

T.C.
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF PAEDIATRIC DENTISTRY

**EVALUATION OF ORAL HEALTH-RELATED
QUALITY OF LIFE IN PRESCHOOL CHILDREN
WITH EARLY CHILDHOOD CARIES**

DOCTOR OF PHILOSOPHY THESIS

DENTIST
DİLEK DÜZENLİ

İstanbul-2023

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DECLARATION

I hereby declare that this thesis is my work and that I adhered to ethical behaviour at all stages from planning to writing. To the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgement has been made in the text.

04/04/2023

DİLEK DÜZENLİ



DEDICATION

**To the powerful women of my family
who raised and made me the woman I have become,**

*Adile ÖZTÜRK, Harika DÜZENLİ
Yasemin DEMİRDÖVEN and Nurdan ARKAN...*



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LIST OF SYMBOLS AND ABBREVIATIONS

ppm	Parts per millions
%	Percent
#	Number of
AAPD	American Academy of Pediatric Dentistry
COHIP	Child Oral Health Impact Profile
COHRQoL	Child Oral Health-Related Quality of Life
CPQ 8-10	Child Perception Questionnaires 8-10
CPQ 11-14	Child Perception Questionnaires 11-14
C-OIDP	Child Oral Impacts on Daily Performances
DMFT	Number of decayed, filled or missing permanent teeth due to caries
dmft	Number of decayed, filled or missing primary teeth due to caries
EAPD	The European Academy of Paediatric Dentistry
ECC	Early Childhood Caries
ECOHIS	Early Childhood Oral Health Impact Scale
HRQoL	Health-Related Quality of Life
IAPD	International Association of Paediatric Dentistry
MOHRQoL	Michigan Oral Health-Related Quality of Life Scale
OHRQoL	Oral Health-Related Quality of Life
QoL	Quality of Life
POQL	The Paediatric Oral Health-Related Quality of Life
S-ECC	Severe Early Childhood Caries
SOHO-5	The Scale of Oral Health Outcomes for 5-year-old Children
T-ECOHIS	Turkish version of the Early Childhood Oral Health Impact Scale
T-SOHO-5	Turkish version of SOHO-5
T-SOHO-5c	Child version of the Turkish SOHO-5
T-SOHO-5p	Parent version of the Turkish SOHO-5
WHO	World Health Organization

ABSTRACT

DÜZENLİ, D. (2023). Evaluation of Oral Health-Related Quality of Life in preschool children with early childhood caries. Yeditepe University Institute of Health Sciences, PhD Thesis, İstanbul.

Early Childhood Caries (ECC) disrupt functional and social aspects, decreasing the Oral Health-Related Quality of Life (OHRQoL). Assessing the correlation between ECC and the OHRQoL is proposed to lead to the further development of measurements used in the Paediatric Dentistry Clinic routine and would help to determine and allocate the sources to patients in need. This study aimed to assess the impact of ECC on the OHRQoL of preschool children using the Turkish version of ECOHIS (T-ECOHIS) and the Turkish version of SOHO-5 (T-SOHO-5) which will be adapted in the process. The SOHO-5 measurement is cross-culturally adapted to Turkish and pilot-tested (n=20). Sociodemographic background information and dental status of children (dmft and ICDAS), the OHRQoL scores (T-ECOHIS and t- SOHO-5) were evaluated (n=86). The frequencies of answers given to scales and the level of agreement (T-ECOHIS vs T-SOHO-5 parent and T-SOHO-5 parent vs child) were tested with Percent agreement, Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC. Results showed a significant correlation between dmft values and T-ECOHIS ($p=0.002$), T-ECOHIS CIS ($p=0.002$), T-ECOHIS FIS ($p=0.020$), T-SOHO-5 parent ($p=0.029$) and T-SOHO-5 child ($p<0.001$). The agreement analysis between T-ECOHIS vs T-SOHO-5 parent and T-SOHO-5 parent vs child were statistically significant ($p<0.05$), except the items related to the child's self-esteem and appearance ($p>0.05$). In conclusion, the consequences of ECC on the oral health of children affect both preschool children's and their parents' OHRQoL. T-SOHO-5 is a valid tool to be used on preschool children to evaluate the effects of ECC.

Keywords: Early Childhood Caries, Oral Health-Related Quality of Life, the Turkish version of the Early Childhood Oral Health Impact Scale (T-ECOHIS), The Scale of Oral Health Outcomes for 5-year-old children (SOHO-5)

ÖZET (Turkish)

DÜZENLİ, D. (2023). Erken çocukluk çağı çürükleri olan okul öncesi dönemdeki çocukların ağız sağlığı ile ilişkili yaşam kalitelerinin değerlendirilmesi. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü. Doktora Tezi, İstanbul.

Erken Çocukluk Çağı Çürükleri (EÇÇ) fonksiyonel ve sosyal açıdan bozulmalara yol açarak Ağız Sağlığı ile İlişkili Yaşam Kalitesini düşürmektedir. EÇÇ ile Ağız Sağlığı ile İlişkili Yaşam Kalitesi arasındaki korelasyonun değerlendirilmesinin, Çocuk Diş Hekimliği klinik rutinde kullanılan ölçümlerin geliştirilmesini sağlayacağı, ihtiyaç sahibi hastaların belirlenmesi ve kaynakların tahsis edilmesinde yardımcı olacağı öngörülmektedir. Bu çalışmada Türkçe'ye adaptasyonu yapılacak olan SOHO-5 anketi (T-SOHO-5) ile Erken Çocukluk Ağız Sağlığı Etki Ölçeği (T-ECOHIS) kullanılarak, EÇÇ'nin okul öncesi çocukların ağız sağlığı ile ilişkili yaşam kaliteleri üzerine etkisinin değerlendirilmesi amaçlandı. SOHO-5'in pilot çalışma (n=20) ile kültürler arası adaptasyonu sağlanmış ve anket Türkçe'ye uyarlandı. Sosyodemografik bilgiler, çocukların diş sağlık durumu (dmft ve ICDAS), ağız sağlığı ile ilişkili yaşam kalitesi değerleri (T-ECOHIS ve T-SOHO-5) değerlendirildi (n=86). Yaşam kalitesi cevaplarının frekansları ve anketlerin uyum ve güvenilirlikleri Percent agreement, Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC testleri ile analiz edildi. Sonuçlara göre dmft değerleri ile T-ECOHIS ($p=0.002$), T-ECOHIS CIS ($p=0.002$), T-ECOHIS FIS ($p=0.020$), T-SOHO-5 ebeveyn ($p=0.029$) ve T-SOHO-5 çocuk ($p<0.001$) değerleri arasındaki ilişki istatistiksel olarak anlamlı bulundu. T-ECOHIS ile T-SOHO-5 ebeveyn ve T-SOHO-5 ebeveyn ile çocuk değerleri arasındaki uyum analizinin, çocuğun özsaygısı ve görüntüsüyle ilgili maddeler dışında ($p>0.05$), istatistiksel olarak anlamlı olduğu belirlendi ($p<0.005$). Sonuç olarak EÇÇ'nin diş sağlığı üzerindeki sonuçları okul öncesi çağda çocukları ve ailelerini etkilemektedir. T-SOHO-5'in EÇÇ'nin etkilerini değerlendirmek üzere okul öncesi çağda çocuklar için kullanılabilecek bir araç olduğu belirlendi.

Anahtar Kelimeler: Erken çocukluk çağı çürükleri, Ağız sağlığı ile ilişkili yaşam kalitesi, Erken Çocukluk Ağız Sağlığı Etki Ölçeği (T-ECOHIS), SOHO-5

1. INTRODUCTION and PURPOSE

A decreased rate of dental caries in children is observed in the last two decades; nevertheless, its high prevalence is still an issue in developing or underdeveloped countries (1). Children under the age of three are susceptible to an aggressive form of caries disease called Early Childhood Caries (ECC) (2). The severity of ECC was stated by the International Association of Paediatric Dentistry (IAPD) Expert Panel, as an aspect of a societal cost and personal burden on children and their families at the Bangkok Global Summit (3). The need for consideration of the daily impact of ECC on the quality of children's and their parent's life was especially emphasized rather than just the definition, aetiology, risk factors, prevalence, or management of ECC (3–5).

The tools developed to measure the magnitude of alteration in the quality of a person's daily life caused by oral and dental health problems are called the Oral Health-Related Quality of Life (OHRQoL) measurements (4). OHRQoL measurements that are frequently used in paediatric dentistry are usually the modified version of the instruments originally developed for adults (6). Since each subject, different age groups, or people from diverse cultures require a unique tool, OHRQoL measurements are encouraged to be modified through the processes of adaptation and validation (4–6). New variations increase an instrument's accessibility and usability in different situations. The effect of ECC on the Quality of Life (QoL) is evaluated in the literature in some studies mentioning its effect on early tooth loss, and malnutrition in children leading to delayed growth (7,8).

Measurements used for preschool children are advised to be proxy reports since children under three years old cannot express themselves truly or understand the consequences (5). On the other hand, parents tend to observe everything about their children with bias (9). This situation led to the urge to develop a subjective assessment system ready to use by paediatric dentists for pre-schoolers. Turkish version of the Early Childhood Oral Health Impact Scale (T-ECOHIS) (10) is an OHRQoL measurement already adapted to Turkish culture and showed validity, that is appropriate to be used with preschool children. T-ECOHIS relies on a child's parents' proxy report on rating their affected QoL, leading to discrepancies and bias. The Scale of Oral Health Outcomes for five-year-old children (SOHO-5) (11) is an OHRQoL measurement developed to assess the QoL of children based on their self-report,

which is not yet adapted to Turkish culture and evaluated whether to use in preschool children.

Oral and dental diseases involve clinical manifestations which are expressed via indexes by professionals. These indexes reflect clinically essential information objectively about the disease and help to regulate the treatment needs. It is noted that through indexes, the depicted knowledge only holds universal information, however, the social and psychological effects of a disease on a person add an identity (4). Thus, besides the well-known methods, OHRQoL measurements are required to be incorporated into a regular patient examination routine (8). With the availability of new instruments and an understanding of the effects of diseases, especially ECC in pediatric patients, a diverse perspective related to clinical applications or community health is hoped to be achieved.

Recent literature about the OHRQoL measurements used for preschool children having ECC is reviewed for this study. To our knowledge, there is a lack of literature evaluating the affected OHRQoL of preschool children due to the impact of ECC upon their self-assessment in comparison with their parent's proxy report, emphasizing the precision of either approach using two measurements, based on the child's apparent oral health depicted with dmft scores. This study aimed to provide the translation and cross cultural adaptation of SOHO-5 to the Turkish language and to assess the impact of ECC on preschool children's OHRQoL using T-ECOHIS and the Turkish version of SOHO-5 (T-SOHO-5). The hypothesis (H_1) of this study was, as the dmft values showing the dental status of children increased by ECC severity, the OHRQoL scores will also increase. Moreover, the null hypothesis (H_0) was that there is no difference between the OHRQoL scales of T-ECOHIS and T-SOHO-5 in measuring the OHRQoL of children and their parents.

2. GENERAL INFORMATION

2.1 Early Childhood Caries

One of the greatest hazards to the child's primary dentition is ECC. The American Academy of Pediatric Dentistry (AAPD) defined ECC as 'the presence of one or more decayed, missing due to caries, or filled tooth surfaces in any primary teeth in children under 71 months old. It is stated that children under three years old having smooth surface caries are identified as having Severe Early Childhood Caries (S-ECC) (12). For different age groups, a separate description of S-ECC is present. Children younger than 3 years of age with any smooth surface lesions, for children aged between 3 and 5 years, 1 or more maxillary anterior lesions or a dmfs score of 4. 5 and 6 surfaces for ages 3, 4 and 5 years respectively (13,14).

ECC is stated as a specific form of caries, observed in primary dentition due to its early onset, unique localization, and rapid destruction of the teeth. It typically appears in caries-resistant regions, such as labial surfaces of the upper incisors, also in the upper and lower molars, rarely in the upper canine, or in the lower incisors and lower canines in very severe cases (15). This unique clinical diagnostic criterion was believed mainly because of the nutritional habits of the baby. During bottle feeding, the maxillary incisors bath in cariogenic substrate containing drinks, on the other hand, the position of the tongue protects the lower incisors due to infant swallowing (16). Even though saliva has a buffering effect on the acidic environment, an immunologic defence mechanism, and the mechanical cleaning ability of the teeth, these properties decrease at night (17). Due to a variety of etiological, clinical, course features and localization unique to ECC, it is also referred to as labial caries (18), caries of incisors (19), nursing bottle caries (20), baby bottle tooth decay (21), nursing bottle mouth (22), and nursing caries (2) in the dental literature.

2.1.1 Etiology of Early Childhood Caries

Dental caries is an infectious and transmissible disease. Nonetheless, ECC is an extremely aggressive type of dental caries. Scientific research suggests that the ECC develops in three stages. The first stage is characterized by the introduction of the oral cavity

with microorganisms causing ECC. The second stage is the increased number of cariogenic microorganisms reaching pathogenic levels because of the continued proliferation due to frequent and prolonged exposure to cariogenic substrates. At last, in the third stage a rapid demineralization, followed by cavitation of the enamel occurs, leading to rampant caries (29). It is suggested that the three key components for dental caries to progress are: microorganisms, substrate, and time (30).

In the etiology of ECC, a special role is given to dental plaque, which is the media for microorganisms causing decay, namely cariogenic bacteria. Of great interest in the cariogenesis process is only two bacterial genera: *mutans streptococci* and *lactobacillus* (15). A significant role is attributed to the bacterium *Streptococcus mutans* since it is responsible for the primary oral infection in the initiation of ECC, which is called “the window of infectivity” (31,32). Although, earlier and later infection is a probability, usually, the mother’s cariogenic bacteria are introduced to the baby’s oral flora between the 19th-31st months. To prevent the first transmission, sharing a spoon while eating or tasting food, and kissing in the mouth region should not be permitted (31).

Once the cariogenic bacteria are introduced to the oral flora, with a frequent supply of substrate acquired from the plaque and if tooth brushing is neglected especially before sleeping, ECC occurs (17). Babies being bottle-fed with juices or sweetened milk with sugar, honey, or grape molasses is a common bad nutritional habit. Intermittent bottle feeding at night deteriorates the cleaning and buffering activity of saliva and increases the cariogenic activity of ECC in the baby’s oral cavity (16,17). In toddlers, on the other hand, once the ability to chew is acquired, snacks in the form of solid cariogenic foods such as sweets, chocolates, cakes, biscuits, chips, and pretzels are replaced to stand as the substrates for the progression of ECC (16,33).

The socioeconomic status and education level of the parents are the co-factors in the ongoing process of ECC and increase the severity of the disease. Demographic characteristics, socioeconomic status, education of parents, parents' attitude, the child's behavioural attitude, oral hygiene habits in the family, eating habits, use of a bottle or pacifier soaked in honey or jam, the child's mouth breathing, the presence or absence of the child's chronic disease and condition that requires special attention, psychosocial factors, the child's medication status and ethnicity, low birth weight, perinatal stress are some of the factors found associated with ECC (34–37).

2.1.2 Prevention of Early Childhood Caries

ECC is a multifactorial health problem with biological, social, and behavioural underlying causes. Determining the underlying cause can be as complicated as the treatment itself. Behaviour management of the patient based on empathy and communication may not be adequate for a child to receive the treatment in the dental chair (38). In addition to that, regarding ECC's rapid and destructive progression, professionals may not have enough time to provide the ideal painless and anxiety-free conditions without pharmacological techniques. Intervention treatments proposed by paediatric dentists may not resolve problems if the acceptance of a procedure on the dental chair is insufficient by either the child or the parent (39). Prevention is for sure the safest way to reduce this complex pathology (38–40).

For the prevention of ECC, The European Academy of Paediatric Dentistry (EAPD) has recommended general strategies. The reduction of behaviours that encourage the early transmission of Mutans Streptococci during the first year of life is advised for parents and toddlers. Moreover, it is stated that oral health assessments with counselling are crucial. It is emphasized that daily brushing with a smear of toothpaste with fluoride after the first tooth erupts is vital and for individuals at risk of ECC, at least twice a year, professional fluoride applications are advised (41).

To prevent ECC occurrence worldwide, IAPD published a declaration for individuals, professionals, and healthcare workers in 2019 (3). According to the recommendations, the cariogenic diet should be restricted. The regular consumption of sugar-containing beverages or foods should be avoided. Beverages with added sugar in a baby bottle especially after 12-18 months should be ceased, and breastfeeding on-demand after the first primary tooth erupts is not recommended. Immediately after the eruption of the first primary tooth oral hygiene measures should be implemented. Using a soft toothbrush of age-appropriate size, parents should accompany when their child's tooth brushing twice daily (25). A smear of fluoridated toothpaste for children under the age of three and a pea-sized amount of fluoridated toothpaste for children ages three to six are recommended to be used. It is stated that children at high risk for ECC should be provided with professionally applied fluoride varnish treatments. A caries risk assessment specific to the child and parental education including guidance to prevent any oral disease should be conducted

within six months and no later than twelve months of age (26). A pinpoint achievement is that all infants and toddlers should have access to preventive care, counselling and dental screenings. Experts are encouraged to raise awareness and lead lawmakers, policymakers, and third-party payors on the effects of preventive measures for ECC (12).

Primary Prevention

A detailed preventive measure can be described for individuals by stages. Considering the window of infectivity, the primary prevention should begin during the prenatal period, and it should comprise a mother's general and oral health. Mothers are recommended to start antimicrobial therapy with chlorhexidine to reduce the number of cariogenic microorganisms in their oral flora and should have proper oral health to reduce the primary colonization during that specific period (32,41). Parents should be educated on recognizing the first signs of ECC on the cervical lesions of maxillary deciduous incisors, by the 'lifting the lip' technique and learn the importance of regular plaque removal by brushing twice daily with 1000 ppm (parts per million) concentration of fluoridated paste. Children under three years of age are recommended to use a smear size and those above three years of age are recommended to use a pea-sized amount of fluoridated toothpaste (12).

For children, primary prevention consists of all the prophylaxis treatments, including regular dental check-ups based on individual caries risk assessed by a dental professional after the eruption of the first teeth. In the prenatal period, anti-cariogenic behaviour management should be introduced to parents and oral hygiene education should be provided (12). During the post-natal period, mothers should initiate breastfeeding right after birth and continue for at least six months until the second year (42). At the age of 12-24 months, bottle feeding should be weaned from, especially if the consumption of fermented carbohydrates or sugar-added liquids is dominant in the diet (12). According to *Begzati et al.*, parents should avoid bad feeding habits. Breastfeeding is recommended over bottle-feeding especially when the baby is asleep and even worse if it is filled with sweetened liquids (23). Using a sippy cup would be a better choice than baby bottles.

