe dental anxiety was 26.

The OHAR version of the MCDASf ⁽¹⁵⁾, used in our study, consisted of the first *six* questions of the original MCDASf with the total scores ranging from 6 to 30 ⁽¹⁵⁾ by excluding sedation and GA related questions . By corresponding the number of the questions used in our study (i.e, six), to the original MCDASf (with eight questions), the score of 19.5 (rounded off to 19) corresponded to the score of 26. Thus anyone whose score was at least 19 was considered as having severe dental anxiety, and this was the basis of our study. Interestingly Patel *et al.* in 2015 ⁽¹⁸⁾ used the same OHAR questionnaire and utilized the same cutoff score of 19 but instead used it to categorize patients into “dentally anxious” and “dentally non-anxious”, as opposed to “severely dentally anxious” or “non to moderate dental anxiety”. This may have been a misjudgment on behalf of the authors, because they used a six questions based questionnaire only and not eight.

This present study, adhered to the principles found in the original validated MCDASf study⁽¹⁷⁾. Thus anyone scoring ≥ 19 was considered severely dentally anxious, while anyone scoring below 19 was considered to have non to moderate dental anxiety.

5.3 Dental anxiety and demographics

5.3.1 Sample size and setting

We had a sample size composed of 156 pairs (dyads) of children and their parents. This was a sample taken from a dental hospital setting that had a unique dual role of primary and secondary healthcare dental provision. Our sample size of 156 dyads was on average with other studies. For example Krikken *et al.* and Patel *et al.* ^(18,115) had less - 100 and 132 pairs respectively. On the

other hand, our study group numbers were less than those of Klein *et al.* (184), Luoto's (2,498 dyads) and Krikken *et al.* (326 dyads)^(19,89,123). Generally, larger sample sizes lead to statistically clearer results. The response rate of our study was very high (99.40%) and this was higher than expected and comparable to other studies. Klein *et al.* had a response rate of 92.40% while Patel *et al.* had 100%^(18,19).

An interesting aspect of this study is the fact that our study was conducted in the dental environment as opposed to home or school, since we were interested in evaluating dental anxiety in normal environment, similarly to Patel *et al.* and Klein *et al.*^(18,19). While in Luoto *et al.* and Krikken *et al.*^(89,123) studies, the children completed the questionnaires at school and the parents at home and they were not sure who provided the information, the parents, the child or someone else.

In the current study we recruited children attending a postgraduate dental hospital which as mentioned above, was considered as primary and secondary health care provider. All the children who visited the hospital, whether known to be anxious or not, in a specific period either for the first time or had previous visits to the hospital or patients who were referred to the hospital because of behavior problems were recruited. This is in contrast to the study group in Gustafsson *et al.*⁽¹⁶⁾ that was specifically referred for dental behavior management problems in combination with a need for dental treatment. However, Folayan *et al.*⁽¹²⁴⁾ conducted their study in a similar university teaching hospital setting which provided the dental care needs of all children below the age of 16 years. The children included in their study also had no previous dental experience. In addition, the study population in Patel *et al.*⁽¹⁸⁾ was drawn from two clinics in Scotland which provided

routine dental treatment as well as a referral service for dentally anxious children and adults. The children involved in their study were registered and referred.

5.3.2 Age and dental anxiety

It is a well-known fact that, as children get older, they attain their own set of dental experiences, and they may grow less anxious of coming to the dentist^(61,95,125). The UK Child dental health survey in 2013 found that anxiety decreased in 15 year old children in comparison to 12 years old group⁽⁴⁷⁾. Our data highlighted that children's age was an important factor when assessing self-reported anxiety; this present study confirmed a decreased dental anxiety for children older than 11 years of age, although this was not confirmed with proxy reporting. In contrast, other studies had found no difference in the severity of dental anxiety between age groups^(18,19,126–128). Actually and on the contrary, other studies^(91,129) found that dental anxiety increased with age. This could be explained by the possibility of other factors arising, such as children having had more previous painful dental experiences⁽¹³⁰⁾.

One other aspect is that we used the MCDASf tool that had been validated for use in children as young as five⁽¹⁷⁾. The lowest age in our group of patients was seven years similar to Patel *et al.*⁽¹⁸⁾ while the patients' age in Aldossari *et al.*⁽¹²⁰⁾ ranged from 5-12. The children in Krikken *et al.*⁽¹²³⁾ were 7-11 years old while Luoto *et al.*⁽⁸⁹⁾ studied older children from 11-16 years old.

5.3.3 Dental anxiety in relation to gender

In this current study, female children in our sample showed similar levels of dental anxiety when compared to male children (whether self or proxy reported). Reports on gender differences regarding dental anxiety among children had not been consistent although the majority of investigators reported higher levels of dental anxiety among girls^(19,47,131–134). In a meta- analysis,

higher dental anxiety scores were attributed to girls in 10 out of 12 populations⁽⁴⁾. In our study, this was a non-significant tendency. On the other hand, several studies found that there were no differences between both genders regarding dental anxiety^(54,126,129,135). In contrast, it had been reported that dental anxiety is more prevalent in boys^(54,136). These contrasting observations may be attributed to various factors, such as the cultural background of the population being studied, the structure of the anxiety scales being used, the real differences in anxiety levels between genders, the willingness to acknowledge feelings of anxiety, or various combinations of these aforementioned factors^(91,137).

5.3.4 Parent's gender and MCDASf

To check if the gender of parents who completed the questionnaires affected the dental anxiety reported by children or parents, we found that the gender of the parent had no effect. Although when surveys were completed by mothers, the dental anxiety scores tended to increase, however this result was statistically not significant. Other studies were not so clear with this aspect, for example Klein *et al.* did not study this relation because of the very small number of fathers in their sample⁽¹⁹⁾, and Patel *et al.* (2015) did not study the effect of parent's gender on the dental anxiety altogether⁽¹⁸⁾. However, Folayan *et al.* reported that fathers' assessment of their child's dental anxiety level could not be adequately reliable for treatment planning in comparison to that of the closely correlated mother and her child's self-reported dental anxiety⁽¹²⁴⁾.