Regular dental visits, a non-cariogenic diet, a persistent tooth brushing routine with the right amount of fluoridated toothpaste, and for high caries risk patients' professional topical fluoridation of children under the age of six with 5% sodium fluoride varnish (NaFV: 22,500 ppm) are the main elements of primary prevention for the ECC (12). Global use of

different fluoride intake methods is shown in Figure 2 according to data from FDI's estimated amounts of people worldwide benefiting from different types of fluoride sources around the years 2001-2013 (43). When the diverse varieties of fluoride intake methods are considered globally, despite the great efficacy of being professionally applied, using an appropriate amount of fluoridated toothpaste has a non-neglectable effect concerning prevention for crowds (43).

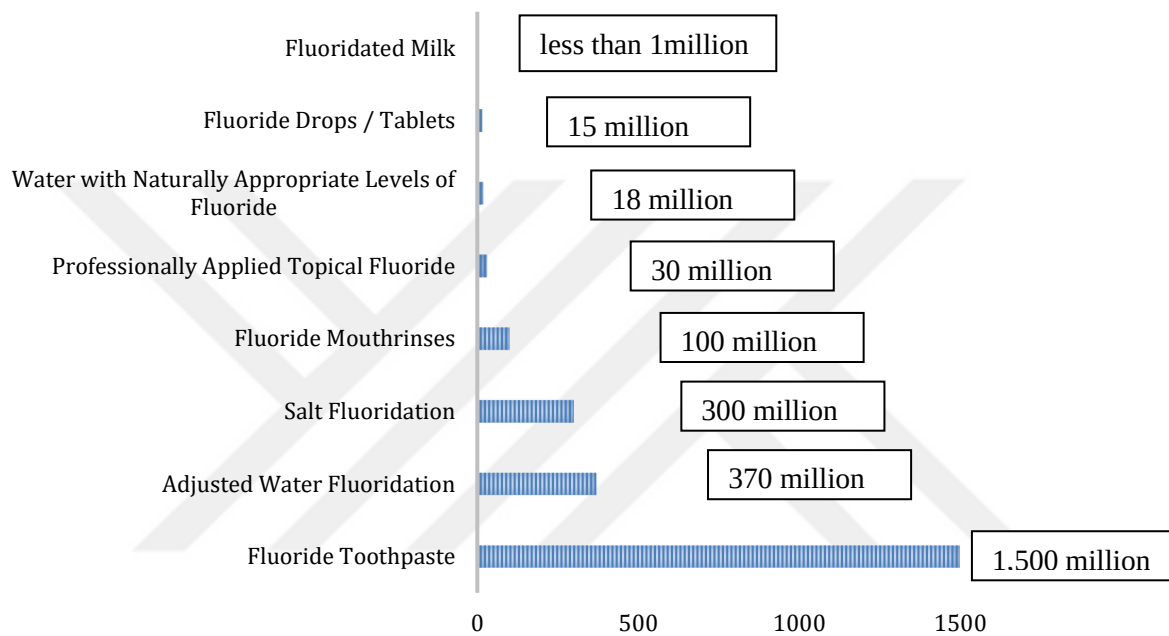


Figure 1. Types of Fluoride Intake Methods Globally (43)

Secondary Prevention

Secondary prevention is the timeline that starts from the diagnosis and ends with an invasive treatment need. Necessary consultations with the dentist should be conducted as soon as possible (12). The aim of this procedure is the early identification of the “white spot” lesions which is the early stage of a cavity by a dental professional (26). Thus, education to health professionals like paediatricians, family physicians, and mid-level medical practitioners targeted and being sure that primary care health providers would refer patients to a dentist by twelve months of age for early identification of disease is crucial (23).

All necessary precautions and prophylactic treatments have a significant role to delay an invasive intervention to treat ECC (25,26). Otherwise, ECC can progress from the initial 'white spot' lesion, a decay on the enamel, to deep multiple cavities in a year. This rapid destruction was observed in two-thirds of the children within a year in a study conducted by **De Grauwe et al.** It was claimed that caries could develop from the enamel to the dentin level in six months (44). All prophylaxis treatments including fissure sealants and regular topical fluoride applications are considered secondary preventions. Topical application of sodium fluoride varnishes may be the best method of choice by a dental professional, as well as Silver Diamine Fluoride. In rampant caries silver diamine fluoride is stated to have a great ability on the arresting carious lesions of cavitated in primary dentin (45,46).

Drinking fabricated juices, flavoured milk, or fizzy drinks should not be permitted for young children. Fruit consumption should be in edible form, rather than juice. Frequent snacking habit without tooth brushing inhibits the remineralization process, causing constant demineralization in caries lesions. A healthy diet should persistently continue at the daycare, school, or with any caretaker. Daily tooth brushing should be performed twice a day with the help of parents and is obligatory before going to bed (16,25).

Tertiary Prevention

Tertiary prevention is the professional treatment required for ECC. If primary or secondary prevention were not achieved, tertiary prevention is inevitable. The first appointment with a paediatric dentist should be arranged after the eruption of the first primary teeth around the 6th month (12). Parents and the baby are introduced to dental care and all necessary precautions will be explained to prevent ECC, which is the primary prevention. Recall sessions should be arranged every sixth month regularly to avoid any occurrence of caries (26). If an early stage of a caries lesion is spotted, preventive cautions should be converted to new strategies for the secondary stage. The timeline is crucial after the diagnosis of ECC since it is an extremely aggressive form of caries (47). With the help of secondary preventive care, primary teeth are hopefully managed to fulfil their duties, until physiologic exfoliation before the need for an intervention by a paediatric dentist (25) If it is struggled during the secondary prevention stage and failed, tertiary prevention is needed. All dental treatments including pulpal therapies, restoration of the cavities with prefabricated crowns or other suitable restorative materials, arresting caries to slow down the process, extractions, or placing space maintainers are included in tertiary prevention (38). In addition

to that, some cases are treated under general anaesthesia as an urgent treatment need when patient and parent compliance is not adequate to slow down the progression of ECC (27,40,48).

The term “tertiary prevention” is also preferred when treatment needs to be managed in a wider perspective (big population group), quicker manner (fast application by the doctor), and easier to operate (low technique sensitivity). The cases of ECC require simple, easy-to-manage, highly tolerated, fast treatment methods like atraumatic restorative treatment (ART) and simplified and modified ART (SMART) (49). Treatment, in summary, is the removal of the soft dentine in the cavity as much as possible with hand instruments or plastic special burs, also chemo-mechanical caries removal may as well be of choice, followed by the restoration using materials like glass ionomer cement (45). Material preference is based on the fluoride-releasing ability and requirement of low moisture sensitivity (45,49).

2.1.3 Complications and Consequences

ECC has some inevitable complications and related consequences. In the initial stages, lesions present in the mouth may not cause any pain and alert the parent. Without symptoms, lesions may progress at different sites of the teeth. Although buccal and cervical caries lesions are specific to ECC and children with a habit of holding food in the mouth, striking pain related to food impaction caused by the loss of the marginal ridge due to approximal cavities can be observed. Caries progression of irregular patterns challenges restorations for paediatric dentists. Prefabricated stainless-steel crowns or zirconia crowns may be a wiser option than a material with adhesion problems.

When the caries lesion is deep enough to affect the pulp, a purulent or gangrenous inflammatory process may occur in the root canals. The type of infection, being chronic or acute, determines the clinical compliance of the patient and the local symptoms. In an acute infection, an abscess or narrowed vestibular sulcus is observed, the gingiva is oedemic and under pressure it is painful. The tooth is sensitive to percussion and palpation. In some cases, the purulent inflammatory process of the pulp extends to the periodontium, when the clinical symptoms become much more difficult to overcome (16).

The general condition of the patient can be described as having severe pain, fever, loss of appetite, with a pale and frightened appearance. The patient cannot be fed because of

oedema of the lip and gum inflammation. In some cases, a purulent secretion in the capsulated abscess can be discharged, and the patient is relieved by the reduced pressure. This action creates a fistula which is seen in chronic cases of infections (16). Chronic infections with fistulas are often experienced as periods of healing and recurrence of the acute phase in cycles. With the repetitive destruction of the periodontium, supporting tissues are lost within a period determined by the host's immunologic response. Over time, increased mobility leads to the early loss of the tooth. Moreover, sometimes ankylosis may occur because of an infection, and deciduous teeth may persist and may cause eruption disorders of permanent successors causing orthodontic malalignment (14,16,50).

Another consequence of ECC is the early loss of deciduous teeth caused by the need for extraction before the time of physiologic exfoliation. Early extraction can have negative effects including abnormal tooth eruption, speech impediments like mispronouncing some letters and sounds, difficulty chewing or eating, poor aesthetics, etc. To prevent and/or correct these discrepancies, orthodontic rehabilitation will be needed in terms of space maintenance and/or regaining the lost space in the dental arches, which will provide normal pronunciation and phonetics, aesthetic improvement, and the proper eruption of the permanent successor teeth. (16,38).

In some cases, rampant caries lesions cause the early destruction of the crown before physiologic exfoliation. The weakening of the structural integrity of the primary tooth may result in the breakdown of the dental hard tissues. The remaining tissues of the tooth, usually a piece of the residual root remains can be persistent in the permanent dentition. If the physiologic tooth resorption is abrupted, residual deciduous root drifts and penetrates the bone or mucosa. Root remnants can intervene with the alignment of the teeth, or an ectopic eruption of a remaining root can cause deep and painful bruising at the upper lip (16).

Clinical symptoms that are mentioned before like pain from pulpitis, gangrene, apical periodontitis, abscesses, cellulitis, or phlegmon, are depicted as serious conditions endangering a child's general health. Infections due to dental caries in patients with congenital heart anomalies are life-threatening. According to the focal infection theory, untreated dental disease plays a significant role in the pathogenesis of infective endocarditis, which carries a high risk of mortality (51,52).

2.1.4 Prevalence of Early Childhood Caries Worldwide

The World Health Organization (WHO) estimated that 48% of people worldwide have ECC (53). Despite the decline in the prevalence of dental caries in children in some countries, caries in preschool children remains a major health problem in both underdeveloped and developing countries (54). The prevalence of ECC also varies within a country depending on several factors like race, culture, ethnicity, socioeconomic status, lifestyle, dietary pattern, and oral hygiene practices (20,25,53,55,56). A review of the literature, by **Congiu et al. (2014)** suggests that in most developed countries the prevalence of ECC varies between 1 and 12% (55). The prevalence of ECC has been reported as 70% in less developed countries, in disadvantaged groups in developed countries and in low socioeconomic groups (54,57–59). In a former systematic review, **Ismail and Sohn (1999)** stated that around the world the prevalence of ECC varies from 2.1% in Sweden to 85.5% in rural Chinese children (14).

In different countries, the prevalence of ECC ranges from 11.4% in Sweden to 7–31.0% in Italy (60–62). A study by **Nobile et al.** showed the prevalence of ECC in Italy as 29.8% (61). A higher prevalence of caries has been reported in some Middle Eastern countries, such as Palestine (76%) and the United Arab Emirates (83%) (63,64). The national surveys from some countries, such as Greece (17%,36%), Brazil (45.8%, 40%), India (51.9%), and Israel (64.7%), showed an inconsistent prevalence of ECC (65–70). The national prevalence of ECC in the USA can be estimated between 3% and 6%, which is consistent with the prevalence in other Western countries (25). Table 1 shows filtered data on the prevalence of ECC around 5 years of age in different countries derived from the literature between the years 2000 and 2021. Although accomplishments in oral and dental care are emphasized in all mentioned countries, the widespread transmission of the disease and its importance were shown by studies, depicting the significant percentages of preschool children having ECC.

A study by **Masumo et al. (2020)**, emphasized the importance of the prevention of ECC as a public health problem. They compared the prevalence of caries in children at two different sites in Tanzania: Kampala (17.6%) with Manyara (3.7%) where drinking water is rich in fluoride. They concluded that the discrepancy in the number of caries experienced is due to systemic fluoride intake although it is not possible to detect and standardize the total

amount of fluoride by children to assess in further studies (54). Additionally, in the literature water fluoridation is mentioned to be available in several countries, including Australia, Brazil, Hon-Kong, and the USA (71). The effectiveness of fluoride in different forms against dental caries is known and encouraged (12,41,72).

Moreover, a review of the prevalence of ECC and the predisposing factors by **Congiu et al. (2014)**, revealed the impact of the background factors. The importance of prevention and management of ECC cases is mentioned as an important object of public health. Despite ECC being found strongly associated with the socioeconomic status of the family, the role played by the caregivers about the value given, and the attitude towards oral care is depicted to be precious (55).

2.1.5 The Prevalence of ECC and Evaluation as a Public Health Problem in Türkiye

The demand for paediatric dental treatments increases as does the awareness of oral health, provided by the health programs utilized by the Turkish Ministry of Health in 2014. This strategy involved screening programs for the assessment of oral and dental health, in collaboration with educational seminars and the applications of 5% NaF varnishes. **Sengul et al.** stated that (73), surveys carried out within the country since then in the years 2010 (74), 2015 (90), and 2019 (76), showed a decrease in the increasing rate of oral and dental health problems.

Kapdan et al. (2010) evaluated the oral health status of preschool children aged between 3 and 6 in different subgroups. According to their study, the mean dft score was found as 1.63 in the 3 years of age group; 2.72 in the 4 years of age group; 3.04 in the 5 years of age group, and 3.64 in the 6 years of age group. The prevalence of caries increased significantly over the years ($p<0.05$). They concluded that the caries situation stayed behind the expectations based on the WHO and added that further preventive dentistry services should be given (77). Although the increase in dft scores as children get older may be attributed to the non-reversible nature of dentin caries; public surveys in different countries between the years 2010 and 2019 do not reflect the expected results (74–76).

Güner Onur et al. (2020) estimated the prevalence of dental caries in Turkish children living in Edirne between the ages of 7 to 12 and evaluated the predisposing factors, such as parents' education level and income level, that are associated with the caries

experience between caries-free and caries-active children (78). The studies in Table 1., show the estimated prevalence of ECC in Türkiye along with other countries (73,79,80).

Most children with rampant caries and complicated oral diseases have cooperation problems during regular dental treatments because of the dental pain experienced, the long session and the need for several visits (27). The most distressing phase of ECC is the acceptance and treatment phase. It requires the cooperation of both the child and the parents or the caregiver and strongly relies on how they deal with the disease (81). Therefore, apart from the immediate discomfort caused by a toothache, ECC has a bad influence on the quality of everyone related, as in all kinds of diseases. Families affected by dental caries invest time, patience, trust, and money. ECC has an important impact on the parents' performance, focus, or attendance at work; as their social and emotional state while affecting their OHRQoL as well. Therefore, ECC is considered a public health problem due to its high prevalence in some populations and its wide range of consequences if not treated or left uncontrolled by health services (28).

The severity of dental caries increases the burden on families. S-ECC cases often need urgent advanced dental treatments under general anaesthesia, which is not affordable for many families. Children of such families should be the target group and be prioritized for treatment and preventive care (73). According to **Sengul et al.**, the dentist/patient ratio is 1/11,300 in the city Erzurum of Türkiye. This data can be compared to ratios from a review by **Chen et al. in 2021** stating the ratio is smallest in Nigeria (1:48,400) and highest in Brazil (1:600) (71).

Table 1. The Prevalence of ECC in Different Countries

Literature	Country	Number of Children	Age	Prevalence (%)
<i>Mora et al. (2000)</i> (82)	Spain	173	2-5	37
<i>Wigen et al. (2001)</i> (83)	Norway	1,348	5	11
<i>Cariño et al. (2003)</i> (84)	Philippines	448	5	94
<i>Autio-Gold et al. (2005)</i> (85)	Florida	221	5	48
<i>Tsai et al. (2006)</i> (86)	Taiwan	981	1-6	52.9
<i>Pitts et al. (2007)</i> (87)	England	216,873	5	38
<i>Ferreira et al. (2007)</i> (69)	Brazil	1,487	0-5	40
<i>Ferro et al. (2007)</i> (62)	Italy	3,401	5	31
<i>Cleaton-Jones et al. (2008)</i> (88)	S. Africa	7,185	2-5	59
<i>Simratvir et al. (2009)</i> (89)	India	609	3-6	59
<i>El-Nadeef et al. (2010)</i> (64)	United Arab Emirates	1340	4-5	52
<i>Ozer et al. (2011)</i> (79)	Türkiye	226	3-6	49,6
<i>Begzati et al. (2011)</i> (90)	Kosovo	1,008	2-6	17,5
<i>Li et al. (2012)</i> (91)	China	1,850	5	64
<i>Mantonanaki et al. (2013)</i> (70)	Greece	605	5	17
<i>Doğan et al. (2013)</i> (80)	Türkiye	399	3-5	40
<i>Nobile et al. (2014)</i> (61)	Italy	158	5	29.8
<i>Mothupi et al. (2016)</i> (92)	S. Africa	459	4-5	44
<i>Shitthisetpong (2017)</i> (45)	Thailand	8308	5	75,6
<i>Ozsın Ozler et al. (2020)</i> (93)	Türkiye	208	5-6	78.8
<i>Sengul et al. (2021)</i> (73)	Türkiye	1,156	4-5	73.7
<i>Elbek Cubukcu et al. (2021)</i> (94)	Türkiye	150	4-6	87

Treating all the patients' suffering cannot end the health problems of society. The development of oral health promotion strategies and education programs, along with the allocation of support to parents and caregivers in demand is required. Families need to develop coping skills, enhanced motivation, and knowledge to overcome barriers to preventive dental care. If preventive dental care fulfils its aims or even gets close enough, it will succeed in a considerable drop in the number of children with ECC (28). Which then, may increase the OHRQoL of a population progressively.

2.2 The Concept of the Quality of Life and Its Relation to Oral Health

2.2.1 Definition of the Quality of Life and Health-Related Quality of Life

Since the concept of Quality of Life (QoL) is integrated into many different disciplines from economy to health, from politics to social sciences, it is difficult to make a general definition for this concept (95). WHO defined the QoL as "the way individuals perceive their position in life in line with their goals, expectations, interests, and standards of living within the culture and values system they live in" (96).

The QoL was suggested to be evaluated in four main categories: Personal inner space, personal social area, external natural environment, and external social environment (72). To assess a person's quality of life via these categories, both subjective and objective indicators about life should be incorporated (97). Indicators such as physical, economic, social, and psychological well-being have strong objective reflections on the QoL of the person. Nonetheless, the subjective perceptions and expectations of the person transform these objective reflections into a real and more precise QoL evaluation (72,98).

Health-Related Quality of Life (HRQoL) focuses on how the patient perceives the disease, the treatment results, and his/her concerns about the illness. It is stated that an individual's ability to cope with a disease can affect one's perception of health status, life expectations, and content (97). Therefore, two people with the same health status may have different QoL. Furthermore, health-related quality of life is emphasized as a dynamic structure and will change over time since the patient by time, experiences, learns, adapts, and alters his expectations (95,97).

Since oral and dental health is a key component of general health, Oral Health-Related Quality of Life (OHRQoL) being well integrated into HRQoL is easily predictable. This close relation can be observed when a systemic disease causes an oral symptom or when a dental disease affects a patient's general health. Nonetheless, to assess how a patient's life quality is affected, oral disease, dental pain, or function disorder examination methods will not be convenient (8). Research on oral and dental health-related diseases would involve clinical indicators determined by indexes. These indexes provide clinically essential information or regulation during treatment needed. However, these indexes do not provide information about the social and psychological effects of the disease (4). This situation has led to the development of the concept of OHRQoL (8).

2.2.2 Definition of the Oral Health-Related Quality of Life

The OHRQoL of a person expresses how a situation or compliance in the oral region can affect the well-being of the individual by evaluating functional, psychological, and social factors (98). It was first introduced by **Bush et al. (1973)** (99) and was defined as "that part of a person's QoL affected by oral health" by **Naito et al.** (100). Over time, the latest definition, by the United States Association of General Surgeons, transformed to that OHRQoL is "a multidimensional concept that reflects the individual's ability to easily participate in social activities and functions while eating, sleeping, self-esteem, and his or her level of satisfaction with oral health." (5).

2.1.3 Brief History of the OHRQoL Measurements

HRQoL measurements were used widely but were not specified for oral applications. The concept of OHRQoL was first introduced during World War II to indicate a soldier's ability to perform oral functions, well-being, and suitability for service, which required having a total of at least six teeth on each jaw (37).

Johen and Caho in 1976 emphasized the importance of a patient's perspective-based examination method is required, which promoted to get used in daily routine. They stated that cultural factors, lifestyle differences, and social indicators should be taken into consideration to improve health policies (101). **Reisine in 1984**, concluded that dental disease-related problems can cause a loss in the workforce, which showed dental complaints may affect social indicators (102). Research by **Gift and Atchison** depicted the close relationship between oral health, OHRQoL, and systemic diseases. They emphasized the fact

that oral and general health cannot be assessed separately (103). **Engel in 1977** proposed a patient-centred examination method, involving their thoughts, which changes the perception of diagnosis and characteristics of diseases (104). **Locker in 1988**, designed the first draft of an oral health measuring tool after he realized that unique assessment criteria were obligatory to evaluate different results gathered from each patient (4).

In the past, psychosocial results caused by dental diseases were not cared for, since they were not seen as vital. Recently, advanced perception states let people value the emotional and psychosocial danger of individuals suffering from low OHRQoL (95).

Oral and dental health covers teeth, gingiva, periodontium, connective tissues and bone around, hard and soft palate, oral cavity and mucosa layer covering the temporomandibular joint combining the upper and lower jaw to the cranium, lips, tongue, salivary glands and masticatory muscles (105). Any abnormality in these areas can be the reason for a patient's complaint. Moreover, systemic diseases and oral health are interlinked, having many diseases, syndromes, and conditions of oral manifestations. The relationship between oral diseases and other diseases, diabetes, heart and kidney diseases, stroke, low birth weight, and premature birth are the topics emphasized in the literature repetitively (7,8). The correlation between periodontal diseases and diabetes is known for a long time (105). Inadequate care for oral health may contribute to the prognosis of chronic diseases by complicating the recovery mechanism of the body, worsening the situation, or even being lethal in cases of bacterial endocarditis (105).

The oral cavity provides individuals to perform functions such as speaking, tasting, breathing, eating, and drinking. Lack of oral and dental health may inhibit individuals' functions causing restrictions in their daily performances. Dental pain can result in difficulty in eating or chewing; tooth loss and discoloured or damaged teeth may lead to decreased personal communication abilities subsequently affecting social life (5). In other words, oral health has a profound impact on an individual's quality of life, affecting the physical, mental, and social well-being of a person (3,8,97).

ECC, developmental enamel defects, traumatic dental injuries, bruxism, malocclusion, orthodontic rehabilitation, dental erosion, congenital tooth agenesis, and periodontal diseases are some of the topics covered related to the OHRQoL in children. Also, children

with clefts, chronic diseases, children with special needs, receiving oncologic treatment, and children treated with orthognathic surgeries or general anaesthesia are focused on by researchers in the recent literature (37,81,106–110).

2.2 Assessment of the OHRQoL of Children

In recent years, results acquired from a patient's perspective became as valuable as the clinical parameters gathered in the investigation of the success of health services. Information about a person's OHRQoL is decisive when assessing the effect of oral health on daily life. OHRQoL is a measure of an individual's content in life depending on oral well-being (27). Over time different tools are developed for unique occasions, different age groups, or different topics to assess the effects of health status, comfort, or satisfaction of different patients on the elements of daily life (27). Some of the OHRQoL measures for adults that are found frequently in the literature and the number of items they involve are shown in Table 2.

Initially, OHRQoL methods used to measure how oral health affects daily life, psychological state, and social well-being were developed for adults. However, nowadays assessment methods developed for children have become frequently discussed as well (5). The tools appropriate for children are frequently the adapted versions of the adult measurements (111). Thus, over the past several years there happened to be a variety of tools available for researchers to use, either developed originally for children or adapted from a tool formerly suitable for adults, which are listed below:

- Child Perception Questionnaires 8-10 (CPQ 8-10) and 11-14 (CPQ 11-14) (112,113)
- Michigan Oral Health-Related Quality of Life Scale (114)
- Child Oral Impacts on Daily Performances (C-OIDP) (115)
- Early Childhood Oral Health Impact Scale (ECOHIS) (9)
- Child Oral Health Impact Profile (COHIP) (116)
- Pediatric Quality of Life Inventory™ Oral Health Scale™ (117)
- The Pediatric Oral Health-Related Quality of Life (POQL) (118)
- The Scale of Oral Health Outcomes for 5-year-old Children (SOHO-5) (11)
- Preschool Version of the Child Oral Health Impact Scale (COHIP-PS) (119)

Table 2. OHRQoL Measurements Available for Adults

Authors	Title	# Items
<i>Cushing et al. (1986)</i> (120)	The Social Impacts of Dental Disease	14
<i>Gooch et al. (1989)</i> (121)	Rand Dental Health Index	3
<i>Atchison and Dolan (1990)</i> (122)	Geriatric Oral Health Assessment Index (GOHAI)	12
<i>Strauss and Hunt (1993)</i> (123)	Dental Impact Profile (DIP)	25
<i>Locker and Miller (1994)</i> (124)	Subjective Oral Health Status Indicators	42
<i>Slade and Spencer (1994)</i> (125)	Oral Health Impact Profile (OHIP)	49
<i>Leao and Sheiham (1996)</i> (126)	Dental Impact of Daily Living (DIDL)	36
<i>Kressin et al. (1996)</i> (127)	Oral Health-Related Quality of Life	3
<i>Adulyanont et al. (1997)</i> (128)	Oral Impacts on Daily Performance (OIDP)	9
<i>Slade (1997)</i> (129)	Oral Health Impact Profile 14 (OHIP-14)	14
<i>Cornell et al. (1997)</i> (130)	Oral Health Quality of Life Inventory	56
<i>McGrath and Bedi (2001)</i> (131)	Oral Health-Related Quality of Life UK (OHRQoL UK)	16
<i>Allen et al. (2002)</i> (132)	Oral Health Impact Profile 20 (OHIP-20)	20

Culler et al. conducted a study to provide an overview of different tools appropriate for preschool-aged children and stated that nuance between the tools potentially makes one of them more suitable for a specific intent (133). The appropriateness of a tool to use in a specific situation is determined by several factors like the subject, intended audience, the method of administration, the format of the responses, the time covered, the number of items, or the domains covered (111,133). OHRQoL measurements can be used to grade a treatment's success or the devastation of an illness. They can be used in a clinical setting or community surveys. Tools are also mentioned to be used to estimate patient satisfaction with dental prosthetics and orthodontic appliances (134).

One of the greatest differences in the measurements is the time needed to complete the administration which depends on the number of items contained, and the context of the questions which means the domains. According to the child's age the number of questions, the length, and the complexity of the question sentences change as the answering options (93,133). OHRQoL measurements are developed by researchers in correspondence with a need.

The administration method of the measurement can be either a self-administered questionnaire or an in-person interview. This feature is important when assessing a Child Oral Health-Related Quality of Life (COHRQoL) since according to the responder's age self-administration may not be possible because of the lack of reading ability. In addition to that, when this age is considered, the response choices should also be as easy to understand (6). As a result, it is inappropriate to use the Likert-type range of responses addressing the frequency of the occurrence or a grade of impact, which are typically used for adults. For preschool children, simple yes/no questions or answering via visual cards of Likert scales (135).

An important factor related to the OHRQoL measurements is the respondent. The difference in validity and reliability of the evaluation made by the child or the parent may be an important problem in studies conducted to determine the COHRQoL. Nonetheless, the rapid development of the mental and psychological capacity of children does not allow the use of a single measurement for all age groups when measuring OHRQoL. It is recommended to select scales according to the cognitive and communicative abilities of the subject age group (5,27,133). Table 3. shows different OHRQoL measurements that are

available for preschool children, showing the age specificity, the number of items each tool includes, and the availability in the Turkish Language.

2.3.1 OHRQoL Measurements Suitable for Pre-schoolers

Children begin giving accurate reports on their health or own experiences around 6 years of age. (133). Since it would be difficult for children at this age to fully define health problems, comprehend, or express themselves correctly, it is recommended to direct questions to parents or caregivers to obtain precise information (27). Particularly for the evaluation of OHRQoL, primarily parents are chosen as the respondents on how the oral health of their child affects his/her life (5,27). **Ripa et al (1988)**, in their review, stated that evaluations made by parents or caregivers are reliable and they depict the general QoL of the child (2). Opposing parties suggest that a child's oral health eventually affects the family. However, perspectives and data obtained from the patient have significant importance. In a more recent review by **Culler et al.**, it is stated that, due to the lack of awareness regarding the primary dentition's importance, the oral health status of preschool children has been frequently overlooked by the parents or caregivers. Thus, measurements involving the self-report of a child are also available for preschool children (133).

The Michigan Oral Health-Related Quality of Life Scale

The Michigan Oral Health-Related Quality of Life Scale Child Version (Michigan-OHRQoL) is developed at the University of Michigan to be used by children older than 4 years old. Later it is recommended to be used for younger children in 2003 by the same group of researchers. **Filstrup et al.** evaluated the OHRQoL of 22–70-month-old children with ECC before and after dental treatment in comparison with a caries-free group of children (114). The administration method of the measurement is in-person interviews. The parent version is 10 items about the child's oral health and answered using a 5-point Likert scale which ranges between "strongly disagree" and "strongly agree". The child version starts with a unique screening used to eliminate if the respondent can self-report. Two questions, "Are you a boy or a girl?" and "What does a dentist clean and fix?" are expected to be answered correctly by children. Although the measurement is described to be suitable for children older than 4 years old, a younger child who passes this step is described as eligible to self-report. Michigan-OHRQoL measurement has several limitations. It is not a widely used instrument and has not been adapted to different languages yet. Another weakness of the measurement is the grading of the agreements of the parents to the items

rather than the frequency of occurrence (133). The final limitation of the Michigan-OHRQoL measurement is that originally it is designed to be used in a clinical setting and thus, not appropriate for epidemiological surveying (136).

The Dental Discomfort Questionnaire (DDQ)

The Dental Discomfort Questionnaire (DDQ) is developed by **Versloot et al.** in 2006 (137). Although it is originally developed for children between the ages of 2-5 years old, as a unique feature, the use of this measure is recommended for nonverbal children, patients with learning disabilities, kids with special healthcare needs, and any patient with limited communication skills (6,138). The measurement solely focuses on pain and is developed for the identification of oral pain by adults (teachers, family members, or any observer) with ease by following a convenient checklist, as mentioned by the developers (137). The 8 items in the DDQ measurement are evaluated with the frequency of occurrence by the proxy report of behavioural changes caused by dental or oral pain.

Pediatric Quality of Life Inventory (PedsQL)– Oral Health Scale

The Pediatric Quality of Life Inventory (PedsQL) is a measurement developed to assess the QoL of children who are healthy or have acute or chronic health conditions, aged between 2-18 years old (6). An additional part related to Oral Health Scale has been added to this original version by **Steele et al. in 2009** (117). For children older than 5 years old, self-report or proxy-report assessment of 5 items is utilized. On the other hand, for younger children of age 2-4 proxy-report is kept mandatory. Questions involve how much of the items covered have affected the life of the child for the last 1 month. Proxy answers involve 5 choices, on the other hand, a child's self-report has 3 choices to ease decision-making. Pictures of happy/sad faces are used to aid the answering process. The Oral Health Scale is recommended to be used with the PedsQL Core Scale which has 23 items, and upon children with no known oral health issues to address the need for dental treatment (117). This measurement is validated by two different studies with children having age intervals of 8-14 and 2-18. Although the PedsQL Core Scale has been widely used and the Oral Health Scale was proven appropriate to be used in a wide range of ages, the study involves a group of children with a mean age of 10. Moreover, in the study, the percentage of preschool children among the other ages is not given (117,133).

The Pediatric Oral Health-Related Quality of Life (POQL)

The Pediatric Oral Health-Related Quality of Life (POQL) measurement was developed by **Huntington et al. in 2011** at Boston University to be used in dental clinics or public schools for minority populations or low-income groups (118). It is developed to be used for different age groups, as well as preschoolers (3-7 years). The preschool version involves six items about the child and seven items about the family experience. The items are related to the past three months and the frequency of occurrence is questioned. A unique feature of the measurement is that it evaluates the amount of bothersome. Thus, the impact of a very bothering situation but experienced less frequently may result to assess a more accurate QoL score (118,133). It is stated as a reliable, responsive and valid tool (136). Furthermore, it was used in the assessment of change in the OHRQoL scores of children after ECC treatments (108,133). The preschool version is validated to be used in preschool children but being only selective for dental caries is stated as a disadvantage (133,139). The POQL measurement has been translated into Turkish by **Yazicioğlu et al. (2018)** (140). The measurement involved in their study is the Child Self-Report measure for the age of 8-14 years old (Table 3) and the corresponding Parent-Report-On-Child measure, and the process was carried out according to the recommended guidelines (141,142). They concluded that the Turkish version is a valid reliable tool to distinguish children with or without dental caries based on their OHRQoL scores (140).

Child Oral Health Impact Profile – Preschool Version (COHIP-PS)

The Child Oral Health Impact Profile (COHIP) is developed by **Broder et al. (2007)** at New York University (116). This measurement is for children aged between 8-15. Ten years later an adaptation by **Ruff et al. (2017)** made this measurement, Child Oral Health Impact Profile – Preschool Version (COHIP-PS), to be used between the ages 2-5 possible (119). COHIP-PS is described to be unique to three special occasions which are: children with cleft lip/palate, children seeking speech therapy and routine paediatric dental care (133). COHIP-PS has a unique feature of using positive word choices “Did the child enjoy smiling?” and “Did they feel good about themselves?” (116,119) implying the positive aspect are as valuable as the negative aspects while measuring the OHRQoL (133). A disadvantage of COHIP-PS is that there is only one published article, despite the COHIP being relatively widely used and translated into other languages (119,133).

Table 3. OHRQoL Measurements Developed for Children

Author	Title of the Measurement	Age	Number of Items	Available in Turkish
Jokovic et al. (2002) (113)	Child Perception Questionnaires 11-14 (CPQ 11-14)	11-14	c:37 p:14,31	DNE
Jokovic et al. (2004) (112)	Child Perception Questionnaires 8-10 (CPQ 8-10)	8-10	c:25 p:14,31	Aydinoğlu et al. (2021) (143)
Filstrup et al. (2003) (114)	Michigan Oral Health-Related Quality of Life Scale (Michigan-OHRQoL)	>4	c: 9 p: 10	DNE
Gherunpong et al. (2004) (115)	Child Oral Impacts on Daily Performances (C-OIDP)	10-12	c:8	Can et al. (2009) (144)
Versloot et al. (2006) (137)	The Dental Discomfort Questionnaire (DDQ)	2-5	p:8	DNE
Pahel et al. (2007) (9)	Early Childhood Oral Health Impact Scale (ECOHIS)	3-5	c:9 p:4	Peker et al. (2011) (10)
Broder et al. (2007) (116)	Child Oral Health Impact Profile (COHIP)	8-15	c: 34	DNE
Steele et al. (2009) (117)	Pediatric Quality of Life Inventory - Oral Health Scale (PedsQL Oral Health Scale)	2-4 5-7 8-12 13-18	p: 5	DNE
Huntington et al. (2011) (118)	The Pediatric Oral Health-Related Quality of Life (POQL)	3-7 8-12	p: 12 c/p:10	Yazıcıoğlu et al. (2018) (140)
Tsakos et al. (2012) (11)	The Scale of Oral Health Outcomes for 5-Year-Old Children (SOHO-5)	5	c: 7 p: 8	DNE
Ruff et al. (2017) (119)	Child Oral Health Impact Scale - Preschool Version (COHIP-PS)	2-5	p: 11	DNE

(DNE = does not exist, c = child version, p = parent version)

2.4 Turkish Version of ECOHIS (T-ECOHIS)

The Early Childhood Oral Health Impact Scale (ECOHIS) was developed by **Pahel et al. (2007)** at the University of North Carolina (9). ECOHIS is developed and validated to assess oral health diseases or related treatment's negative impacts on the lives of 3-5-year-old children and their families. The assessment of the OHRQoL depends on the parent's self-assessment (4 items) and proxy report of their child (9 items). Throughout the 13 items in total, the entire life experience is questioned and answered via a Likert scale of 5 options. ECOHIS is one of the most frequently discussed OHRQoL measurements in the literature (133). It is translated into different languages of French (145), Chinese (146), Farsi (147), Brazilian (148) and by **Peker et al.** into Turkish (10).

ECOHIS is used to evaluate parental stress related to dental health. **Peker et al.** stated that assessing parents' perceptions about how oral health problems, including symptoms, diseases, and treatments influence their children's oral health and their life, is an important part of measuring young children's OHRQoL (10). They carried out the process of cross-cultural adaptation to Turkish, which exhibited acceptable validity and reliability.

Turkish version of ECOHIS (T-ECOHIS) relies on parental ratings of thirteen items involving questions in four domains which are one oral symptoms item, four functional limitations items, and two each from the emotional well-being and social well-being for the children. Questions are divided into two parts, the child and family impact sections as shown in Table 4. ECOHIS is the only available tool adapted and validated by **Peker et al.** (10) to use in cases of ECC in Turkish.

Sakaryalı et al. (2019), assessed the impact of the presence of ECC, traumatic dental injuries (TDI), and malocclusions on the OHRQoL of preschool children and their families. Children aged 1 to 6 years old who attended the Gazi University, Faculty of Dentistry, Department of Paediatric Dentistry, participated in the study and were administered the T-ECOHIS. The OHRQoL of the family was significantly negatively affected by the presence of S-ECC and malocclusions ($p < 0.05$), but not that of the child ($p > 0.05$). It can be concluded that the presence of ECC, TDI, and malocclusion decreases OHRQoL of Turkish preschool children and especially their families (7).