5.3.5 Patient's nationality and ethnicity

Dubai is a city within the UAE and is of a cosmopolitan nature with multi nationalities. This was reflected in our study. In our sample we had 31 nationalities and more than 4 ethnicity groups but due to the uneven distribution between the nationalities and ethnicities (which may be due to the

small sample size) we grouped them into two groups each: UAE nationals and non UAE nationals, and Arab and non-Arab ethnicities. We were interested to know if the nationality or the ethnicity affected the self and proxy reported dental anxiety. Our data showed no difference between the groups, although a tendency for increased dental anxiety was noticed in UAE nationals and Arab populations. This was in harmony with Klein *et al.* USA study which showed no ethnic difference⁽¹⁹⁾. On the other hand, other studies found that ethnicity and background could affect the level of dental anxiety; for example: In the Arab cultural background, it had been suggested that boys were expected to act like men and to be brave^(91,138). However, in American or European cultures, children were considered to be able to express their anxiety and feelings⁽¹²⁹⁾. Children of Asian descent exhibited an overall greater degree of anxiety recorded pre and post-treatment when compared to their Caucasian counterparts⁽¹³⁹⁾.

5.3.6 Educational level and occupational status of the parents

In our study, education of parents of children had no effect on the self or proxy anxiety scores recorded. This finding is in harmony with other studies^(140–142). Interestingly, many studies had shown a clearer pattern: that high dental anxiety was associated with higher levels of education^(143,144). In contrast some studies had found that severe dental anxiety is associated with low educational level of the parents which may be due to decreased dental awareness among them^(131,145).

In our study, the occupational status of the parents was divided into not working, students, self-employee and professional but due to uneven distributions between the groups we decided to categorize them into two groups unemployed (which included parents who are not working and students) and employed either self-employee or professional and there was no difference in the

dental anxiety either self or proxy between the two groups although the severe dental anxiety was higher in children where their parents are employed but this was not significant. This is in contrast to Appukuttan *et al.* who found that dental anxiety was lowest for those who were employed and highest among students population ⁽¹⁴⁶⁾. It is important to note that occupational status of the parents and parental income could be closely related to socioeconomic level of the family. Thus children from low socioeconomic families tended to experience more dental anxiety ^(131,147). This could possibly be due to decreased dental awareness in low socioeconomic families, thus meaning that dental anxiety increased ⁽¹⁴⁵⁾. Certain other studies reported a very weak association regarding these factors ^(148,149).

5.4 The prevalence of dental anxiety

Our study showed that severe dental anxiety existed in our sample, which was expected as dental anxiety is a worldwide phenomenon as mentioned above ^(112,113). The prevalence of dental anxiety in this study according to self-reporting was 22.40%, while proxy reporting was 33.30%. This was found to be more than what was reported in the UK 2013 Child Dental Health survey, as only 14% of 12 year old children and 10% of 15 year old children were classified as having extreme dental anxiety, with 24% of 12 year old children and 36% of 15 year old children classified as having low or no dental anxiety⁽⁴⁷⁾. This was also the case when compared to the figures reported by Patel *et al.* where the self-reporting dental anxiety was 18% and the proxy reporting was 24% ⁽¹⁸⁾. The prevalence of dental anxiety in Krikken *et al.* ⁽¹²³⁾ was 10.50% among the children. While Luoto *et al.* had the prevalence between 9 and 13% ⁽⁸⁹⁾.

Our results were close to the prevalence of dental anxiety studies in UAE which was reported by Hawamdeh *et al.* of 36% ⁽¹¹⁷⁾ and higher than the prevalence reported by Humphris *et al.* in Dubai which was 6% ⁽¹²²⁾, however these studies were related to young adults and not children.

The increased prevalence in our study could be due to the fact that as a secondary dental care center, some of our patients were referred for anxiety. Also there might have been an overestimation of the dental anxiety; for example, when we compared the prevalence of the dental anxiety in our study between the self and proxy reporting we found that the parents tended to overestimate the dental anxiety in their children. One explanation would be that the parent's level of dental anxiety influenced the rating of their children's dental anxiety⁽¹²³⁾.

5.5 Dental anxiety per procedure

Our study showed that dental anxiety was related to the type of dental procedure. The results showed that “having a dental extraction” was the most provoking procedure for dental anxiety reported by both parents and children followed by having “injection in the gum” then “having a filling” which is logical to assume. Dentists' remit involves a multitude of dental procedures, with some of them considered to be anxiety producing while others are not. For example the UK's Adult Dental Health Survey in 2009 highlighted that two items elicited anxiety most often and they were both associated with receiving dental treatment; 30% of adults said that having a tooth drilled would make them very or extremely anxious and 28% reported similar levels of anxiety about having a local anesthetic injection⁽¹⁵⁰⁾. While Howards and Freeman reported that “injection in the gum” scored the most in terms of anxiety⁽¹⁷⁾. This pattern was similar to many others: Patel *et al.* found that dental extractions generated the highest anxiety scores followed by injections in the gum⁽¹⁸⁾ while Krikken *et al.* reported that dental fear scored more for the injections and the dentist drilling⁽¹²³⁾ and finally Paryab and Hosseinbor found that the “injection” had the highest score followed by “dental extraction”⁽¹⁵¹⁾.

It had been reported that dental anxiety is related to previous dental experience^(54,91,133,137,140,148,152).

In this current study we did not assess the relation between the dental anxiety and the history of

the dental procedures the patients had, and this may be considered a shortcoming. High levels of dental anxiety are expected among children on their first visit to the dentist^(91,137). Dental anxiety in children would then decrease with more dental visits, hence having experienced more dental treatments⁽¹⁵²⁾. Additionally, this is possibly due to the fact that previous dental experience establishes a dentist-patient trust, and the children become older and mature with subsequent dental visits^(137,152). Children who had experienced specific dental treatment will likely be less anxious about that particular treatment⁽⁵⁴⁾. Conversely, Peretz *et al.* reported that dental anxiety in all children who had experienced dental procedures in the past was higher than in children who had not⁽¹⁴⁰⁾. This could be because the children studied already knew they would have an unpleasant dental session^(54,133,148,153). In contrast, many studies reported that prior dental experience was not associated with dental anxiety and has no influence on it^(66,148,154). More painful or invasive dental procedures will likely lead to negative experience of dental treatment and the development of dental anxiety⁽¹³⁷⁾⁽¹⁵⁵⁾.

5.6 Parents' ability to assess their children's dental anxiety

MCDASf scores, whether self or proxy reported, were assessed for two aspects; correlation and agreement as highlighted in the result section.

5.6.1 Correlation between self and proxy scores

Our study noted a positive correlation between child scores and parents' scores and this suggested that when a child reported a higher score, the parent also did so. This was similar to Coric *et al.* and Peretz *et al.* who reported a strong correlation between the children and parents dental anxiety scores^(66,156). On the other hand Krikken *et al.* and Klein *et al.* found poor consistency in the dental fear scores reported by the parent/child dyads^(19,123). Our study suggested an overall trend,

but the correlation does not mean an agreement. This aspect, agreement/lack of agreement will be discussed below.

5.6.2 Concordance/discordance of scores of anxiety

In the present study we found agreement between the child self-reported and parents' proxy reported dental anxiety. Although the percentage of agreement between parent-child pairs on "severe anxiety" or "none to moderate dental anxiety" was (68.6%), adjusting for chance agreement showed that this agreement was fair. The parents also failed to detect severe anxiety in 10.3% of their children. This was in agreement with Patel *et al.* who showed fair agreement between self and proxy reported dental anxiety⁽¹⁸⁾.

When we compared to other studies contrasting views were noted. While Krikken *et al.* found a moderate agreement between child and parents assessment of the dental anxiety⁽¹²³⁾, Luoto *et al.* concluded that parents and children cannot be used as reliable proxies for determining each other's dental fear, and 11- to-16-year-olds should be studied only by eliciting information about fear from the patients themselves⁽⁸⁹⁾. In contrast, Gustafsson *et al.* looked at the parent-child agreement of dental anxiety measure using the CFSS-DS tool in 8–19-year- old Swedish children and their parents and reported modest inter-rater agreement⁽¹⁶⁾. Most of the studies so far report poor, fair or only moderate agreement between children and their parents, in spite of using different types of anxiety questionnaires and different statistical tools to assess inter-rater agreement.

5.6.3 Agreement of parents and children per question/procedure

Do parents and children agree on what procedures cause dental anxiety and what do not? A 100% agreement would mean that parents know their children well and were able to relate to their anxiety, however parents may reflect inadvertently their own anxieties ⁽¹⁵⁷⁾, in addition vicarious

anxiety is a well-known phenomenon⁽¹⁵⁸⁾. This study attempted to assess whether there was agreement between the children and their parents per individual question related to a procedure. Inter-rater agreement on individual question scores, showed fair agreement (52.6%) for “visiting the dentist” and “having the teeth cleaned and polished” (47%), and poor agreement for “extraction of a tooth” (30%) and “having a filling” (31%). When compared to Patel *et al.* this was similar as they found fair agreement for “visiting the dentist” (53%), “examination of the teeth” and “having cleaning and polishing” (48%) and poor agreement with the “extraction” (30%) and “having a filling” questions⁽¹⁸⁾. It appeared that parents and children agreed on the non-invasive aspects of dental treatment but disagreed on the invasive aspects, with parents tending to overestimate anxiety scores, despite ranking them in the same order. This pattern of agreement was partially observed in Krikken *et al.* study (who used a different questionnaire with different questions) but they found that the items that had agreement in the dental anxiety scores between the children and their parents were “dentists”, “having to open your mouth”, “having somebody look at you”, “the dentist drilling”, “the sight and the noise of the dentist drilling”, “having somebody put instruments in your mouth”, “people in the white uniform” and “having the nurse clean your teeth”⁽¹²³⁾. The latter study showed that agreement was achieved in invasive and non-invasive dental procedures, as opposed to our study.

5.7 Dental anxiety and dental behavior

This study categorized children exhibiting FBRS 1 or 2 as uncooperative while FBRS 3 or 4 as cooperative. This was similar practice to Klein *et al.* study in the USA⁽¹⁹⁾. In our study population, 9% of the children were reported to be uncooperative according to behavior assessment by the calibrated dentists using the standardized FBRS⁽⁷⁾. In comparison the proportion of non-cooperative patients in the study of Sharma and Tyagi was 10.7%⁽¹⁵⁹⁾, while Klein *et al.* and

Folayan *et al.* reported 12.5% and 5.7% of uncooperative patients respectively ⁽¹⁹⁾⁽¹²⁴⁾. Thus when compared with other studies our result was almost in the same range although some studies, such as Paryab and Hosseinbor identified the uncooperative behavior in a higher proportion 28.67% ⁽¹⁵¹⁾.

Proper evaluation of dental anxiety in children or adolescents enables a tailored approach to behavioral management and treatment⁽¹⁹⁾. Typically, dental anxiety correlates positively with a child's behavior during dental treatment. The more anxious a patient is, the more behavioral problems can be expected: 61% of children with dental anxiety had dental management behavioral problems, but only 27 % of children with dental management behavior problems had dental anxiety⁽⁹⁵⁾. Our study highlighted that there was a negative correlation between both self- and proxy scores of dental anxiety and the child's behaviors as expressed by FBRs. That is when the MCDASf score increased, dental behavior worsened indicating a trend. This was similar to findings in Klein *et al.* study in the USA⁽¹⁹⁾. However, we went further to assess where the agreement was between the levels of anxiety and the FBRs as below.

5.7.1 Concordance/discordance between self/proxy reported dental anxiety and FBRs

In our study there was a significant relationship established between dental anxiety either self or proxy and the dentists' assessment of the children's behavior during treatment but the agreement was fair (78.80% for self -reporting and 71.80% for proxy reporting corresponding to the FBRs categorization). So when the child scored themselves as 'non to moderately anxious', they displayed cooperative behavior in 73.70% of cases, while when they scored severe dental anxiety scores, they displayed uncooperative behavior in 5.10% of the cases (a similar pattern was observed for proxy scores and behavior categorization too). The result showed also that 17.3% of

the children according to self-reported anxiety were able to accept treatment without interruption despite their high dental anxiety (this figure was higher for proxy scores; 26.3%). It may be inferred that children were able to cope with the treatment procedures, or parents overestimated their child's level of anxiety. A number of explanations may be adduced for this. Firstly, it may be that children were effectively managed by the attending dentists in terms of behavior management techniques employed routinely in dentistry⁽²⁾. This could be a possibility as the children were recruited and managed in a specialist pediatric dentistry clinic. Secondly, the children may have chosen not to express their felt anxiety. The ability of a child to cope and not manifest disruptive behavior during dental treatment, despite being anxious, may be related to individual personality traits. Finally, the parent may have incorrectly rated their child's anxiety level. Other studies showed other patterns; Folayan *et al.* in their study found no significant relationship established between children's self-rating and the dentists' assessment of the children's behavior during treatment⁽¹²⁴⁾. On the other hand Klein *et al.* study found that self-reported dental anxiety is a reliable predictor of Frankl rating during dental visits⁽¹⁹⁾. While Peretz *et al.* found that the children who had a history of crying and fear in the previous visit demonstrated significantly higher dental anxiety than those who reacted excellently⁽¹⁴⁰⁾. It is worth noting that Patel *et al.*⁽¹⁸⁾ study, assessing proxy and self-reported anxiety had not included the dentist.