Table 4. ECOHIS Questions Showing Children and Family Impact Sections

ECOHIS Questions (9)	
Child Impact Items: How often has your child ever Because of dental problems or dental treatments?	
1	Had pain in the teeth, mouth, or jaws (Child Symptoms)
2	Had difficulty drinking hot or cold beverages (Child Function)
3	Had difficulty eating some foods (Child Function)
4	Had difficulty pronouncing any words (Child Function)
5	Missed preschool, daycare, or school (Child Function)
6	Had trouble sleeping (Child Psychology)
7	Have been irritable or frustrated (Child Psychology)
8	Avoided smiling or laughing when around other children (Self Image/Social Interaction)
9	Avoided talking with other children (Self Image/Social Interaction)
Family Impact Items: How often have you or a family member Because of your child's dental problems or dental treatments?	
10	Been upset (Parental Distress)
11	Felt guilty (Parental Distress)
12	Taken time off work (Family Function)
13	Had a financial impact on your family (Family Function)
ECOHIS Answers	
Never = 0	
Hardly Ever = 1	
Occasionally = 2	
Often = 3	
Very Often = 4	
I Don't Know = 5	

Duangthip et al. (2019), investigated the association between the OHRQoL and caries experience of Hong Kong preschool children using the Chinese version of the ECOHIS and the dmft index. Sociodemographic information was collected and evaluated from the children and their parents. They concluded that preschool children in Hong Kong who experienced caries had lower OHRQoL ($p = 0.02$), but the child's sex and education level of a parent or the caregiver were not found to be associated with OHRQoL ($p > 0.05$) (149).

Lai et al. (2019), recruited 315 Hong Kong preschool children with S-ECC to determine its relationship with OHRQoL. Caries and plaque status of children and a sociodemographic background questionnaire were used in addition to the ECOHIS. It was found that the presence of pain and severity of ECC was associated with low levels of OHRQoL and it was added that more measures are needed to decrease the prevalence of children with S-ECC (150).

Grant et al. (2019), conducted research to determine the change in the OHRQoL of children with S-ECC following dental rehabilitation under general anaesthesia (DRGA). 103 children and their parents are asked to apply the ECOHIS measure. As a result, the OHRQoL scores of the children were improved statistically significantly following DRGA. It is emphasized that consideration should be given to using the ECOHIS to help prioritize children waiting for DRGA (106).

Ferrazzano et al. (2019), evaluated the effect of dental treatment under GA on OHRQoL in children with S-ECC and assessed differences in their weight, height, and Body Mass Index (BMI) by using ECOHIS. 1 year later there was a statistically significant improvement in the ECOHIS values ($p < 0.0001$), meaning a reduction in pain, disturbance when eating, sleeping and behavioural problems. In addition to that, it was stated that the growth of the children increased significantly (110).

Jiang et al. (2019), conducted a study to assess the effects of dental general anaesthesia treatment on early childhood caries. A total of 159 children, aged between 2-5 years were treated and applied the measurement ECOHIS. 117 and 101 children participated on the days of the 6th and 12th months of clinical controls, respectively. 151 children completed ECOHIS questionnaires pre-treatment and at the 1st, 3rd, 6th and 12th months

after treatment. ECOHIS scores at each post-treatment time point were still significantly lower than those at pre-treatment, although they had increased slowly over time within 1 year of treatment. Overall, high success rates were obtained for the dental procedures, and the children's OHRQoL significantly improved after treatment. However, there was a tendency towards caries relapse, and the children's OHRQoL deteriorated over time (48).

Pesaressi et al. (2020), evaluated the correlation between the OHRQoL and the dental caries of 213 children, who were 3 years old and randomly selected from seventeen government schools. Clinical examination was done with the Caries Assessment Spectrum and Treatment (CAST) instrument and the Peruvian ECOHIS Score was used to measure OHRQoL. They discovered that the OHRQoL of 3 years old children is negatively impacted by the presence of cavitated teeth, whether there is pulpal involvement or not (151).

Subramaniam and Surendran (2020), assessed the correlation between the OHRQoL of preschool children, aged 3-5, with their dental caries status in urban and rural Bengaluru. Oral examination and OHRQoL measurements were done on 1545 children between the ages of 3-5. They found OHRQoL to be significantly associated with dental caries and that OHRQoL among preschool children living in urban Bengaluru was better than those in rural Bengaluru (152).

Rajab and Abdullah (2020) aimed their study to determine the prevalence of ECC among preschool children and to assess its effect. The study was conducted using ECOHIS, a sociodemographic questionnaire with children aged 4 and 5 years. Clinical examination included cases of ECC, dental trauma and anterior malocclusion. They concluded that dental caries was high in prevalence and was found to be associated significantly with worse OHRQoL of both children and their families (153).

Ozsin Ozler et al. (2020), conducted a study to evaluate the effect of ECC on the OHRQoL of children using the Turkish version of ECOHIS. The ICDAS score was used to assess the children's oral health status. Their results showed a strong association between the QoL of children and ECC and an even stronger one in extensive caries. They concluded their study with an emphasis on the importance of incorporating social and psychological problems, besides functional and aesthetic concerns as a routine part of dental visits (93).

Tabassum et al. (2020), evaluated the relationship between ECC and OHRQoL in children. They found a positive and insignificant relationship between ECC and ECOHIS in the rural population, whereas there was a moderately strong, positive relationship between the two in the urban population. They stated that OHRQoL of young children enables parents and caregivers to implement positive dental care practices (154).

Lara et al. (2021), conducted a study to assess the effect of ECC on OHRQoL by using the Mexican version of ECOHIS in 409 children aged between 3-5 years. Socioeconomic variables such as dietary and tooth-brushing habits were also evaluated. M-ECOHIS was found to be significantly correlated with the severity of dental caries. The dental caries was found to be correlated with school type, age groups, educational level of the family, income and living conditions, which is stated as a demonstration of how distinct risk factors were closely related to different stages of caries (155).

Pakkhessal et al. (2021), evaluated the association between ECC and OHRQoL with ECOHIS in 350 children. Children's ECOHIS scores increased as the dmft scores increased, demonstrating a significant correlation between them. These findings can serve as appropriate resources for creating preventive measures and promoting young children's oral health (156).

Pereira et al. (2021), evaluated the effect of dental treatments on the OHRQoL of children. With an observational prospective study design, they were able to gather data for the clinical oral examination and the OHRQoL scores of children both previously and after receiving dental treatment. They found that the OHRQoL increased, as the scores decreased significantly after treatment. It was concluded that the aim of the oral health policies should be to cease ECC (107).

Fernandez et al. (2022), conducted a cross-sectional study with 205 children aged between 2-5 years old using the Brazilian ECOHIS. They found that children with carious lesions which are deep into the dentine or with pulpal involvement or abscessed teeth had poorer OHRQoL than children without such lesions (157).

2.5 The Scale of Oral Health Outcome for 5-year-old Children (SOHO-5)

The Self-Reported Scale of Oral-Health Outcomes for 5-year-old Children (SOHO-5) was originally developed to increase the oral health of Scottish children in Glasgow, Scotland, UK (11). The development of the measurement was in conjunction with a school-based preventive program. The assessment is carried out as an interview-based self-report of children on their OHRQoL. The SOHO-5 consists of seven items for both children (Table 5) and their parents (Table 6), each evaluating the impact of a child's state of oral health on daily activities. Children are asked about their experienced difficulties while eating, drinking, speaking, playing, sleeping, or their avoidance of smiling due to their caries (11).

Table 5. SOHO-5 Questions for Children's Self-Report

	SOHO-5 Questions for Children's Self-Report
1	Has it ever been hard for you to eat because of your teeth?
2	Has it ever been hard for you to drink because of your teeth?
3	Has it ever been hard for you to speak because of your teeth?
4	Has it ever been hard for you to play because of your teeth?
5	Have you ever not smiled because your teeth were hurting?
6	Have you ever not smiled because of how your teeth look?
7	Has it ever been hard for you to sleep because of your teeth?

Table 6. SOHO-5 Questions for Parent's Proxy-Report

	SOHO-5 Questions for Parent's Proxy-Report
1	Has your child ever had any difficulty eating because of his/her teeth?
2	Has your child ever had any difficulty speaking because of his/her teeth?
3	Has your child ever had any difficulty playing because of his/her teeth?
4	Has your child ever avoided smiling because of the appearance of his/her teeth?
5	Has your child ever avoided smiling because of the state (holes in teeth, pain) of his/her teeth?
6	Has your child ever had difficulty sleeping because of his/her teeth?
7	Has your child's self-confidence ever been affected because of his/her teeth?

Answer choices of “no”, “a little”, and “a lot” were used with face cards to ease comprehensibility. Since it can be administered to younger children, SOHO-5 provided valuable data about their OHRQoL based on their self-assessment. Self-reports depicted children’s valuable perceptions of the impact of their oral health on various aspects of their lives (11). SOHO-5 is widely used and translated into several languages.

Abanto et al. (2013), cross-culturally adapted the SOHO-5 measurement to the Brazilian Portuguese language and assessed its reliability and validity. They tested their adapted version with 2 pilot studies (n=20) with 5 to 6 years old children and their parents. For validity and reliability assessment they included 193 participants and an oral examination for dental caries by two experts. They experimented again with 159 children-parent pairs for the test-retest reliability results. The adaptation process started with the two native Portuguese translators’ first translations and was revised in a panel for conceptual and item equivalence. The consensus pilot version was pilot tested (n=20) and then translated back to English by two bilingual translators. The back-translated English version was compared with the original SOHO-5 for semantic equivalence. The final consensus version is pilot tested (n=20) for the second time in another sample group and concluded that there were no changes that need to be made regarding new suggestions or difficulty in comprehension (158).

Abreu-Placeres et al. (2017) cross-culturally adapted the SOHO-5 measurement to Spanish for Dominican Republican children aged 6 to 7 years old. 69 children participated in the study and went through oral examination to estimate their caries experience. A team of dental and psychology researchers work on the translation process. Two bilingual researchers translated the SOHO-5 from English to Spanish. Two Spanish versions are then compared, and a consensus version is created. A pilot study was carried out in a sample group with similar characteristics and minor changes were done according to it, forming the final version (136).

Rachmawati et al. (2017) cross-culturally adapted to create the Indonesia version of the SOHO-5 scale. 161 children at the age of 5 participated in the study with their parents. The translation process was done following the recommended guidelines as described (141,159). The translated version is revised in a panel by a dentist and a dental public health researcher. A pilot study was conducted with 27 children and a consensus version is created.

As an additional step this version is back-translated to the source language by a dentist, then compared with the original SOHO-5 scale and with minor changes the final version is accepted by the expert panel. To estimate test-retest reliability 27 children underwent repeated administration of the translated version. (160).

Gao et al. (2020) cross-culturally adapted the SOHO-5 measurement to Chinese with a forward-backwards translation method. Initially, the English SOHO-5 is translated into Chinese by two bilingual speakers. The two separate translations were discussed in a panel and a consensus Chinese version is formed. This version is translated back to English and reviewed again by the expert panel in terms of semantic, experiential, conceptual and idiomatic equivalence. This version is pilot tested in a group of 20 children aged 5 to 6. Following recommendations and minor changes the final version of the Chinese version of SOHO-5 is approved (161).

Mishu et al. (2021) cross-culturally adapted SOHO-5 to Bengali following the forward-backwards translation method to be used in the children of Bangladesh. The first step of translation from English to Bengali was done by two independent bilingual speakers. Two translations are compared, and a consensus version is created, which is then back-translated to English by an independent translator. These two English versions are reviewed by the researchers. This version is pilot tested in a group of 272 children aged between 5 to 9 years old, face validity was done and translated version was commented on as appropriate and comprehensible by the researchers. For reliability and validity testing 788 children-parent couples participated in the study (135).

Ramadhani et al. (2021), conducted a study to investigate the relationship between ECC and OHRQoL, using the SOHO-5 questionnaire. The PUFA index was preferred which is formed by the capital letters of the symptoms of teeth with the mucosal consequences of pulpal involvement (p), ulceration (u), presence of a fistula (f), or abscess. The clinical examination involved dmft and PUFA values of 266 5-year-old children aged. OHRQoL values were discovered to be correlated with dmft and PUFA values, with parents' perceptions being more strongly correlated than children's (162).

Fernandes et al. (2015) conducted a study and compared the correlation and comparative analysis of ECOHIS and SOHO-5. They evaluated the distinguishing ability of

the measurements of the caries severity. Only the SOHO-5 child version was found not to be able to distinguish the children with or without caries (163).



3 MATERIALS and METHODS

3.1 Study Design

The study was designed as a non-interventional cross-sectional clinical study. It was approved by the Yeditepe University Clinical Research Ethics Committee (approval no: 1437) on the 5th of May 2021 (Appendix A) and was carried out in agreement with the Declaration of Helsinki Principles.

Two different age-appropriate OHRQoL measurements, T-ECOHIS, and the SOHO-5 were used in this study to assess the effect of ECC on the OHRQoL of preschool children after asking permission from the authors. This study was carried out in two parts: First part is the cross-cultural adaptation of the SOHO-5 measurement to the Turkish language, according to the guidelines (141) and the second part is designed to assess any correlation between the caries status of children having ECC and their OHRQoL scores using the newly developed Turkish version of SOHO-5 (T-SOHO-5) and T-ECOHIS (10).

3.2 Study Population

For the adaptation process of OHRQoL measurements, the population size was recommended to be five to ten times the number of items on a scale (164). Since SOHO-5 has 7 items, the group size was interpreted to be at least 70. For the second part of the study, which estimates any possible correlation between the ECC and OHRQoL, a power analysis was done using the program G*Power (v3.1.9). In the study by *Ozler et al.* for the comparison of ECOHIS scores and the mean dmft scores of children with ECC (23.54 ± 8.12) and without ECC (4.54 ± 8.48), the effect size was estimated to be 2.287 (165). According to that, it was calculated that at least 10 participants were needed to achieve the power of 80% with a significance level of $\alpha=0.05$. Since the group size required for the cross-cultural adaptation process was also adequate for the second part of the study, the group size was determined to be at least 70. Considering the missing data rate of 10% due to the missing or “don’t know” responses, as in the study by *Peker et al.*, (n calculated to be at least 77) 86 children from the patients who were referred to Yeditepe University, Faculty of Dentistry, Department of Paediatric Dentistry and their parents were accepted for the study (10).

Participants of the study were from the children and parent pairs of the paediatric dentistry clinic who have undergone a thorough clinical and if needed radiographic examination. Patients younger than 71 months old with written voluntary informed consent from parents were accepted for the study. Every step of the study was explained to the participants using terms children could understand. Children who could complete the clinical examination and behaved cooperative enough to self-assess during the T-SOHO-5 measurement were included in the study population.

The exclusion criteria were determined as follows and children following these criteria were excluded from the study: Children with cooperation issues, hearing loss, talking disability or with limited sight, a cleft lip and/or palate, a parafunctional habit, medication usage that may alter dental status, having attention deficit and hyperactivity disorder, with special needs or any systemic disorder that may alter cognitive development. Every child approached for the study was treated equally, with no less benefit from the clinic's diagnosis, treatment, and referral principles regardless of their participation.

3.3 Cross-Cultural Adaptation of SOHO-5 to Turkish Language and Culture

The translation and cross-cultural adaptation process was carried out based on the recommendations from the published guidelines (141,142,159) and exemplary studies (10,135,158,160,166). The proposed guidelines mention five essential steps for the translation and cross-cultural adaptation of HRQOL measures (141,142,159). According to **Guillemin et al.**, these steps are translation, back translation, committee review, pre-testing, and weighting of scores are the steps needed to construct the process of adaptation. The translation is recommended to be multiple leading to divergent interpretations. Translators should be competent in the language and independent. In addition to that, it is advised that translation can be done by teams to reduce personal idiosyncrasies (141).

The second step, back-translation, is the translation of the final language to the source language. Back translating is recommended to be done independently to result in distinct products. Unlike the first translators, back-translators preferably should not be aware of the intent of the material, without any bias. A committee is constituted to compare the source and final versions, whose role is to produce a final version of the source material with recommendations and modifications if needed. Membership in the committee should be

multidisciplinary and bilingual for precision. If possible, pre-testing is recommended, which can be done either by using a probe technique or by submitting the source and final versions to bilingual people. This process eliminates discrepancies. The final step is the cultural adaptation of the weight of scores to the cultural context. In summary, it is the explanation of differences caused by the application of a test to another culture, by experts (141).

Both the child and parent versions of the SOHO-5 which is originally developed in English are needed to be forward and back-translated for the cross-cultural adaptation. This process is recommended to be carried out in five steps, shown in the flow chart below, although not every step is mandatory. In the first step, the original SOHO-5 measurement was translated into Turkish by two independent professionals (DS and DT) who are competent in both languages Turkish and English. The translators chosen for this step, know the Turkish culture and have appropriate communication skills with the preschool children. Moreover, DT had prior experience with the T-ECOHIS scale with its application and interpretation. They were asked independently to produce the word-to-word translation of the original scale, T1 and T2. The two Turkish translations were compared and synthesized to establish a consensus forward translation T-final.

During the consensus stage two versions, T1 and T2 were assessed for conceptual equivalences, differences, and discrepancies in the sentence structure of the instructions, questions, and answers. The synthesis revealed some wording differences like the usage of the word “oyuk” rather than “delik” in Turkish to stand for the word “hole” in English. Another correction was done with the replacement of the use of the Turkish word “hiç” alone, instead of the phrase “daha önce hiç” for the expression “have you ever”. The reason for the choice of the word “hiç” is that it alone corresponds to any previous experience, and the addition of the words “daha önce” complicates the meaning of the question. Moreover, “daha önce hiç” adds a bad connotation to the questions, sounds biased, and possibly may have led the children if it were preferred. As the fourth step in Figure 2. the finalized instrument T-final was tested on a group of 20 child-parent couples for pre-test and content validity as a pilot study.