5.7.2 Self-reported or proxy reported which is a better predictor of dental behavior?

We were interested to know whether parents are accurate reporters of their child's dental anxiety using MCDASf-OHAR in comparison to their behavior during dental treatment. As highlighted above, the results showed slightly better agreement between self-reported dental anxiety and the dentist's behavior evaluation (78.8%) than parents' agreement (71.8%) but both agreements were fair. However, we found that on balance, proxy reporting had a slightly high predictability of

uncooperative behavior, i.e., parents were better in detecting severe anxiety in their children that lead to uncooperative behavior, and this could be explained by the fact that parents may be more aware of their children's general behavior and that it may be due to some of our patients being referred patients (where the parents brought their children to the specialized pediatric clinic because of the dental behavior management problems). This was similar to Krikken *et al.* who concluded that the results from their study suggested that a great majority of parents were able to rate the level of dental fear of their children with a tendency to rate somewhat higher than their children did⁽¹²³⁾. On the other hand, Klein *et al.* found that child fear scores are slightly better predictors of in-treatment Frankl behavior scores than parental scores where patient self-assessments of anxiety were fair-to-good differentiating between uncooperative and cooperative behavior⁽¹⁹⁾. Research on child psychology and psychopathology has shown that parents' estimations of children's problems and dysfunctions are not compatible with the children's own estimations⁽¹⁶⁰⁾ in general. But overall parents become more involved as children and adolescents with dental anxiety need extra attention, to prevent the progression from dental anxiety to dental phobia⁽¹⁵⁶⁾ and thus the impairment of developing a positive attitude to dental health and treatment.

As highlighted above most of the studies used different methodology and so far report poor, fair or only moderate agreement between children and their parents, in spite of using different types of anxiety questionnaires^(18,19) and different statistical tools to assess inter-rater agreement. Hence, the findings of the present study were similar to some published studies^(18,19), indicating that parent/guardian proxy-reported anxiety assessment should be questioned and clinicians should use validated pediatric self-reported dental anxiety measures⁽¹²⁰⁾ where possible.

This research was presented at the 66th National Conference of the British Society of Pediatric Dentistry (BSPD) held in Dundee September 2018⁽¹⁶¹⁾ (Appendix VII).

5.8 Limitations of the study

- The sample size was adequate compared with other studies. However, a bigger sample size would have provided more patient variety.
- The sample was a convenience sample, a more representative sample with proper randomization in a non-dental setting could have resulted in less biased results.
- The patients were not classified as new or referred patients which could have affected the level of the anxiety.
- Previous dental experience was not recorded. This could have had an influence on the anxiety score.
- The patients attended the hospital had different procedures some of them had examinations only and some had varieties of dental procedures. The FBRS could be changed according to the procedure done for the patient.
- Some children needed help in reading while they were answering the questions of the questionnaire which could have influenced their answers.

6.00 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Within the limitations of this study, and in the UAE sample studied, it can be concluded that:

- Dental anxiety in 7–16 year-old children was not uncommon; its prevalence was 22.4% (self-reported) and 33% (proxy-reported).
- The age of the child was the only significant variable/factor in relation to self-reported dental anxiety. As the child got older her/his dental anxiety decreased.
- Both self- and proxy-reported dental anxieties were highest in relation to “tooth extraction” followed by “having an injection in the gum” and finally by “having a filling”. The least anxiety was related to having teeth cleaned and polished.
- Parents were fairly able to rate the level of dental anxiety of their children with a tendency to rate somewhat higher than their children did, significantly so with “having a filling”.
- There was a positive correlation between self- and proxy-reported dental anxieties. When the child’s score went up, so did the parents’. In addition, there was fair agreement between children’s self-reported and proxy reported dental anxiety however self-reported dental anxiety should complement parental ratings as far as possible
- There was a negative correlation between both self- and proxy- reported anxieties and the child’s behavior. Increased dental anxiety lead to uncooperative behavior.
- Both the self-reported and proxy reported dental anxiety were fair predictors and indicators for the observed dental behavior during dental treatment.

6.2 Recommendations:

- More research is needed to detect the prevalence of the dental anxiety among the UAE population such as a cross sectional study covering all the UAE Emirates.
- Ideally, the type of appointment the patient/parent is attending for, where the dental anxiety and behavior assessment is measured, should be uniform and similar for reproducibility.
- Dental anxiety should be diagnosed as part of the treatment plan as in order to manage the behavior of the children.
- The association between dental anxiety and general anxiety should be studied since the dental anxiety could be a reflection of general anxiety.
- More specific research needs to be carried out to compare between the Mothers' and fathers' ability to assess their children's dental anxiety.

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Appendix I. MCDASf-OHAR Questionnaire

Child's ID No. :

Name of the Dentist:

Dental Anxiety Questionnaire (Child copy)

For the next 6 questions I would like you to show me how relaxed or worried you get about dental treatment. To show me how relaxed or worried you feel, please use the simple scale below. The scale is just like a ruler going from 1, which would show that you are relaxed, to 5, which would show that you are very worried. (Please circle the appropriate number on the scale).

 **1** would mean: relaxed/not worried

 **4** would mean: worried a lot

 **2** would mean: very slightly worried

 **5** would mean: very worried

 **3** would mean: fairly worried

How do you feel about...					
...going to visit the dentist?	1	2	3	4	5
...having your teeth looked at?	1	2	3	4	5
...having your teeth cleaned and polished?	1	2	3	4	5
...having an injection in the gum?	1	2	3	4	5
...having a filling?	1	2	3	4	5
...having a tooth taken out?	1	2	3	4	5

Additional Information:

After you have completed this form please return it to a member of the Dental Team.

Dental Anxiety Questionnaire (Parent copy)

For the next 6 questions I would like you to show me how relaxed or worried your child get about dental treatment. To show me how relaxed or worried your child feels, please use the simple scale below. The scale is just like a ruler going from 1, which would show that your child is relaxed, to 5, which would show that your child is very worried. (Please circle the appropriate number on the scale).