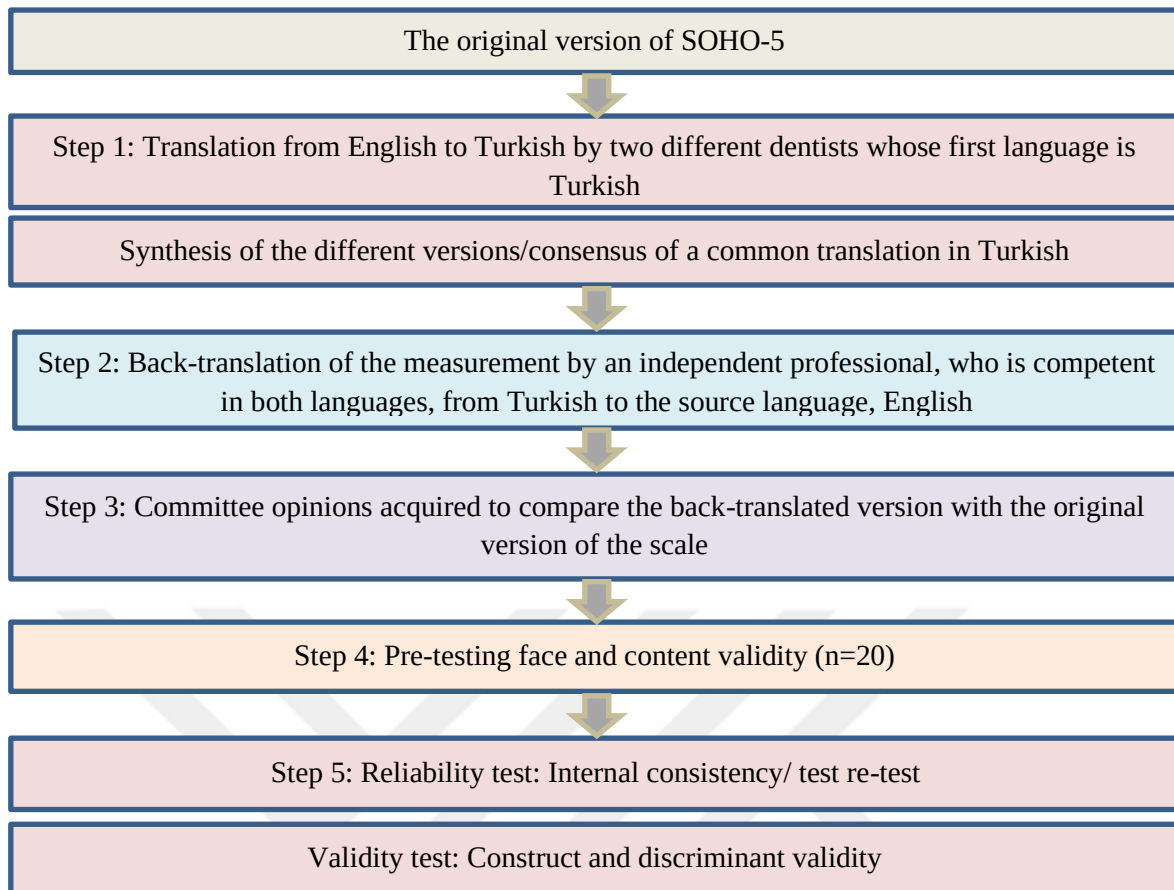


Figure 2. The Flow Chart for the Cross-Cultural Adaptation Procedure (141,142)

The forward translated product T-final was then delivered to an expert (GA), who was employed to back-translate to the source language, English. The expert was chosen from another specialization for this step since the back-translation was recommended to be completed independently and unaware of the original content. She was also blinded that the translation product E1 will be compared with the SOHO-5. She is Turkish and teaches English in preschool. Translators DS and DT are advanced in the English language, and chosen for their vocabulary and language skills, on the other hand, GA was chosen as a translator to check the simplicity of the word choice or the clarification of the instructions.

A committee was constructed to compare the source, SOHO-5, and the back-translated version, E1, for semantic equivalence, to evaluate any discrepancies, missing words, or phrases. One of the committee members is a professional (IK) who is a clinical child psychologist. Proficient in both English and Turkish, she currently works as a counsellor for

preschool and school children in a private primary school with a medium of English instruction. The other member of the committee was the supervisor of this thesis study, SSK. The pre-test of the T-final version was evaluated, and no recommendations were proposed by the committee members. The T-final version was accepted as the final version of the cross-cultural adaptation process. The Turkish version of the SOHO-5 measurement was named “5 Yaş için Ağız Sağlığı ile İlişkili Yaşam Kalitesi Etki Ölçeği” (T-SOHO-5). T-SOHO-5 (Appendix E). The final version of the scale was shared with the author of the SOHO-5 scale, Tsakos, G. for consensus and approval (Appendix F).

3.4 Instruments Used for Data Collection

3.4.1 Oral Health Status of Children

For data collection initial step was to evaluate the oral health status of children. The design of the study did not include the clinical examination of children. Children at the age of 5 who have completed regular oral examinations were included in the study. Children’s dental caries experience was noted via the coding system that quantifies the extent of dental lesions as suggested by the International Caries Detection and Assessment System (ICDAS) (167) and dmft scores were calculated (168).

For the present study, an instrument (Appendix B) was constructed to note existing caries on each primary tooth and the tooth surface present in the oral cavity was examined and scored according to the ICDAS from zero (no lesions) to six (extensive lesions) and the number of teeth involving decayed, missing because of caries, with fillings was noted according to the decay-missing-filled teeth (dmft) index (168). This information was gathered via the computer program ‘Hastane İşletim Sistemi’ which is developed and used at Yeditepe University. Figure 3 shows the screen image of the oral findings of a patient.

Tanımlar

Dişler	Tanı Kodu	Tanı Adı
55, 84	K02.1.1	DENTİN ÇÜRÜĞÜ ICDAS 4
74, 85	K02.1.2	DENTİN ÇÜRÜĞÜ ICDAS 5

Anamnez Bilgileri On Tanı Girişi Kesin Tanı Girişi Tetkik Girişi Tedavi Planı Girişi Tedavi Takip Reçete Girişi

Figure 3. Screen image of Oral Health Findings of a Child on the HIS System

3.4.2 Sociodemographic Form

While the children's teeth were being evaluated, a "Sociodemographic Information Form" was delivered to parents (Appendix C). This instrument contains eight questions about the child's sex, the presence of any siblings, both parents' educational attainments, the presence of oral hygiene habits and frequency of tooth brushing, the experience of any previous dental visit and the main compliance for the current oral health examination. The form was self-administered and filled by the parents/guardians without knowing the dental status of their child. When necessary, they were allowed to ask any questions about the instruments and answered for clarification. The questions were adopted from previous studies (94,140,149,165) or based on the items which are proposed to influence the ECC (78) and OHRQOL (5). Itemization for the answer choices was discussed for suitable statistical analysing methods. Via this instrument, the data obtained would be used to assess any predisposing effect of sociodemographic background on the development of ECC or any influence on the perception related to OHRQoL of children and their parents.

3.4.3 OHRQoL Assessments

T-ECOHIS measurement was cross culturally adapted by Turkish by *Peker et al.* (10), which was originally developed by *Pahel et al.* (9). T-ECOHIS measurement (Appendix D) has 13 items concerning both children's and parents' OHRQoL. There are 13 items in total which are divided into two parts: the child impact section and the family impact section. The child impact section is constructed by four domains which are child symptoms (1 item), child functions (4 items), child psychology (2 items), and child self-image and social interaction (2 items). The family impact section is composed of two domains which are parental distress (2 items) and family function (2 items). Responses are recorded using 5-point Likert scale (never = 0, hardly ever = 1, occasionally = 2, often = 3, very often = 4 and do not know = 5). The response 'Do not know' is recorded for the missing scores. The child impact section and family impact section are calculated separately, then simple sum of the two scores is calculated to achieve the total T-ECOHIS score which ranges between 0-52. The scores of the child impact section and family impact section can range between 0-36 and 0-16 respectively. Higher scores depict a greater impact on the OHRQoL.

The Scale of Oral Health Outcomes (SOHO-5) was developed by *Tsakos et al.* (11). It was cross-culturally adapted to Turkish culture for the present study. The T-SOHO-5 scale (Appendix E) contains 7 items for both child's self-report and parental report. Children are addressed regarding their difficulties eating, drinking, speaking, playing, sleeping, smiling due to pain, and smiling due to appearance, using a 3-point Likert scale (no=0, a little = 1 and a lot = 2) with the help of a card with corresponding smiley faces. The parental version of the questionnaire includes items depicting difficulty while eating, playing, speaking, and sleeping if avoiding smiling due to pain or appearance, and an additional item about parents' opinions on their child's self-confidence. The answers are noted with a 5-point Likert scale (no = 0, a little = 1, moderate = 2, a lot = 3, and a great deal = 4, do not know = 5). The scores for T-SOHO-5 are calculated as the sum of the response codes for both child and parent scales. The T-SOHO-5 child scores can range from 0-14 and T-SOHO-5 parent scores can range between 0-35. The scores are evaluated separately for the child and parent scales. A higher sum of scores denotes a greater degree of impact on the children's quality of life. Children are interviewed face-to-face for the child version of the T-SOHO-5 questionnaire. The parental version of T-SOHO-5 is self-administered. OHRQoL scores, dmft values, and

the sociodemographic information of each child are gathered to be statistically analysed to determine level of association and agreement.

3.5 Data Analysis

Data were proofread and cleaned before transferring to the computer database for storage. Data analysis involved the descriptive analysis of the socio-demographic data, caries experience, and total ECOHIS and SOHO-5 scores and was done using the program R-vers. 2.15.3 program (R Core Team 2013).

The mean, standard deviation, minimum, maximum and median values of age, dmft, ICDAS, T-ECOHIS and T-SOHO-5 scores were calculated. For the data analysis of the Sociodemographic information form, T-ECOHIS form, T-SOHO-5 parent and T-SOHO-5 child form the frequency and percentage of the responses given to the questions were calculated.

A total of 86 children-parent couples filled out the OHRQoL measurements. T-ECOHIS and T-SOHO-5 parent forms were completed by the parents, answering a choice from the 6 options. T-SOHO-5 child form is completed as an interview on children's self-report and answers were scored on 3 options. The missing answers were treated as "Do not know". The results from each of the OHRQoL measurements of children being greater than 2 reflected the affected QoL.

The evaluation of the dental health of the children was done by the dmft scores of children. When assessing the carious status of each tooth, the highest ICDAS score was noted after every surface of the teeth was evaluated. The highest ICDAS score of the surfaces was used to classify the caries status. The absent teeth are noted if extracted (m) or exfoliated (x) to calculate the total number of teeth and dmft values. Dmft scores were assessed to check any association between T-ECOHIS (child impact section and family impact section), T-SOHO-5 parent and T-SOHO-5 child.

For the internal consistency assessment of the pilot-test group (n=20), the Cronbach alpha values were calculated T-SOHO-5 Parent = 0.77 and T-SOHO-5 Child =0.71. For the 86 new child-parent couple's data for the Cronbach alpha values were calculated as T-

ECOHIS Total = 0.83, T-ECOHIS CIS = 0.74, T-ECOHIS FIS = 0.73, T-SOHO-5 Parent = 0.65 and T-SOHO-5 Child = 0.67. For every correlation analysis (T-SOHO-5p vs T-SOHO-5c, T-SOHO-5p vs T-ECOHIS) Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC were used. To check any correlation between the answers of different scales given by the parents, all 7 questions in the parental version of the T-SOHO-5 were compared against the 7 similar items chosen from the 9 questions of the child impact section of T-ECOHIS.

T-SOHO-5 parent and T-SOHO-5 child were further evaluated to discriminate any nuance between self-response and proxy report. Agreement between them is tested using Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC analysis. Items from the T-SOHO-5 parent that were similar to the items from the T-SOHO-5 child were chosen. Since the answering choices for children's items were out of 3, parents' choices were also diminished to 3 choices before statistical analysis.

4 RESULTS

A total of 86 child-parent couples were included in the study. The mean, standard deviation, minimum, maximum and median values of age, dmft, ICDAS, T-ECOHIS and T-SOHO-5 scores determined for the study group are presented in Table 7. 43 boys and 43 girls with a mean $\pm$ SD age of 5.47 ± 0.28 participated in the study. The mean $\pm$ SD dmft was calculated as 12.02 ± 4.20 . The mean $\pm$ SD ICDAS score was calculated as 2.72 ± 2.03 .

Table 7. Mean, standard deviation, minimum, maximum and median values of age, dmft, ICDAS, T-ECOHIS and T-SOHO-5 scores.

	Min-Max (Median)(n=86)	Mean $\pm$ SD (n=86)
Age	5.01-5.97 (5.45)	5.47 ± 0.28
dmft	3-20 (12)	12.02 ± 4.20
ICDAS	0.6-5.6 (2.6)	2.72 ± 1.03
T-ECOHIS Child Impact Section	0-21 (7.5)	8.15 ± 4.41
T-ECOHIS Family Impact Section	0-13 (6)	5.33 ± 3.62
T-ECOHIS	0-33 (13)	13.48 ± 7.52
T-SOHO-5 Parent	0-11 (1)	1.81 ± 1.69
T-SOHO-5 Child	0-8 (2)	2.48 ± 1.89

The frequency and percentage of the sociodemographic background information of the participants obtained by the responses given to the questions in the Sociodemographic Information Form are presented in Table 8. More than half of the children had siblings [53 (61.6%)]. University education was found higher for both fathers and mothers than other levels of education [59 (68.6%) and 52 (60.5) respectively]. Approximately half of the parents, 45 (52.3 %) to be exact, stated their child's oral hygiene habit as regular, although only 27 (31.4%) of children were brushing their teeth more than once a day, reaching the required amount of tooth brushing which is twice a day. Oral health examination done for the study was only initiatory for 6 of the children. Nearly half of the patients (45.3%) who already had experienced a dental appointment, needed re-examination for dental pain either occasionally felt (n=26) or unrelenting pain (n=13).

Table 8. The frequency and percentage of the responses given to the questions in the sociodemographic information form.

	n	%
Sex		
Girl	43	50.0
Boy	43	50.0
Have a sibling		
No	33	38.4
Yes	53	61.6
Father's Educational Level		
High School	17	19.8
University	59	68.6
Postgraduate	10	11.6
Mother's Educational Level		
Primary	4	4.7
High School	21	24.4
University	52	60.5
Postgraduate	9	10.5
Regular Tooth Brushing Habit		
No	41	47.7
Yes	45	52.3
Frequency of tooth brushing		
Less than once a day	27	31.4
Once a day	32	37.2
More than once a day	27	31.4
Previous dental examination		
No	6	7.0
Yes	80	93.0
Check-up	23	26.7
Visible caries, no pain	18	20.9
Occasionally felt pain	26	30.2
Relentless pain, unresponsive to medication	13	15.1
Bad habits (pacifier, thumb sucking, teeth grinding etc.)	2	2.3
The appearance of teeth (colour, size, gaps, crowding etc.)	20	23.3
Dental trauma followed by bleeding cracks, malposition or mobility	3	3.5
Bad breath even after brushing	6	7.0

The oral health status of children in terms of dental caries determined by the frequency and percentage of ICDAS scores, and absent teeth (extracted and exfoliated) are given in Table 9. Teeth are numbered in rows as the ICDAS scores are shown in columns from 0 to 6. Missing teeth (m) are used for teeth extracted before, whereas (x) is used for the teeth lost with physiologic exfoliation, based on the dental history. ICDAS Score 5 was found highest (49, 57%) in the left mandibular first deciduous molars (# 74) whereas ICDAS Score 6 was recorded as highest (21, 24.4%) in the right mandibular first deciduous molars (# 84) Maxillary central deciduous incisors (#51, #61), followed by the maxillary lateral deciduous incisors (#52, #62) were found extracted (m) more frequently than the rest of the deciduous teeth. Mandibular deciduous incisors (#72, #71, #81, #82) were determined as the least affected group of teeth followed by the mandibular deciduous canines (#73, #83).

Table 9. The frequency and percentage of ICDAS scores showing the oral health status of the children in terms of dental caries (*m- Missing, **x- Exfoliated)

	Frequency and Percentage of ICDAS Scores, n (%)								
	0	1	2	3	4	5	6	m*	x**
#55	5 (5.8)	0 (0)	3 (3.5)	3 (3.5)	30 (34.9)	36 (41.9)	9 (10.5)	0 (0)	0 (0)
#54	6 (7)	0 (0)	1 (1.2)	0 (0)	29 (33.7)	37 (43)	13 (15.1)	0 (0)	0 (0)
#53	42 (48.8)	0 (0)	0 (0)	12 (14)	25 (29.1)	6 (7)	1 (1.2)	0 (0)	0 (0)
#52	40 (46.5)	0 (0)	1 (1.2)	12 (14)	14 (16.3)	12 (14)	5 (5.8)	2 (2.3)	0 (0)
#51	35 (40.7)	0 (0)	2 (2.3)	6 (7)	19 (22.1)	12 (14)	7 (8.1)	4 (4.7)	1 (1.2)
#61	35 (40.7)	0 (0)	1 (1.2)	7 (8.1)	19 (22.1)	12 (14)	8 (9.3)	4 (4.7)	0 (0)
#62	42 (48.8)	0 (0)	1 (1.2)	10 (11.6)	14 (16.3)	12 (14)	5 (5.8)	2 (2.3)	0 (0)
#63	36 (41.9)	0 (0)	0 (0)	13 (15.1)	29 (33.7)	7 (8.1)	1 (1.2)	0 (0)	0 (0)
#64	5 (5.8)	0 (0)	1 (1.2)	0 (0)	28 (32.6)	38 (44.2)	14 (16.3)	0 (0)	0 (0)
#65	8 (9.3)	0 (0)	2 (2.3)	1 (1.2)	36 (41.9)	34 (39.5)	5 (5.8)	0 (0)	0 (0)
#75	10 (11.6)	0 (0)	0 (0)	1 (1.2)	21 (24.4)	39 (45.3)	15 (17.4)	0 (0)	0 (0)
#74	7 (8.1)	0 (0)	0 (0)	0 (0)	13 (15.1)	49 (57)	16 (18.6)	1 (1.2)	0 (0)
#73	43 (50)	0 (0)	0 (0)	8 (9.3)	27 (31.4)	7 (8.1)	1 (1.2)	0 (0)	0 (0)
#72	73 (84.9)	0 (0)	1 (1.2)	8 (9.3)	3 (3.5)	1 (1.2)	0 (0)	0 (0)	0 (0)
#71	74 (86)	0 (0)	0 (0)	3 (3.5)	2 (2.3)	1 (1.2)	0 (0)	0 (0)	6 (7)
#81	76 (88.4)	0 (0)	0 (0)	3 (3.5)	2 (2.3)	1 (1.2)	0 (0)	0 (0)	4 (4.7)
#82	76 (88.4)	0 (0)	0 (0)	6 (7)	3 (3.5)	1 (1.2)	0 (0)	0 (0)	0 (0)
#83	49 (57)	0 (0)	0 (0)	14 (16.3)	17 (19.8)	5 (5.8)	1 (1.2)	0 (0)	0 (0)
#84	5 (5.8)	0 (0)	0 (0)	0 (0)	24 (27.9)	35 (40.7)	21 (24.4)	1 (1.2)	0 (0)
#85	6 (7)	0 (0)	0 (0)	4 (4.7)	26 (30.2)	37 (43)	13 (15.1)	0 (0)	0 (0)

Table 10. The frequency and percentage of responses given by the parents to T-ECOHIS questions (n=86).

	T-ECOHIS Responses, n (%)					
	Never	Hardly Ever	Occasionally	Often	Very Often	Do Not Know
How often has your child ... because of dental problems or the need for dental treatment?						
Had pain in the teeth, mouth or jaws?	5 (5.8)	16 (18.6)	57 (66.3)	8 (9.3)	0 (0)	0 (0)
Had difficulty drinking beverages	38 (44.2)	30 (34.9)	15 (17.4)	2 (2.3)	1 (1.2)	0 (0)
Had difficulty eating some foods	8 (9.3)	11 (12.8)	50 (58.1)	12 (14)	5 (5.8)	0 (0)
Had difficulty pronouncing words	65 (75.6)	19 (22.1)	1 (1.2)	1 (1.2)	0 (0)	0 (0)
Missed preschool or daycare	50 (58.1)	20 (23.3)	16 (18.6)	0 (0)	0 (0)	0 (0)
Had trouble sleeping	41 (47.7)	25 (29.1)	19 (22.1)	0 (0)	0 (0)	1 (1.2)
Have been irritable or frustrated	38 (44.2)	26 (30.2)	22 (25.6)	0 (0)	0 (0)	0 (0)
Avoided smiling or laughing	57 (66.3)	15 (17.4)	7 (8.1)	4 (4.7)	2 (2.3)	1 (1.2)
Avoided talking with other children	55 (64)	18 (20.9)	7 (8.1)	3 (3.5)	1 (1.2)	2 (2.3)
How often have you/another family member because of your child's dental problems or treatment						
Been upset	29 (33.7)	11 (12.8)	21 (24.4)	14 (16.3)	9 (10.5)	2 (2.3)
Felt guilty	19 (22.1)	4 (4.7)	11 (12.8)	30 (34.9)	22 (25.6)	0 (0)
Had to take hours or days of work	42 (48.8)	31 (36)	6 (7)	5 (5.8)	0 (0)	2 (2.3)
Had the family's economic situation affected	48 (55.8)	16 (18.6)	12 (14)	2 (2.3)	2 (2.3)	6 (7)

The frequency and percentage of responses given by the parents to T-ECOHIS questions are given in Table 10. According to the findings derived from T-ECOHIS, 66.3% of the parents stated that their child experienced dental pain on occasion. 79.1% of the parents stated that their child never or hardly ever had trouble while drinking. The total percentage of parents stating that their children occasionally or more frequently had difficulty eating (77.9%) was found higher than drinking beverages (20.9%). Additionally, the highest percentages were determined for the parents who stated that their children never had difficulty pronouncing words while speaking (75.6%), missed school (58.1%), had trouble sleeping (47.7%), have been irritable or frustrated (44.2%), avoided smiling (66.3%) or talking with other children (64%). The percentage of the answers ‘never’ given to the questions ‘had to take hours or days of work’ (48.8%) and ‘had the family’s economic situation affected’ (55.8%) were found the highest in the family impact section.

Table 11. The frequency and percentage of responses given by the parents to T-SOHO-5 (n=86)

		Responses to T-SOHO-5 by parents, n (%)					
		Never	Hardly Ever	Occasionally	Often	Very Often	Do not Know
1	Difficulty eating	8 (9.3)	13 (15.1)	48 (55.8)	13 (15.1)	3 (3.5)	1 (1.2)
2	Difficulty speaking	51 (59.3)	20 (23.3)	8 (9.3)	4 (4.7)	3 (3.5)	0 (0)
3	Difficulty playing	60 (69.8)	13 (15.1)	7 (8.1)	3 (3.5)	2 (2.3)	1 (1.2)
4	Avoid smiling due to appearance	55 (64)	21 (24.4)	7 (8.1)	2 (2.3)	1 (1.2)	0 (0)
5	Avoid smiling due to pain	55 (64)	22 (25.6)	5 (5.8)	4 (4.7)	0 (0)	0 (0)
6	Difficulty sleeping	46 (53.5)	23 (26.7)	16 (18.6)	0 (0)	0 (0)	1 (1.2)
7	Self-confidence affected	39 (45.3)	16 (18.6)	9 (10.5)	2 (2.3)	3 (3.5)	17 (19.8)

The frequency and percentage of responses given by the parents to T-SOHO-5 are presented in Table 11. 55.8% of the children had difficulty eating occasionally according to their parents. On the other hand, based on their parents' responses, 59.3% of children never had difficulty while speaking, 69.8% while playing and 53.5% while sleeping. Parents stated that their children never or hardly ever avoided smiling due to appearance (88.4%) or dental status (89.6%). Conspicuously the answer 'do not know' was mostly preferred (19.8%) by the parents, following the answer 'never' (45.3%) for the item questioning if parents think their child's self-esteem may have been affected by their dental health.

The frequency and percentage responses given by the children to T-SOHO-5 child are presented in Table 12. The total percentage of children stating that they had a little and a lot of difficulties while eating (86%) was found higher than children having difficulty (a little and a lot) while drinking (25.6%). The responses given by children showed that most of them had no difficulty speaking (88.4%), playing (83.7%) or sleeping (65.1%) parallel to their parents' observations. More children stated that they did not avoid smiling due to dental pain (86%) and the appearance of their teeth (72.1%).

Table 12. The frequency and percentage of responses given by children to T-SOHO-5 (n=86)

		Responses to T-SOHO-5 by children, n(%)		
		No	A little	A lot
1	Difficulty eating	12 (14)	45 (52.3)	29 (33.7)
2	Difficulty drinking	64 (74.4)	21 (24.4)	1 (1.2)
3	Difficulty speaking	76 (88.4)	9 (10.5)	1 (1.2)
4	Difficulty playing	72 (83.7)	14 (16.3)	0 (0)
5	Avoid smiling due to pain	74 (86)	12 (14)	0 (0)
6	Avoid smiling due to appearance	62 (72.1)	12 (14)	12 (14)
7	Difficulty sleeping	56 (65.1)	23 (26.7)	7 (8.1)

Based on the oral health examination dmft values of children were calculated and further analyses were done to evaluate any significant correlation between ECC and OHRQoL children. Table 13 shows the correlation and statistical significance between mean dmft and the factors age, ICDAS mean, T-ECOHIS (child impact section, family impact section and total scores given separately), T-SOHO-5 parent and T-SOHO-5 child. The mean dmft of children was found statistically significantly correlated with ICDAS mean value ($p=0.567$). ICDAS scores of a child increase significantly as dmft values increase ($p<0.001$). The T-ECOHIS total ($p=0.002$), child impact section ($p= 0.002$) and family impact section ($p =0.020$) were found statistically significantly correlated with the dmft of children. T-SOHO-5 parent ($p = 0.029$) and T-SOHO-5 child ($p <0 .001$) were found statistically significantly correlated with the dmft values of children. Strong correlations were found with ICDAS mean ($r=0.960$, $p<0.001$) and T-SOHO-5 child ($r=0.529$, $p<0.001$) between the mean dmft of the study group.

Table 13. The correlation and statistical significance between dmft and the factors age, ICDAS mean, T-ECOHIS child and family impact sections are given separately, T-SOHO-5 parent and T-SOHO-5 child.

	dmft	
	r	p
Age	-0.063	0.567
ICDAS mean	0.960	<0.001*
T-ECOHIS CIS	0.334	0.002*
T-ECOHIS FIS	0.253	0.020*
T-ECOHIS Total	0.335	0.002*
T-SOHO-5 parent	0.240	0.029*
T-SOHO-5 child	0.529	<0.001*

* Pearson Correlation Analysis, $p<0.05$

Table 14. The assessment of the association of the sociodemographic factors and the mean dmft values of the study group

	dmft		
	Median (Q1, Q3)	Test value	p
Sex		-0.330	0.742
Girl	11 (8, 15)		
Boy	12 (8, 16)		
Having a sibling		-1.101	0.271
No	14 (9, 16)		
Yes	11 (8, 14)		
Fathers' Educational Level		-1.944	0.052
Undergraduate (Up to high school graduation)	13 (11, 18)		
University or Postgraduate	11 (8, 15)		
Mothers' Educational Level		-0.845	0.398
Undergraduate (Up to high school graduation)	12 (10, 16)		
University or Postgraduate	12 (8, 16)		
Parent's Educational Level		3.382	0.184
Both undergraduate	12.5 (11, 18)		
At least one parent is a university or postgraduate	11.5 (9, 13)		
Both parents are university or postgraduate	11.5 (8, 16)		
Regular Tooth Brushing Habit		-1.064	0.287
No	12 (10, 16)		
Yes	11 (8, 16)		
Frequency of tooth brushing		1.014	0.602
Less than once a day	12 (9, 16)		
Once a day	11.5 (9.5, 14)		
More than once a day	11 (8, 16)		
Previous dental examination		-0.894	0.371
No	10.5 (8, 12)		
Yes	12 (8.5, 16)		
Check-up		-0.999	0.318
No	12 (10, 16)		
Yes	11 (7, 15)		
Visible caries, no pain		-0.416	0.678
No	12 (8.5, 15)		
Yes	12.5 (7, 17)		
Occasionally felt pain		-0.179	0.858
No	11.5 (8, 16)		
Yes	12 (9, 16)		

Relentless pain, unresponsive to medication		-0.539	0.590
No	12 (8, 16)		
Yes	12 (11, 12)		
Bad habits (pacifier, thumb sucking, teeth grinding etc.)		-0.806	0.420
No	12 (8, 16)		
Yes	14.5 (11, 18)		
The appearance of teeth (colour, size, gaps, crowding etc.)		-0.601	0.548
No	12 (8, 16)		
Yes	11 (8.5, 14.5)		
Dental trauma (followed by bleeding cracks, malposition or mobility)		-1.501	0.133
No	12 (9, 16)		
Yes	7 (5, 13)		
Bad breath even after brushing		-0.570	0.568
No	12 (8, 16)		
Yes	12.5 (11, 15)		

* Mood's median test. $p < 0.05$

The assessment of the association of the sociodemographic factors and the mean dmft values of the study group according to Mood's median test are given in Table 14. None of the items evaluated in the sociodemographic information form showed a significant association with the mean dmft scores of the study group. Fathers' and mothers' educational levels showed a negative but insignificant association with the mean dmft scores ($p=0.052$, $p=0.398$) respectively.

Table 15 and Table 16 show the agreement analysis between T-SOHO-5 parent vs ECOHIS and t-SOHO parent vs T-SOHO-5 child. Results from the Percent agreement, Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC tests are shown in both tables. If the significance level from different tests meets, the agreement is considered successful. On the other hand, in the presence of discrepancies they need to be discussed if $p > 0.05$.

The agreement evaluation of T-SOHO-5 parent and the related items from T-ECOHIS according to the Percent agreement, Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC tests are presented in Table 15. Items 1,3,4,5 and 6 rated by parents from T-SOHO-5 parent were statistically significantly in agreement with the similar items 3,5,8,7 and 6 from T-ECOHIS respectively, according to the Percent

agreement, Spearman's rho, ICC, Kappa and Gwet's AC tests ($p < 0.05$). There is a variation between the answers given to item 2 from the T-SOHO-5 parent and item 4 from the T-ECOHIS by parents ($p = 0.056$) according to the reliability testing, ICC. When the answers given to item 7 from the T-SOHO-5 parent and item 9 from the T-ECOHIS were analysed for agreement, only Gwet's AC test showed a statistically significant agreement ($p < 0.001$).

The agreement evaluation of T-SOHO-5 parent and T-SOHO-5 child according to the Percent agreement, Spearman's rho, Intraclass Correlation Coefficient (ICC), Cohen's Kappa and Gwet's AC tests are presented in Table 16. Items 2 and 3 rated by parents from T-SOHO-5 parent were statistically significantly in agreement with items 3 and 4 from the T-SOHO-5 child respectively according to the tests Percent agreement, Spearman's rho, ICC, Kappa and Gwet's AC tests ($p < 0.05$). For item 1 from both the T-SOHO-5 parent showed a slight agreement of 0.127 (95% CI) with item 1 from the T-SOHO-5 child according to the Kappa test ($p = 0.136$). Items 4 and 5 from the T-SOHO-5 parent, showed statistically significant agreement with items 6 and 5 from the child version respectively according to only Gwet's AC test ($p < 0.001$). When item 6 from the parent version is compared with item 7 from the child version, the ICC test showed poor reliability of 0.167 (95% CI).

Table 15. The agreement analysis between t-SOHO-5 parent and T-ECOHIS

t-SOHO-5 parent	t-ECOHIS	Percent agreement	Spearman's rho	p	ICC (95% CI)	p	Kappa (95% CI)	p	Gwet's AC (95% CI)	p
Item 1	Item 3	0.698	0.699	<0.001*	0.664 (0.527, 0.767)	<0.001*	0.516 (0.359, 0.672)	<0.001*	0.655 (0.540, 0.769)	<0.001*
Item 2	Item 4	0.593	0.365	0.001*	0.171 (-0.041, 0.368)	0.056	0.184 (0.037, 0.331)	0.015*	0.536 (0.408, 0.665)	<0.001*
Item 3	Item 5	0.570	0.300	0.005*	0.184 (-0.027, 0.380)	0.043*	0.209 (0.064, 0.354)	0.005*	0.518 (0.392, 0.644)	<0.001*
Item 4	Item 8	0.616	0.437	<0.001*	0.468 (0.286, 0.617)	<0.001*	0.270 (0.109, 0.431)	0.001*	0.571 (0.449, 0.694)	<0.001*
Item 5	Item 7	0.488	0.398	<0.001*	0.301 (0.097, 0.481)	0.002*	0.182 (0.046, 0.317)	0.009*	0.359 (0.215, 0.503)	<0.001*
Item 6	Item 6	0.639	0.388	<0.001*	0.263 (0.056, 0.448)	0.007*	0.424 (0.260, 0.588)	<0.001*	0.545 (0.412, 0.677)	<0.001*
Item 7	Item 9	0.384	0.038	0.729	-0.098 (-0.301, 0.115)	0.816	0.062 (-0.059, 0.182)	0.313	0.293 (0.166, 0.420)	<0.001*

* Shows the level of significance of the agreement analysis

Table 16. The agreement analysis between t-SOHO-5 parent and child

t-SOHO-5 parent	t-SOHO-5 child	Percent agreement	Spearman's rho	p	ICC (95% CI)	p	Kappa (95% CI)	p	Gwet's AC (95% CI)	p
Item 1	Item 1	0.470	0.271	0.012*	0.228 (0.017, 0.419)	0.017*	0.127 (-0.041, 0.295)	0.136	0.246 (0.082, 0.410)	0.004*
Item 2	Item 3	0.872	0.824	<0.001*	0.745 (0.634, 0.826)	<0.001*	0.507 (0.319, 0.696)	<0.001*	0.853 (0.763, 0.943)	<0.001*
Item 3	Item 4	0.823	0.346	0.001*	0.242 (0.032, 0.431)	0.012*	0.340 (0.094, 0.587)	0.007*	0.797 (0.693, 0.901)	<0.001*
Item 4	Item 6	0.639	0.027	0.805	-0.024 (-0.233, 0.187)	0.588	-0.040 (-0.134, 0.055)	0.405	0.567 (0.421, 0.712)	<0.001*
Item 5	Item 5	0.791	0.083	0.449	0.086 (-0.126, 0.291)	0.212	0.055 (-0.140, 0.250)	0.576	0.765 (0.657, 0.873)	<0.001*
Item 6	Item 7	0.682	0.275	0.011*	0.167 (-0.046, 0.366)	0.061	0.246 (0.054, 0.437)	0.012*	0.599 (0.458, 0.740)	<0.001*

* Shows the level of significance of the agreement analysis

5 DISCUSSION

The great impact of ECC on children and their families' lives surpasses clinical aspects, proving that elaborate strategies are needed to be addressed on children's dental health for further improvement of QoL in a community. Although prophylaxis treatments are emphasized for community health programs, affected QoL requires urgent dental treatment of children with symptoms. Thus, it can be speculated that the first treatment goal for health programs should be pain relief and arresting active dental lesions rather than prophylaxis treatment.

In summary, OHRQoL scales can inform evidence-based dental practice and distinguish children in dental treatment needs when employed population level. Assessing children's OHRQoL with different instruments is applicable only if there is a scale available and appropriate for the patient and context. This study aimed to evaluate the association between ECC and OHRQoL in preschool children. T-ECOHIS is a valid tool to assess OHRQoL of preschool children and their families, translated by **Peker et al.** (10) and was used in this study in comparison with T-SOHO-5. SOHO-5 is translated for the present study into Turkish culture based on recommended guidelines (141,142).

Several studies have been conducted to evaluate the OHRQoL of children to evaluate the effect of different oral conditions. ECOHIS scale has been mostly chosen for children or adolescents and has dominated literature by being translated and cross-culturally adapted to be used in different settings and populations. ECOHIS was preferred by researchers in studies regarding dental trauma, orthodontic treatments or molar incisor hypomineralization cases, thus, most of the viable information in the literature is related to children who are older than 6 years of age. Table 3. Shows that the only available Turkish OHRQoL scale which is appropriate for preschool children is T-ECOHIS, which was cross-culturally adapted and validated by **Peker et al.** (10). CPQ for ages 8 to 10 years was translated by **Aydinoğlu et al. (2021)** (143). The Turkish version of the C-OIDP was cross-culturally adapted to be used in primary school children in 2008 by **Can et al.** (169) and **Peker et al. (2020)** evaluated the children's psychometric properties of children aged 11 to 12 (170). Turkish POQL was available to use for ages 8-14 years old by **Yazıcıoğlu et al.** (140).

So far T-ECOHIS was preferred to evaluate the Turkish children's OHRQoL in relation to ECC only by **Ozsin Ozler et al. (2020)** (93). The results showed a strong association between the QoL of children and ECC and an even stronger one in extensive caries. In their study, they used the T-ECOHIS scale to calculate the OHRQoL of children aged 5 to 6 years old, similar to our study. It is important to emphasize that T-ECOHIS depicts a child's QoL through his/her parent's opinion. There are 9 items in the child impact section related to children's daily lives, rated by their parents as a proxy report. There is relatively limited information about the OHRQoL of preschool from their viewpoint since they do not have sufficient reading and comprehension abilities, thus able to self-report. In our study, an elaboration was intended to make possible differences caused by evaluating children's personal opinions.

Tsakos et al. stated that the development of a new scale was appropriate for very young children because there was a lack of an appropriate measure, and all information was based on the parental reports as proxies (11). On the other hand, besides the domains like emotional well-being that involve abstract domains which children younger than 6 years cannot comprehend, it is evident that general health or the QoL can be reported reliably by children aged 4 to 6 years (11,171). This has led to the development of a self-reported measure among 5-year-olds constructed by 7 items administrated via face-to-face interviews. SOHO-5 was cross-culturally adapted to Brazilian (158), Spanish (136), Indonesian (160), Chinese (161), and Bengali (135). SOHO-5 was used to evaluate the association between OHRQoL and ECC using dmft values by **Ramadhani et al. (2021)** which was exemplary of our study. Different from ours, for the oral health examination they used the PUFA index in addition to dmft evaluation. In their study, they restricted the age of the participants to 5 years old (162).