 **1** would mean: relaxed/not worried

 **4** would mean: worried a lot

 **2** would mean: very slightly worried

 **5** would mean: very worried

 **3** would mean: fairly worried

How does your child feel about?

					
...going to visit the dentist?	1	2	3	4	5
...having your teeth looked at?	1	2	3	4	5
...having your teeth cleaned and polished?	1	2	3	4	5
...having an injection in the gum?	1	2	3	4	5
...having a filling?	1	2	3	4	5
...having a tooth taken out?	1	2	3	4	5

Additional Information:

After you have completed this form please return it to a member of the Dental Team.

Appendix II. Informed Consent



Parent Information and Informed Consent Form

Title of Study: Child Self-Reported and Parents Proxy-Reported Dental Anxiety and their Relationship to Child Dental Behaviour in the United Arab Emirates

Principal Investigator: Dr. Safeya Mohammed Algharebi, Department of Paediatric Dentistry, Hamdan Bin Mohammed College of Dental Medicine, Building 34, Dubai Healthcare City, Dubai, UAE. Telephone: (050) 4466433

Please take your time to review this information form, and feel free to consult with or discuss this study with your dentist, colleagues, family, friends, and/or physician before deciding whether or not to participate. If you have any questions regarding the study or any related issues we encourage you to ask the principal investigator, as listed above. This consent form may contain words that you do not understand. Please ask the research staff to explain any words or information you do not clearly understand.

Purpose of the study

This study is being conducted at the Hamdan Bin Mohammed College of Dental Medicine, Department of Paediatric Dentistry, to study the correlation between the parental assessment of their children's dental anxiety and the children's self-reported dental anxiety and to investigate the epidemiological factors associated with children's dental anxiety.

Study procedures

If you choose to take part in this study, the following procedures will happen: you and your child will be asked to fill questionnaires independently in the dental clinic before the examination at the start of the dental appointment and will be collected by the assistant. (See attached copy).

No treatment will be provided to, or denied from, your child as a result of your participation in this study. You may stop participating in this study at any time. However, if you decide to stop participating, we encourage you to talk to the research staff first.

Risks and discomforts

There are no recognized risks or discomforts that may be caused to your child by participation in the study.

Benefits

There may or may not be a direct benefit to your child from participating in this study. We hope the information we collect will help the profession in providing the best possible oral health care for their patients.

Cost / Payment

There is no cost to you for participating in the study and you will receive no payment or reimbursement for any expenses related to taking part in this study.

Alternatives: You should feel no obligation to participate in the study.

Confidentiality

All information obtained from this study is confidential and will remain so. Information gathered in this study may be published or presented in public forums; however, your and your child's name and other identifying information will not be used or revealed. In any published data, your identity (and your child's) will be protected and treated as confidential according to the Personal Health Information Act of UAE. To protect your identity, every participant will be given a Study Number instead of their name in all documents related to the study. All information obtained from this study will be used strictly for research purposes only. If the study information is to be used in any subsequent investigation, your consent will be taken.

Hamdan Bin Mohammed College of Dental Medicine Research Ethics Board may review study records for purposes of quality assurance only. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law.

All records relating to this study will be kept in a secure, locked area and only those persons identified will have access to these records. If any of your child's medical/research records need to be copied to any of the above, his/her name and all identifying information will be removed. No information revealing any personal information such as your/your child name, address or telephone number will leave the HBMCDM.

Voluntary participation / Withdrawal from the study

Your decision to participate and to allow your child to participate in the study is voluntary. You may refuse to give consent for child to participate in the study or withdraw from it at any point in time. If the research staff feels that it is in your child best interest to withdraw her/him from the study, they will remove you without your consent.

We will tell you about any new information that may affect your child health, welfare, or willingness to stay in this study.

Questions

Please feel free to ask questions regarding the study or anything related to it that requires further clarification. To contact the research staff regarding a question, please call:

Dr. Safeya Algharebi at (050) 4466433 or Dr. Iyad Hussein at +971 43838907

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

STATEMENT OF CONSENT

I have read this consent form. I have had the opportunity to discuss this study with **Dr.Safeya Algharebi** and/or her research staff. I have had my questions answered in a language I understand. All risks, benefits, costs, and alternatives regarding this study have been thoroughly explained to me. I believe that I have not been unduly influenced by any research team member to participate in the study by any statements or implied statements. Any relationship I or my child may have with the research team has not affected my decision to participate. I understand I will be given a copy of this consent form after signing it. I understand my and my child's participation in the study is voluntary and I may choose to withdraw my child from it at any point in time. I freely agree to participate in this research study and I give consent for my child to participate in the research study as well.

I understand that any information regarding my child's identity will be kept confidential, but that confidentiality cannot be guaranteed. I authorize the inspection of any of my records related to this study by the Hamdan Bin Mohammed College of Dental Medicine Research Ethics Board for quality assurance purposes.

By signing this consent form, I have not waived any of the legal rights that I or my child have as a participant in a research study.

Parent/legal guardian's signature: _____

Date: _____ (day/month/year)

Parent/legal guardian's printed name: _____

I, the undersigned, attest that the information in the participant Information and Consent Form was accurately explained to, and apparently understood by, the participant or the participant's legally acceptable representative and that the consent to participate in this study was freely given by the participant or the participant's legally acceptable representative.

Witness signature: _____

Date: _____ (day/month/year)

Witness printed name: _____

نموذج بيانات الوالدين والموافقة المسبقة

عنوان الدراسة: القلق الذي يعرب عنه الطفل إزاء علاج أسنانه والذي يعرب عنه الآباء إزاء علاج أسنان

أطفالهم وعلاقته بسلوك الطفل الخاص بالأسنان في دولة الإمارات العربية المتحدة

الباحث الرئيسي: د. صفية محمد الغاربي، قسم طب أسنان الأطفال، كلية حمدان بن محمد لطب الأسنان، مبنى رقم 34،

مدينة دبي الطبية، دبي، الإمارات العربية المتحدة، هاتف رقم: 4466433 (050)

يرجى مراجعة نموذج البيانات هذا بروية، ولا تترددوا في استشارة أو مناقشة هذه الدراسة مع طبيب الأسنان الذي تتعاملون معه، و/أو الزملاء و/أو الأسرة و/أو الأصدقاء و/أو الطبيب قبل اتخاذ قرار بالمشاركة من عدمها. إذا كان لديكم أي أسئلة بخصوص هذه الدراسة أو أية مسائل تتعلق بها، فلا تترددوا في طرحها على الباحث الرئيسي الموضح أعلاه. قد يحتوي نموذج الموافقة هذا على كلمات يتعذر عليكم فهمها، ومن ثم يُرجى الاستفسار من مسئول البحث عن أي كلمات أو معلومات يتعذر عليكم فهمها بشكل واضح.