The two studies by **Ozsin Ozler et al.** using T-ECOHIS and **Ramadhani et al.** using SOHO-5 resembles the methodology in our study (93,162). Due to its definition, ECC can be spoken for children younger than 71 months, meaning six years of age. We decided to narrow down the age of the participants to 5 years old, similar to **Ramadhani et al.** (162). Because studies show that there is a significant difference between the oral health of children at different ages. **Ramos-Gomez et al.** evaluated the prevalence of ECC in children between 8 months and 7 years and found that there is a significant difference between the ages (172). Similarly in their study, **Kapdan et al.** evaluated the difference between dmft scores of ages

3,4,5, and 6 as significantly different (77). Moreover, studies show that children's perception, which is greatly influenced by their social, language, cognitive and emotional development, is naturally age-dependent (173–175). Thus, by narrowing the age interval of participants, a standardisation between the children was tried to achieve. A total of 86 child-parent couples were included in our study except for the pilot study during translation ($n = 20$). There were 43 boy and 43 girl participants with a mean age (SD) of 5.47 ± 0.28 , ranging between 5.01 and 5.97 (Table 7).

Other than SOHO-5, the Michigan OHRQoL scale also meets the criteria to be used in the desired age group for our study (Table 3). *Filstrup et al.*, originally developed the tool for children older than four years, even though they state that 65% of the 3-year-old children were able to correctly answer the screening questions therefore, this tool can be used since they can self-report. The screening questions are a unique feature of selecting participants according to their ability to self-report based on their answers to the two questions (“Are you a boy or a girl?” and “What does a dentist clean and fix?”) before the items (114). But the Michigan-OHRQoL scale depends on 9 questions of child reports and the grading is done on the agreements of the parents to the items rather than the frequency of occurrence like in ECOHIS or SOHO-5 (133). Another disadvantage is that it is not as widely used or has not been adapted to different languages yet like SOHO-5. The final limitation of the Michigan-OHRQoL measurement is stated as being originally designed to be used in a clinical setting and thus, not appropriate for epidemiological surveying like ECOHIS fulfils to do (136). In summary, SOHO-5 was found appropriate for cross-cultural adaptation to be used in the evaluation of any association between the ECC of preschool children and their OHRQoL. The comparison of children and their parent's perceptions with an already approved OHRQoL scale, T-ECOHIS, was a unique integration for our study.

Comparing different OHRQoL scales was done before by *Page et al.* (176). According to them, the first aim of such a study is to facilitate the most appropriate scale on a particular topic. They compared CPQ for 11-14 years old, COHIP and Caries QC scales on a group of 10 to 13 years old children. Although the age group is different from ours, this article showed that our methodology can work. In addition to that, their study disproved our first concern, which was about the possibility of comparing different scales having a different set of items (176). Our second inquiry was that children's and their parents' administration methods were different. Nonetheless, it is suggested that the influence of the administration method could

affect the results. *Bekes et al. (2021)* evaluated the difference between the three administration methods on preschool children: face-to-face interview, self-administered questionnaire and telephone interview. They found that the mean ECOHIS score for a face-to-face interview was higher than other methods, which indicated that participants were influenced (177). It was agreed that this may be due to the interaction with the interviewer as was also suggested by *Sousa et al. (2009)* (178).

The Adaptation Process

The cross-cultural adaptation was done according to the guidelines (141,142,159). The cross-cultural adaptation of ECOHIS to Turkish culture by *Peker et al.* was followed as a thorough guideline (10). In addition to those other studies of cross-cultural adaptation to Turkish culture by *Yazicioğlu et al. (140)*, *Aydinoğlu et al. (143)*, *Can et al. (169)* were also neatly examined. The cross-cultural adaptation of SOHO-5 to other languages will be discussed in comparison to our study. The method we used for the cross-cultural adaptation is called the forward-backwards translation. This method was also preferred by *Abanto et al.*, *Abreu-Placeres et al.*, *Rachmawati et al.*, *Gao et al.*, and *Mishu et al. (135,136,158,160,161)*. Pilot study frequencies, ages and the number of participants were observed to be different when these studies were examined. The expert panel was mostly constructed of people from different specialities or by the researchers themselves. Although studies revealed their methodology with different transparency, the guidelines mentioned showed similarity to our choices which were: *Guillemin et al.*, *Beaton et al.* and *Von Widenfelt et al. (141,142,159)*.

For the age of the participants included in the pilot testing, 5-year-old children were preferred as the study group as well. *Abanto et al.*, *Gao et al.* and *Rachmawati et al.* used the same age interval for their participants (5 to 6 years old children) (158,160,161). On the other hand, for the cross-culturally adaptation of the SOHO-5 scale, *Abreu-Placeres et al.* included children aged 6 to 7 years old and *Mishu et al.* pilot tested in a group of children between 5 to 9 years old (135,136). Some discrepancies could be caused due to children's ongoing development, if we were to choose different age groups for the pilot study and the study group. Face and content validation was done during the pilot study (n=20) and was graded as successful. Which was a try-out for the applicability and comprehensibility of the items for the attendees before the actual study.

The pilot study was done with 20 child-parent couples and through the administration some wording choices had to be preferred. The original version of the SOHO-5 scale consists of items ‘a little and a lot’ for the answer choices. Although the items question the frequency of experience, the direct translation to Turkish corresponds to the words ‘biraz, çok’ implies the magnitude of the impact. Thus, the words ‘bazen, çok kez’ were preferred for the answer choices in the T-SOHO-5 child version. For the T-SOHO-5 parent version, the same choices were adapted as ‘neredeyse hiç’ and ‘genellikle’ to fit the stages of the Likert of 5 choices questioning the frequency.

Abanto et al., for validity and reliability assessment, included 193 participants and an oral examination for dental caries by two experts which is different from ours. Their adapted version of SOHO-5 scales was used in 2 pilot studies (n=20) different from ours (158). Through the adaptation process **Rachmawati et al.** conducted a single pilot study with 27 children, **Gao et al.** with 20 children and **Mishu et al.** pilot tested in a group of 272 children (135,160,161). Although the number of participants included in the study by **Mishu et al.** stands out, we decided to include 20 children for the content and face validity in the adaptation process. Another difference is that **Abanto et al.** conducted the administration again with 159 children-parent pairs for the test-retest reliability results (158). Test-retest is the process of administration of the same scale after some time on another or the same group to estimate reliability. Since reliability assessment can also be done by internal consistency assessment, the test-retest method was not chosen for possible bias.

As an additional step, the translated version was translated back to the source language English and reviewed again by the expert panel in terms of semantic, experiential, conceptual and idiomatic equivalence. If needed, after minor changes final version was accepted by the expert panel. This process is recommended by the guidelines (141,142,159) and was followed by the researchers **Rachmawati et al.** (160), **Gao et al.** (161) and **Mishu et al.** (135) just like us. The final version of the Turkish SOHO-5 was shared with the developer of the original SOHO-5 and was ready to be used in the present study with T-ECOHIS.

Sociodemographic Form

In the present study, no sociodemographic factor showed a significant association with the dmft values, shown in Table 8. Of the 86 participants, there were 43 boys and 43

girls, but no significant difference was found between the sexes ($p = 0.742$). Moreover, being the only child also did not show a statistically significant association between the oral health status (dmft) of children ($p = 0.271$).

According to the results, parents' educational level was found not to have any significant effect on the oral health status (dmft) of children (fathers $p = 0.52$ and mothers $p = 0.398$). In addition to that, having a post-graduate level of education was found to have no statistically significant effect on the dmft values of the study group ($p = 0.184$). On the other hand, **Ozsin Ozler et al.** in their study found that poor QoL was related to the presence of a sibling, parents' education being low, dental visits based on complaints, and irregular or no toothbrushing ($p < 0.001$) (93). They evaluated dmft values in addition to ICDAS scores but analysed the ICDAS scores in association with the OHRQoL which will be discussed later.

Approximately half of the parents, 45 (52.3 %) to be exact, stated their child's oral hygiene habit as regular, although only 27 (31.4%) of children were brushing their teeth more than once a day, reaching the required amount of tooth brushing which is twice a day. The results did not show any association between children's oral health status (dmft) and their brushing habits. This may be due to the lack of the questioned items since caries is a multifactorial consequence by nature. For example, **Elbek Çubukçu et al.** questioned the age at which tooth brushing has started and if brushing is accompanied by parents (94). In their study, **Lara et al.** also questioned unsupervised tooth brushing and found that it increases the risk of having severe dental caries (155). In addition to hygiene habits, **Ramadhani et al.** also evaluated the frequency of cariogenic snacking, which is directly related to cariogenic activity (162). According to the findings, the oral health examination was done for the first time for only 6 of the children in the present study. This means that most of the participants had experienced a dental visit priorly and therefore expected to be at least symptom-free. Nonetheless, nearly half of the patients (45.3%), needed re-examination due to dental pain that is either occasionally felt ($n = 26$) or unrelenting pain ($n = 13$) unfortunately.

Oral Examination

In our study, even though parents state the opposite, required brushing habits were not imposed by children. Table 8 shows that only 27 (31.4%) of children were brushing their teeth more than once a day. According to the results, the mean ICDAS score (SD) is calculated as 2.72 ± 2.03 and the mean dmft $\pm$ (SD) was calculated as 12.02 ± 4.20 . The lowest

dmft score was 3 for a child, showing that none of the participants was caries-free. Contradictory to our results, WHO's main goal until the year 2025 is to achieve a prevalence of 90% for children without any caries (dmft = 0) (179). The result of other studies is more promising than ours, **Ozsin Ozler et al.** detected 78.8% of ECC in their cases, **Sengul et al.** found 73.3% of ECC cases in a study they conducted in 2021(73,93). A report on Türkiye's Oral and Dental Health Status Profile by **Tezel et al.** revealed that, in 2018, the prevalence of dental caries in 5 years old children was estimated as 64.4%, which was less than the prevalence found in our study group (100%), and stated that the previous statistics belonged to the year 2004 was showed the prevalence of dental caries used to be 69.8%. The mean dmft value for 5 years old children was stated as 3.64 ± 4.04 , which is less than our results (12.02 ± 4.20)(180). This may be due to the sampling method of the participants, who had reasons to apply for a dental examination rather than being patients of a screening program. When studies from other countries were examined, the caries prevalence in children was also less than the present study group's prevalence. **Lara et al.** found the caries prevalence as 82,2% (ICDAS 1-6) (155). In their study **Ramadhani et al.** find the prevalence of ECC to be 88.7% (162). This difference is presumed to be due to the sampling from a Dental faculty, which will be mentioned again as a limitation.

Moreover, ideally, children were at first planned to be divided into two groups according to the severity of caries and to further evaluate any differences in their OHRQoL scores, similar to **Fernandes et al.** (163). Nonetheless, grading the severity of dental status in a group of children all having ECC or S-ECC was not possible statistically. Because the distribution of our study group did not allow the study design to involve a control group having preschool children with none or few cavities. This may be due to the great abundance of dental cavities in preschool children, especially when the sample group is constructed from the patients of a Dental Faculty.

In their study, **Pitts et al.** constructed 4 subgroups of children with a healthy mouth (ICDAS =0), initial caries (ICDAS = 1-2), moderate dental caries (ICDAS = 3-4) and extensive dental caries (ICDAS = 5-6) (181). Similarly, the children could have been divided into two groups according to the middle dmft value, being greater or less $dmft = 12$. But this division would not directly reflect the severity of the ECC. In our study, we evaluated the oral health of the children based on their dmft values and ICDAS scores to the identification of the severity of the caries lesions and presumed to be adequate since the definition of ECC

relies on these parameters. The dmft values achieved significant results with the OHRQoL scales, but not with any of the sociodemographic aspects. From a different perspective, **Ozsin Ozler et al.** evaluated the increase in QoL of children in association with their ICDAS scores. They noted the dmft values as well as the PUFA values for the untreated teeth.

There are different scoring methods for the oral examination like the PUFA index (93,135,162) or Caries Assessment Spectrum and Treatment (CAST) scoring system (151,157). PUFA index is used to depict the mucosal consequences of pulpal involvement (p), ulceration (u), presence of a fistula (f), or abscess (a) related to untreated caries (182). According to the CAST system, which is used to categorize the severity of the disease, scores between 0-2 mean healthy, scores 3 mean pre-morbidity, scores between 4-5 mean morbidity, 6-7 mean severe morbidity, and scores 8 mean mortality (183). Sound teeth, teeth having fissure sealant, or restorations are categorized as healthy. Caries restricted with an enamel lesion are considered pre-morbidity but those that have reached dentin are considered morbidity. Teeth with affected pulp or having abscess or fistula are considered as severe morbidity. Teeth already extracted or not treatable are considered as mortality. In their study, **Fernandez et al.** found that children with carious lesions which are deep into dentine or with pulpal involvement or abscessed teeth had poorer OHRQoL than children without such lesions (157). If we were to involve information about clinical symptoms, pulpal involvement, and previous treatments would have enriched data obtained and would have probably increased the precision in assessing the impact of dental health on the QoL. Furthermore, no significant association were found between dmft and any sociodemographic factors, but by grading the pulpal involvement teeth with symptoms could be graded separately.

OHRQoL Assessment

Based on the oral health examination dmft values of children were calculated and further analyses were done to evaluate any significant correlation between ECC and OHRQoL children. Results show that the increased number of caries due to ECC is associated with more affected OHRQoL of children and their families. In addition to that the translated version of SOHO-5 proves reliable results when compared with ECOHIS. According to the T-ECOHIS, T-SOHO-5 child and T-SOHO-5 parent, the most frequently reported domains were oral health symptoms and functional limitations,

According to the findings presented in Table 13. OHRQoL scores from T-ECOHIS in total ($p = 0.002$), child impact section ($p = 0.002$) and family impact section ($p = 0.020$) separately were found significantly associated with the dmft of children. By using ECOHIS scores and the oral health of children, *Sakaryalı et al. (2019)*, *Duangthip et al. (2019)*, *Lai et al. (2019)*, *Ozsin Ozler et al. (2020)*, *Lara et al. (2021)*, and *Pakkhesal et al. (2021)*, evaluated the relationship between ECC and OHRQoL of children (7,93,149,150,155,156).

Sakaryalı et al. (2019), in their study, found that ECC and S-ECC had affected the OHRQoL of children and their families using T-ECOHIS similar to the present study, but they stated that ECC did not have a statistically significant impact on children's OHRQoL different from the parents. They concluded that this may be due to increased pain sensitivity in S-ECC cases and parents' possible greater aesthetic expectancies (7). *Duangthip et al. (2019)*, in their study, found the overall mean (SD) ECOHIS score was 5.8 (6.2). They found the caries prevalence to be 36.9% and calculated the mean (SD) dmft score as 1.7 (3.2). Their results were similar to the present study, which is children's OHRQoL scores were significantly lower when their dmft scores were higher. They concluded that in Hong Kong, the preschool children's lower OHRQoL was found to be significantly associated with their caries status ($p = 0.002$). Similar to our study, *Duangthip et al.* in their study could not find any association between the sex of the children, the parent's level of education, the child's relationship with the respondent and OHRQoL ($p > 0.05$) (149).

Lai et al. (2019), different from the present study, along with the dmft scores, evaluated the visible plaque index of children resulting in a score above 90%. The mean (SD) age was 4.7 (0.8), the mean (SD) dmft score was 10.2 (4.5) and almost all the children (98.7%) had caries. They concluded that the presence of pain and severity of ECC was associated with low levels of OHRQoL and more measures are needed to decrease the prevalence of children with S-ECC. The prevalence of dental caries estimated by *Lai et al.* is high (98.7%), similar to the present study. They discussed that this situation is probably attributed to the lack of a government-initiated dental programme for preschool children. They stated that the presence of the School Dental Care Service provided for primary school students, causes the lack of parents' motivation to bring their child to see a dentist at their own time and expense (150).

Ozsin Ozler et al. (2020), detected 78.8% of ECC cases in their study group, which is less than the prevalence found in the present study. Their results showed a strong association between the QoL of children and ECC and an even stronger one in extensive caries, which is a similar finding to our study. On the other hand, **Ozsin Ozler et al.** in their study found that poor QoL was related to the presence of a sibling, parents' education being low, dental visits based on complaints, irregular or no toothbrushing ($p < 0.001$), which was not observed as a significant finding in our study. They concluded their study with an emphasis on the importance of incorporating social and psychological problems, besides functional and aesthetic concerns as a routine part of dental visits (93).

Lara et al. (2021), in addition to the same sociodemographic factors evaluated in the present study, inspected variables such as dietary and tooth-brushing habits. Similar to the study results of the present study, it was found that m-ECOHIS was significantly associated with caries severity. They found the caries prevalence as 82,2% (ICDAS 1-6), less than ours. Different from our study they questioned the presence of unsupervised tooth brushing which was found to increase the risk of having severe dental caries. Type of school, age groups, parents' educational level, family income, and living conditions were found to be correlated with caries, showing how distinctive risk indicators were associated with different caries stages (155). **Pakkhessal et al. (2021)**, The mean (SD) dmft value was 3.94(4.17) and the mean (SD) ECOHIS score was calculated as 11.88 (6.9). Similar to our findings, they discovered that as the dmft index increased in children, the ECOHIS scores increased as well. This indicates a significant correlation between the dmft and ECOHIS scores. They claimed that these findings can serve as appropriate resources for creating preventive laws and promoting young children's oral health (156).

Different from our study, **Grant et al. (2019)**, **Ferrazzano et al. (2019)** and **Jiang et al. (2019)** evaluated the relationship between ECC and OHRQoL of children being treated under general anaesthesia. The oral health of children increased statistically significantly after their teeth were treated under general anaesthesia (48,106,110), additionally, the BMI and growth of children increased significantly (110). Evaluating the outcomes of dental treatments through clinical studies allows observing ways to reduce OHRQoL of children. Although there are disturbances related to undergoing the general anaesthesia process itself, it can be suggested that treatments being done in a single session can be considered as an advantage to cause great progress in the OHRQoL. **Pereira et al. (2022)** evaluated OHRQoL

scores of children before and 3 months after the conclusion of dental treatments and found that OHRQoL scores increased as the oral health of the children increased after treatment with an observational prospective study. On the other hand, in the study by **Jiang et al.** after 1 year of follow up a tendency toward caries relapse was observed, which caused the OHRQoL to deteriorate over time (48). Despite successful dental treatments, the effects of ECC on the OHRQoL can be reduced but the preservation of oral health is hard as it used to be.