الغرض من الدراسة

تُجرى هذه الدراسة في كلية حمدان بن محمد بن طب الأسنان، قسم طب أسنان الأطفال، لدراسة العلاقة بين تقييم الوالدين لقلقهم إزاء علاج أسنان أطفالهم والذي يعرب عنه الأطفال أنفسهم إزاء علاج أسنانهم، والبحث في العوامل الوبائية المرتبطة بالقلق إزاء علاج أسنان الأطفال.

إجراءات الدراسة

إذا اخترت المشاركة في هذه الدراسة، فلا بد من اتخاذ الإجراءات التالية: س يُطلب منك ومن طفلك ملء استبيانات بشكل مستقل في عيادة الأسنان قبل الفحص في بداية موعد الكشف على الأسنان وسيتم جمعها من قبل المساعد. (يرجى الرجوع إلى النسخة المرفقة).

لن يتم توفير أي علاج لطفلك أو حرمانه منه نتيجة لمشاركتكم في هذه الدراسة. ويمكنكم التوقف عن المشاركة في هذه الدراسة في أي وقت. ومع ذلك، إذا كنتم ترغبون في وقف المشاركة، يُفضل التحدث مع موظف البحث أولاً.

المخاطر والإزعاج

لا توجد مخاطر معروفة أو إزعاج معروف قد يتعرض طفلك له من خلال المشاركة في الدراسة.

الفوائد

قد يعود على طفلك أو قد لا يعود عليه فوائد مباشرة من المشاركة في هذه الدراسة. ونأمل أن تساعد المعلومات التي نجعلها المهنة في توفير أفضل رعاية ممكنة لصحة الفم للمرضى.

التكلفة/ المدفوعات

لن تتحمل أي تكلفة على المشاركة في الدراسة ولن تتلقى أية مدفوعات أو تعويضات عن أي نفقات تتعلق بالمشاركة في هذه الدراسة.

وبمعنى آخر: لن يكون هناك أي التزام من جانبك تجاه المشاركة في الدراسة.

السرية

جميع المعلومات التي يتم الحصول عليها من هذه الدراسة سرية وستظل كذلك. وقد يتم نشر المعلومات التي يتم جمعها في هذه الدراسة أو تقديمها في المحافل العامة؛ ومع ذلك، لن يتم استخدام اسم طفلك وبيانات التعريف الأخرى الخاصة به أو الإفصاح عنها. وفي حال نشر تلك البيانات، سيتم حماية هويتك (وهوية طفلك) والتعامل معها على أنها سرية وفقاً لقانون المعلومات الصحية الشخصية لدولة الإمارات العربية المتحدة. ولحماية هويتك، سيتم منح كل مشارك رقم دراسة بدلاً من اسمه في جميع الوثائق ذات الصلة بالدراسة. وسيتم استخدام جميع المعلومات التي يتم الحصول عليها من هذه الدراسة بدقة لأغراض البحث فقط. وإذا تم استخدام معلومات الدراسة في أي بحث لاحق، سيتم الحصول على موافقتك. وعلاوة على ذلك، قد يراجع مجلس أخلاقيات البحث بكلية حمدان بن محمد لطب الأسنان سجلات الدراسة لأغراض ضمان الجودة فقط. وعلى الرغم من الجهود المبذولة للحفاظ على سرية معلوماتك الشخصية، لا يمكننا ضمان السرية المطلقة، فقد يتم الإفصاح عن بياناتك الشخصية إذا اقتضى القانون ذلك.

كما ستبقى جميع السجلات المتعلقة بهذه الدراسة في منطقة آمنة ومغلقة ولن يُسمح بالوصول إلى تلك السجلات سوى للأشخاص المصرح لهم بذلك فقط. وإذا تطلب الأمر أن يتم تقديم نسخ من السجلات الطبية/ البحثية الخاصة بطفلك إلى أي من الجهات المذكورة أعلاه، سيتم إزالة اسمه/ اسمها وجميع المعلومات التعريفية الخاصة به/ بها. ولن تُغادر أي من المعلومات التي تكشف أي بيانات شخصية، مثل اسمك/ اسم طفلك أو العنوان أو رقم الهاتف، كلية حمدان بن محمد لطب الأسنان.

المشاركة الطوعية/ الانسحاب من الدراسة

يعد قرارك بالمشاركة والسماح لطفلك بالمشاركة في هذه الدراسة أمر طوعي، ولك حرية رفض منح الموافقة بشأن مشاركة طفلك في الدراسة أو الانسحاب منها في أي وقت. وإذا شعر فريق البحث أن في مصلحة طفلك أن يتم سحبه/ سحبها من الدراسة، سيقومون بإزالة بياناتك دون موافقتك.

وسنقوم بإخطارك بأي معلومات جديدة قد تؤثر على صحة طفلك أو رعايته أو الرغبة في البقاء في هذه الدراسة.

الأسئلة

يرجى عدم التردد في طرح أية أسئلة بشأن الدراسة أو أي شيء يتعلق بها يتطلب مزيداً من التوضيح. للاتصال بموظفي البحث بشأن طرح أي سؤال، يرجى الاتصال على:

د.صفية الغاربي على الرقم (050) 4466433 أو د.إياد حسين على الرقم 971 43838907 +

لا تُوقع على نموذج الموافقة هذا إلا إذا أُتيحت لك الفرصة في طرح أسئلة وتلقيت أجوبة مرضية على جميع أسئلتك.

بيان الموافقة

قرأت نموذج الموافقة هذا وأُتيحت لي الفرصة لمناقشة هذه الدراسة مع د.صفية الغاربي و/أو موظفي البحث التابعين لها، وكانت الإجابة على أسئلتني بلغة أفهمها. وقد تم شرح جميع المخاطر والمنافع والتكاليف والبدائل الخاصة بهذه الدراسة بدقة، وأعتقد أنه لم يتم التأثير عليّ بصورة غير ملائمة من قبل أي عضو من أعضاء فريق البحث للمشاركة في الدراسة من خلال أي تصريحات صريحة أو ضمنية. كما لم تؤثر أي علاقة بيني أو بين طفلي وفريق البحث على قراري في المشاركة. وأعلم أنه سيتم إعطائي نسخة من نموذج الموافقة هذا بعد التوقيع عليه، كما أعلم أن مشاركتي ومشاركة الطفل في الدراسة أمر طوعي وأ أنني قد أختار سحب طفلي منها في أي وقت. ومن ثم فإنني أوافق على المشاركة في هذه الدراسة البحثية بمطلق حريتي وأوافق على أن يشارك طفلي في الدراسة البحثية أيضاً.

كما أعلم أن أية معلومات تتعلق بهوية طفلي ستظل سرية، ولكن لا يمكن ضمان تلك السرية. وأوافق على أن يتم فحص أي من السجلات الخاصة بي التي تتعلق بهذه الدراسة من قبل مجلس أخلاقيات البحث بكلية حمدان بن محمد لطب الأسنان لأغراض ضمان الجودة.

وبتوقيعي على نموذج الموافقة هذا، فإنني لم أتنازل عن أي من الحقوق القانونية المكفولة لي أو لطفلي كمشارك في دراسة بحثية.

توقيع أحد الأبوين/ الوصي القانوني: _____

التاريخ: _____ (يوم/ شهر/ سنة)

اسم الوالد/ الوصي القانوني طباعةً: _____

أقر أنا، الموقع أدناه، وأصادق على أن المعلومات الواردة في نموذج بيانات المشارك والموافقة قد تم شرحها بدقة لي، وأنه قد تم فهمها بوضوح من قبل المشارك أو ممثل المشارك المقبول من الناحية القانونية، وأنه قد تم منح الموافقة بالمشاركة في هذه الدراسة من قبل المشارك أو ممثل المشارك المقبول من الناحية القانونية بمطلق حريته.

توقيع الشاهد: _____

التاريخ: _____ (يوم/ شهر/ سنة)

اسم الشاهد طباعةً: _____

Appendix III. Demographic Sheet



DEMOGRAPHIC DATA COLLECTION SHEET

Child's ID No. :

Child Medical file No.: □□□□□□□□□□□□

Gender: Male Female

Child Date of birth: D/d□□ M/m□□ Y/y□□□□

Nationality:

Ethnicity: Arab Asian White Caucasian African Other (_____)

Educational level (parents): None primary education Secondary education Tertiary education

Occupational Status (parents): Unemployed student Self-employed Professional

وثيقة جمع بيانات ديموغرافية

..... رقم معرف الطفل:

الجنس (للطفل) : ذكر أنثى

صلة القرابة للطفل: الأب الأم اخر

تاريخ ميلاد الطفل:

جنسية الطفل:

العرق: عربي آسيوي قوقازي أبيض أفريقي آخر (_____)

المستوى التعليمي (لوالدين): لا يوجد تعليم ابتدائي تعليم ثانوي تعليم عالي

الحالة المهنية (لوالدين): بدون عمل طالب أعمل لحسابي الخاص مهني

Appendix IV FBRS

APPENDIX 1. FRANKL BEHAVIORAL RATING SCALE

1	--	Definitely negative. Refusal of treatment, forceful crying, fearfulness, or any other overt evidence of extreme negativism.
2	-	Negative. Reluctance to accept treatment, uncooperative, some evidence of negative attitude but not pronounced (sullen, withdrawn).
3	+	Positive. Acceptance of treatment; cautious behavior at times; willingness to comply with the dentist, at times with reservation, but patient follows the dentist's directions cooperatively.
4	++	Definitely positive. Good rapport with the dentist, interest in the dental procedures, laughter and enjoyment.

Appendix V. Translated MCDASf-OHAR

استبيان حول مستوى القلق لدى الأطفال عند زيارة طبيب الأسنان (نسخة الطفل)

الاسئلة الستة القادمة اود أن تبين لي من خلالها القلق او الهدوء المصاحب لك اثناء علاج الاسنان. لقد استخدمنا مقياسا مبسطا لمعرفة مستوى القلق الذي تشعر به. المقياس يشبه المسطرة يبدأ بالرقم 1 الذي يعني أنك غير قلق ومرتاح وينتهي بالرقم 5 الذي يعني أنك تشعر بالقلق إلى أبعد الحدود. الرجاء الاختيار بوضع دائرة عند الجواب الملائم.

- 1 - غير قلق / مرتاح 
- 2- قلق قليلا 
- 3- قلق 
- 4- قلق كثيرا 
- 5- قلق إلى أبعد الحدود 

ما هو شعورك نحو.....



1 2 3 4 5

الذهاب لزيارة طبيب الأسنان

1 2 3 4 5

فحص أسنانك

1 2 3 4 5

تنظيف وتلميع الأسنان

1 2 3 4 5

أخذك لحقته من المخدر الموضعي في اللثة

1 2 3 4 5

عمل حشوة للأسنان

1 2 3 4 5

خلع أحد أسنانك

معلومات إضافية:

بعد تعبئة هذا النموذج يرجى تسليمه لأحد أفراد طاقم العيادة.

قياس مستوى القلق لدى الأطفال عند زيارة طبيب الأسنان (نسخة الوالدين)

في الأسئلة الستة القادمة نود أن نعرف مدى القلق الذي يشعر به طفلك عند علاج الأسنان.

لقد استخدمنا مقياسا مبسطا لمعرفة مستوى القلق الذي يشعر به طفلك. المقياس يشبه المسطرة يبدأ بالرقم 1 الذي يعني أنه غير قلق ومرتاح وينتهي بالرقم 5 الذي يعني أنه يشعر بالقلق إلى أبعد الحدود.

الرجاء الاختيار بوضع دائرة عند الجواب الملائم.

- 1 - غير قلق
2- قلق قليلا
3- قلق
4- قلق جدا
5- قلق إلى أبعد الحدود



كيف سيكون شعور طفلك

عند ذهابه لزيارة طبيب الأسنان؟

1 2 3 4 5

عند فحص أسنانه؟

1 2 3 4 5

عند تقليح وتلميع الأسنان؟

1 2 3 4 5

عندما يتعرض لحقنه من المخدر الموضعي في اللثة؟

1 2 3 4 5

عندما يتعرض لعمل حشوة للأسنان؟

1 2 3 4 5

عندما يتعرض لخلع للأسنان؟

1 2 3 4 5

معلومات إضافية:

بعد تعبئة هذا النموذج يرجى تسليمه لأحد أفراد طاقم العيادة.

Appendix VI. Ethical Approval



Date: 6/12/2016

Dear Dr Al Gharebi – Paediatric dental Resident

Re: Your research protocol

Titled: Child self-reported and parents proxy

Thank you for submitting your research protocol to the Research and Ethics committee of the Hamdan Bin Mohammed College of Dental Medicine, MBRU.

It was considered at the meeting held on: 23/10/2016

After your revisions the protocol has been given approval. If you need specific guidance, please make an appointment to see the Chair, Prof A Milosevic, as soon as possible. The committee would like to remind you that it is a requirement of the programme that you complete a research dissertation, which comprises 15% of credits within the 3-year MSc programme.

With best wishes

Yours sincerely,

Prof A Milosevic

Chair, Research and Ethics Committee, HBMCDM

Appendix VII. BSPD Abstract

Poster (Non-Prize Category)

about sedation treatment sessions, to include details of the dentistry and sedation provided.

Aim: The aim of this audit was to assess if treatment involving inhalation sedation was being recorded, and if all relevant treatment details are captured.

Standards: 100% of treatment episodes using inhalation sedation to be recorded in logbook; to include details of sedation, dental treatment, and complications of either.

Methods: A retrospective audit of sedation logbooks was carried out for 30 patient encounters. These were identified from treatment lists for all staff grades, during September – December 2017. The logbook records were cross-checked with patient's clinical notes for each session. Data was recorded using a proforma.

Results: The logbooks in current use are paper-based. Only 17% of sedation treatment episodes were recorded. Some staff groups showed 0% compliance. There were multiple errors and inaccuracies in data entry, most frequently nitrous oxide dose. No treatment complications were reported. Feedback from users is that paper logbooks are time-consuming and cumbersome to use.

Action plan:

- Education of staff about the logbook and their responsibility for completing.
- Reaudit planned.
- Future plans are to introduce a digital logbook.

Conclusion: Significant improvements need to be made to the recording of treatment under inhalation sedation. It is encouraging that no treatment complications were reported. Introduction of a digital logbook may further improve results.

P25

UAE children's dental anxiety (self and proxy reported) and their dental behaviour

S. ALGHAREBI, M. KOWASH, M. HALABI, A. KHAMIS & I. HUSSEIN

Mohammed Bin Rashid University of Medicine And Health Sciences (MBRU), Dubai, UAE

Background: Child dental anxiety (CDA) and uncooperative behaviour in dental practice are common and intertwined.

Aim: To assess both child-self and parent-proxy reported CDA in relation to child dental behaviour in the United Arab Emirates (UAE).

graduate paediatric dentistry clinic in 2017. Demographics, self and proxy reported CDA scores using a six-question, five-point Likert scale, faces version of the Modified Child Dental Anxiety Scale (MCDAS scores from 6 to 30 where ≥ 19 was severely dentally anxious) in addition to dentist recorded numerical Frankl Behaviour Rating Scale Scores (FBRSS: 1 to 4 where 1 was extremely uncooperative) were recorded and compared. Pearson's correlation, Kappa-coefficient, one-way ANOVA and T-Test statistical analysis were used ($P < 0.05$).

Results: The prevalence of self and proxy severe CDA was 22.4% ($n = 35$) and 33.3% ($n = 52$) respectively, while only 9% ($n = 14$) were dentally uncooperative. In both groups, tooth extraction caused the highest anxiety followed by injections and fillings ($P < 0.001$). There was a positive linear correlation between self (mean score 15.02 ± 4.9) and proxy (mean score 15.7 ± 6.07) CDA scores and a negative linear correlation between both scores and the FBRSS ($P < 0.001$). Self/proxy concordance of severe-anxiety/none-to-moderate-anxiety was fair (68.6%, kappa=0.230, $P = 0.003$). Both self/FBRSS and proxy/FBRSS concordance of severe-anxiety/none-to-moderate-anxiety/behaviour was fair [(78.8%, kappa = 0.227, $P = 0.001$) and (71.8%, kappa = 0.224, $P < 0.001$) respectively].

Conclusion: In the UAE sample studied, there was an agreement between child-self and parent-proxy reported CDA. Increased CDA led to uncooperative dental behaviour.

P26

Consent for children: can a novel parental responsibility form aid the process?

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Background: Documentation of the consent process for children and establishing who has parental responsibility (PR) can be complicated. Parents/guardians may be unaware of the relevant legislation which may prompt discussions of a sensitive nature concerning a child's background.

Aims: To determine if consent was documented correctly and if those who have PR were identified at the initial visit for children having dental treatment under sedation or general anaesthetic (GA) at two Paediatric Dentistry units.

Standards: 100% of children treated under sedation or GA had written consent provided by either: (i) themselves if deemed Gillick competent; (ii) a person with PR.

Method: A retrospective case note analysis of 80 children per unit that had treatment under sedation or GA was completed for two audit cycles.

Results:

Cycle 1: Consent was documented correctly for 79% ($n = 127$) of children. PR was established at the initial visit for 22% ($n = 35$) of children.

Cycle 2: Consent was documented correctly for 97% ($n = 155$) of children. PR was established at the initial visit for 87% ($n = 139$) of children.

No child who was deemed Gillick competent in either cycle signed consent without their parent/guardian.

Recommendations: Following the low compliance in the first cycle a PR form was designed to inform and enable parents/guardians to list all those who have PR at the initial visit. This was implemented prior to the second cycle.

Conclusion: Implementation of a PR form provided a standardised way of establishing who had PR and helped improve the

P27

A two-cycle audit assessing the accuracy of Paediatric Dental Charting

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Background: The audit was carried out to address a Never Event within the Paediatric dental department; a permanent tooth was extracted rather than the deciduous tooth.

Aim: To assess the accuracy of paediatric dental charting, when compared to the OPG taken in the same clinical session.

Objectives: To investigate issues within:

- Clinical workings that may lead to inaccuracies.
- Protocols that could lead to inaccuracies.

To highlight relationships between inaccuracies to formulate change.

Methodology:

- 182 patients were screened 5th April–30th August 2017 – sample size 51.
- Hospital numbers were used to screen for OPGs.
- If OPG was taken, the dental charting was screened for accuracy.