Different from the present study, the process of oral health evaluation was carried out by **Pesaressi et al. (2020)** and **Fernandez et al. (2021)** via the CAST system (184,185). **Fernandez et al. (2021)**, conducted a cross-sectional study with 205 children aged between 2-5 years old using the Brazilian ECOHIS (157). Both studies' findings show that children with carious lesions which are deep into the dentine or with pulpal involvement or abscessed teeth had poorer OHRQoL than children without such lesions.

With a different perspective, **Subramaniam and Surendran et al.** and **Tabassum et al.** compared the OHRQoL of children and their parents from urban and rural populations. **Subramaniam and Surendran (2020)**, assessed the correlation between the OHRQoL of preschool children, aged 3-5, with their dental caries status in urban and rural Bengaluru. Oral examination and OHRQoL measurements were done on 1545 children between the ages of 3-5. Similar to our study they found a strong relationship between dental caries and OHRQoL. They found that the OHRQoL of pre-schoolers in urban Bengaluru was superior to those in rural Bengaluru (152). **Tabassum et al. (2020)**, found a positive and insignificant relationship between ECC and ECOHIS in the rural population, whereas there was a moderately strong, positive relationship between the two in the urban population (154). It can be speculated that if in future studies, rural and urban populations were to be compared, significant differences in results especially based on the answers to the questions in sociodemographic information form could be achieved.

Different from the present study **Rajab and Abdullah (2020)** aimed to assess the prevalence of ECC among 4 to 5 years old preschool children and to evaluate its impact on the QoL of children and families using ECOHIS. They concluded that dental caries was high in prevalence and was found to be associated significantly with more affected OHRQoL of both children and their families. In addition to the ECC cases, they evaluated cases of dental trauma and anterior malocclusion (153). In our study, although the history of dental traumas

or orthodontic problems was stated as compliance by some parents, the actual presence of these factors was not evaluated in the dental health evaluation of the participants which may have influenced the OHRQoL of children.

According to the findings regarding the agreement analysis for the comparison of the two scales in the present study, the translated version of the SOHO-5 scale shows parallel findings with the T-ECOHIS scale when measuring OHRQoL of preschool children. A significant level of agreement was found between the answers given to similar items from T-ECOHIS and T-SOHO-5 scales. Results of the present study show that T-SOHO-5 is a promising tool for the evaluation of preschool children's perspectives. The dmft values of children were found significantly associated with T-SOHO-5 parent ($p = 0.029$) and T-SOHO-5 child ($p < 0.001$). ICDAS scores of a child were positively associated with his/her dmft value increases ($p < 0.001$). The comparison of scales T-SOHO-5 parent and ECOHIS were done by assessing the agreement to determine the efficacy of the scales. Questions from T-ECOHIS were chosen to be compared that were related to the ones from T-SOHO-5 parent items. Depending on the statistical analysis, Percent agreement, Spearman's rho, ICC and Cohen's Kappa, item 7 from the T-SOHO-5 parent 'Has your child's self-confidence ever been affected because of his/her teeth?' and item 9 from the T-ECOHIS 'How often has your child ever avoided talking with other children because of dental problems or dental treatments?' did not agree ($p > 0.05$), despite Gwet's AC value ($p < 0.00$). Based on the findings of the present study, except the discussed items, it can be said that parents can report their child's QOL affected by ECC since T-SOHO-5 shows parallel findings with the T-ECOHIS scale.

It can be speculated that the direct comparison of the answers given to different items from two scales may not be precise since they do not question the same thing, although they were matched previously in a study by **Fernandes et al.** (163). In our opinion, these differences may be due to the frequency of the 'Do not know' answers (19.8%) given by parents to the question 'Has your child's self-confidence ever been affected because of his/her teeth?'. Although the reason for this uncertainty is unknown, in projection with the other studies (186,187), it can be attributed to a possible miscommunication between children of age 5 and their parents. In the present study, the identification of the proxy or the time parents spend with their child in a day was not evaluated. **Abanto et al.** in their study suggested that these factors may affect the answers given to the questions and found that

mothers' answers were reliable as children's own and can be preferred, or at least be used for verification (187).

Evaluation of children's and their parent's opinions separately lead researchers to investigate if there is a difference in the child's and parent's opinions or if it is possible to determine whose perception projects reality more (188). By using SOHO-5 scores and the caries situation of children evaluated using dmft and PUFA values, **Ramadhani et al.**, similar to the present study, found that ECC and OHRQoL are directly proportional. In addition to that, they found that OHRQoL values were associated with the PUFA and dmft values. In addition to that, the perception of children was found less correlated than the parent's (162).

The findings of the present study related to the comparison of answers given by parents and children to the questions regarding a child's social interaction were not in agreement. Items 4 'Has your child ever avoided smiling because of the state (holes in teeth, pain) of his/her teeth?' and 5 'Has your child ever avoided smiling because of the appearance of his/her teeth?' from the questions from the T-SOHO-5 parent scale were not in agreement ($p > 0.005$) with items 6 'Have you ever not smiled because your teeth were hurting?' and 5 'Have you ever not smiled because of how your teeth look?' from the T-SOHO-5 child scale. On the other hand, agreement results of the answers given to all other questions by parents and children were statistically significant ($p < 0.05$). The reason for the different perceptions regarding the items about the social interaction of children from T-SOHO-5 parent and T-SOHO-5 child were discussed in different studies as well. **Eiser et al.** stated that for physical activities, items related to daily functions and oral symptoms, parents' perceptions meet the children's perceptions, on the other hand, for the social and emotional status they say that parents' perceptions are inadequate to be reliable (189). With a verifying perspective, **Gao et al.** described that parents have a restricted amount of knowledge about their child's emotions and feelings regarding their appearance or feeling of pain (161).

Fernandes et al. (2015) carried out a similar study to compare the correlation and conduct a comparative analysis of the ECOHIS and SOHO-5 scales. They evaluated the distinguishing ability of the measurements ECOHIS and SOHO-5 of the preschool children's caries severity. Different from ours, in their study group they divided participants according

to their caries severity. As a result, only the SOHO-5 child version was found not to be able to distinguish the children with or without caries (163).

Limitations

Some limitations were faced during the study, first one was the sampling being from a population from a faculty-based paediatric dental clinic which may not present all children of a population in a country. Therefore, the prevalence of oral impacts is presumed to be different in the general population. The study was carried out in a group of children whose parents demanded an expert opinion for examination or treatment, thus dmft and ICDAS values reflecting the oral health of the children evaluated might have a higher ECC prevalence than general Turkish preschool children as stated before. This limitation can be overcome by sampling from a different environment or with dental screening programmes.

Due to the study design, the OHRQoL scales had one chance to be administered which did not let randomization between the scales. The parental response was evaluated with a form of 20 questions (Appendix D and the parent part of Appendix E) T-ECOHIS and T-SOHO-5 parent together. We did not randomly mix the order of the scales for parental self-report which can be considered a limitation. To overcome this, administrations of the scales could have been done separately, giving a time interval in between. But studies comparing the scales on different administrations commented that this application is viable to recall bias (176).

For the evaluation of the effect of ECC on the OHRQoL of children, the age span of the participants is young for self-evaluation as discussed before. Although, SOHO-5 enables children's perspectives to be verified with their parents, as proxies' opinions' reflection of the reality is debatable. A limitation is caused by the proxy reports of t- SOHO-5 and T-ECOHIS. To standardise the relation of the proxy to the child some studies elaborated the questioning the nature of their relationship. Some studies evaluated if the parent's questionnaire was filled by the father, mother or together. This application depends on the idea that the depth of the mother and father's awareness of agreement with the child's opinion may be different. Nor the time they spend together with the child may have a greater impact, regardless of the gender of the parent. In this study mothers and fathers were allowed to be proxies but the frequency is not known, despite some studies (149). Although *Duangthip et al.* evaluated the sex of the proxy in their study, they did not find any effect on the child's OHRQoL. On the other hand, by evaluating the association between a child's

sex and families' parental distress, they found that parents who have a boy had a higher family impact (149).

The study group was estimated to be at least 77 child-parent couples and for the adaptation process, a pilot study of 20 child-parent couples was decided to be included. The Cronbach -alpha values for the pilot test group and T-ECOHIS Total, T-ECOHIS FIS and T-ECOHIS CIS were satisfactory. Despite the number of participants included (n=86) were greater than the required amount, the Cronbach-alpha values were calculated as T-SOHO-5 Parent = 0.65 and T-SOHO-5 Child =0.67. Thus, test-retest calculations could not be done which is considered a limitation of the study. With a greater sample size, and Cronbach alpha values greater than 0.7, further evaluations could be done.

Unmeasured oral conditions besides ECC that may affect the OHRQoL of children should be further explored. In the study, there were 3 children with a dental trauma history and 2 children with oral habits. 10 children stated that had trouble speaking at least one time (Table 12). Children with missing or extracted maxillary or mandibular anterior incisors (Table 9) or with great mobility may also cause speaking alterations. A greater sample size and elaborate orthodontic examination, like other studies (7,153), are needed to evaluate the children having a hard time speaking or pronouncing. With more detailed questioning and elaborate examination this limitation can be overcome in future studies.

6 CONCLUSIONS

1. According to the findings of the present study, increased number of dental caries due to ECC is associated with more affected OHRQoL of children and their families. Statistically significant correlations were estimated between dmft values and T-ECOHIS ($p=0.002$), T-ECOHIS child impact section ($p=0.002$), T-ECOHIS family impact section ($p=0.020$), T-SOHO-5 parent ($p=0.029$) and T-SOHO-5 child ($p<0.001$). The hypothesis of the study was accepted.
2. The effect of ECC on the OHRQoL was proved with two different measurements T-ECOHIS and T-SOHO-5, regardless of any sociodemographic background factors ($p>0.05$).
3. The translation process of the SOHO-5 scale into Turkish language proved to be successful. The translated version of SOHO-5 showed reliable results also verified with answers given to T-ECOHIS, depending on the level of agreement between T-ECOHIS and T-SOHO-5 parent ($p<0.05$). T-SOHO-5 was determined as a valid tool to assess the OHRQoL of preschool children. The null hypothesis (H_0) of the study was also accepted.
4. The level of agreement between T-SOHO-5 parent and child were found statistically significant ($p<0.05$) except for the items related to the child's self-esteem and appearance ($p>0.05$). This finding indicates the importance of self-assessment during OHRQoL assessments, despite the doubts regarding the lack of cognitive development and comprehension skills of preschool children.
5. OHRQoL measurements can be used in masses to reach out and eliminate the children having ECC in need fast and cost-free. This study enables a new instrument, T-SOHO-5, to be used in Türkiye, based on children's perspectives about how their OHRQoL is affected. It is easy to comprehend for preschool children and be applied by preschool teachers as a tool used as a caries risk prediction model.

This is the only study to evaluate the association of ECC and preschool children's OHRQoL based on their self-report using two different scales in Türkiye, which is considered a strength. Depicting the consequences of ECC on patients from first-hand opinion is valuable data as discussed before. Further research with a greater sample size is needed where a control group can be constructed, the oral examination was incorporated with elaborate data discriminating the other factors affecting OHRQoL of children, and related risk factors are investigated with longitudinal studies.

The outcomes of this study will be an elaboration on OHRQoL measurements because there is still a need for much more clinical information to gather to contribute to the knowledge and clinical practice in Paediatric Dentistry. With the outcomes achieved by this study, it can be shown that poor oral health has a substantial impact on the quality of life and the well-being of children. The conclusions would likely lead to consideration of early childhood caries as an important public health issue and have an influence on the allocation of resources toward treating and preventing oral ill-health on a country basis.

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8 APPENDICES

8.1 APPENDIX A: Ethical Approval


T.C. YEDİTEPE ÜNİVERSİTESİ

Sayı : 37068608-6100-15- 2141

Konu: Klinik Araştırmalar
Etik Kurul Başvurusu hk.

06/05/2021

İlgili Makama (Dilek Düzenli)

Yeditepe Üniversitesi Diş Hekimliği Fakültesi Çocuk Diş Hekimliği Prof. Dr. Senem Selvi Kuvvetli'nin sorumlu araştırmacı olduğu, Dr. Öğr. Üyesi Derya Tabakçılar'ın yardımcı araştırmacı olduğu **"Evaluation Of Oral Health Related Quality Of Life In Preschool Children With Early Childhood Caries"** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KA EK) Başvuru Dosyası (2176) kayıtlı Numaralı KA EK Başvuru Dosyası, Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **05.05.2021** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isim belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (**KA EK Karar No: 1437**)

Prof. Dr. Turgay ÇELİK

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurul Başkanı

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8.2 APPENDIX B: Oral Health Assessment Form

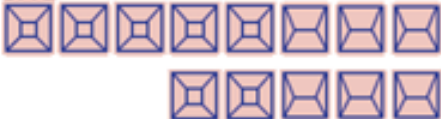
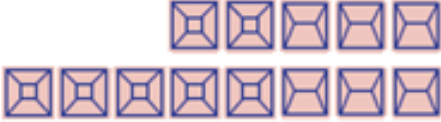
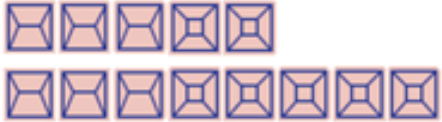
 YEDİTEPE ÜNİVERSİTESİ DİŞ HASTANESİ	Ağız Diş Sağlığı Durum Formu Doktora Tez Çalışması Çocuk Diş Hekimliği Ana Bilim Dalı	Protokol: Tarih:
--	---	--------------------------------

Hasta Adı/Soyadı:

Veli Adı/Soyadı:

Doğum Tarihi:

Aşağıdaki diş şemasında görülen diş numaralarını altında (alt çenede) ve üstündeki (üst çenede) boşluk alana ilgili ICDAS kodunu yazınız. Çürük yüzeyleri karalayınız. Sürmüş dişlerin altına nokta koyunuz.

SAG 	SOL 
	

|

Toplam Diş Sayısı:

dmft*:

*dmft: Çürük, Çekilme, Dolgu Sol Diş Sayısı

Araştırma Yürütücüsü: Dt. Dilek DÜZENLİ – 0532 5774377

8.3 APPENDIX C: Sociodemographic Information Form

 YEDİTEPE ÜNİVERSİTESİ DİŞ HASTANESİ	Sosyodemografik Bilgi Formu Doktora Tez Çalışması Çocuk Diş Hekimliği Ana Bilim Dalı	Protokol: Tarih: Sayfa: 1/1
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Hasta Adı/Soyadı: _____

Doğum Tarihi: _____

Çocuğın cinsiyeti:

1. Erkek
2. Kız

Çocuğın kardeş var mı?

1. Hayır
2. Evet

Annenin eğitim durumu?

1. Okur yazar değil
2. İlkokul mezun
3. Ortaokul mezun
4. Lise mezun
5. Üniversite/teknik okul mezun
6. Yüksek lisans/doktora sahibi

Babanın eğitim durumu?

1. Okur yazar değil
2. İlkokul mezun
3. Ortaokul mezun
4. Lise mezun
5. Üniversite/teknik okul mezun
6. Yüksek lisans/doktora sahibi

Çocuğunuz düzenli olarak diş fırçalamıyor mu?

1. Hayır
2. Evet

Çocuğunuz ne sıklıkta diş fırçalıyor?

1. Günde 1'den daha az
2. Günde 1 kez
3. Günde 2 kez veya daha fazla

Çocuğunuzun daha önce diş doktoruna götürülmesi mi?

1. Hayır
2. Evet ise sebebi aşağıdakilerden hangisidir?
 - a. Kontrol amaçlı
 - b. Diğinde ağrı yapmasa da görsel görülen çürük sebebiyle
 - c. Aza cema hissedilen diş ağrısı sebebiyle
 - d. Dinmeyen çok şiddetli ağrı sebebiyle
 - e. Ewalılamayan kötü alışkanlıklar
 - f. Dişleri yamalı veya sarkık görüldüğü için ileride tel talebdir endişesi

8.4 APPENDIX D: Turkish Version of the Early Childhood Oral Health Impact Scale (Erken Çocukluk Çağı Etki Skalası) (T-ECOHIS)

 YEDİTEPE ÜNİVERSİTESİ DİŞ HASTANESİ	Ağız Diş Sağlığı ile İlişkili Yaşam Kalitesi Ölçütü Doktora Tez Çalışması Çocuk Diş Hekimliği Ana Bilim Dalı	Tariki: Hasta Adı Soyadı: Sayfa: 1/3
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Lütfen, aşağıdaki soruları her biri için, çocuğunuzun ne sıklıkla deneyimlediğini en iyi tanımlayan yanıt seçeneğini yuvarlak içine alarak işaretleyiniz. Her sorunun cevaplarını, çocuğın doğumdan itibaren ne kadar olan tüm yaşamını dikkate alınız.

- 1) Çocuğunuzun dişlerinde, ağzında veya genelinde ne sıklıkta ağrı oldu?
 0. Hiç
 1. Neredeyse hiç
 2. Arasıra
 3. Genellikle
 4. Çok sık
 5. Bilmıyorum
- 2) Çocuğunuzun diş problemleri ve tedavileri nedeniyle, ne sıklıkta sıcak ve soğuk içecekleri içmede zorluk yaşıadı?
 0. Hiç
 1. Neredeyse hiç
 2. Arasıra
 3. Genellikle
 4. Çok sık
 5. Bilmıyorum
- 3) Çocuğunuzun diş problemleri ve tedavileri nedeniyle, ne sıklıkta bazı yiyecekleri yemede zorluk yaşıadı?
 0. Hiç
 1. Neredeyse hiç
 2. Arasıra
 3. Genellikle
 4. Çok sık
 5. Bilmıyorum
- 4) Çocuğunuzun diş problemleri ve tedavileri nedeniyle, ne sıklıkta herhangi bir kelimeyi söylemede zorluk yaşıadı?
 0. Hiç
 1. Neredeyse hiç
 2. Arasıra
 3. Genellikle
 4. Çok sık
 5. Bilmıyorum
- 5) Çocuğunuzun diş problemleri ve tedavileri nedeniyle, ne sıklıkta kireç, aşıakutisi veya ağız hijyeni gıdemedi?
 0. Hiç
 1. Neredeyse hiç
 2. Arasıra
 3. Genellikle
 4. Çok sık
 5. Bilmıyorum

- 6) Çocuklarınız diş problemleri ve tedavileri nedeniyle, ne sıklıkta uyuyamazdı?
- Hiç
 - Neredeyse hiç
 - Ara sıra
 - Genellikle
 - Çok sık
 - Bilmiyorum
- 7) Çocuklarınız diş problemleri ve tedavileri nedeniyle, ne sıklıkta sıtırlı ve kusursuz oldu?
- Hiç
 - Neredeyse hiç
 - Ara sıra
 - Genellikle
 - Çok sık
 - Bilmiyorum
- 8) Çocuklarınız diş problemleri ve tedavileri nedeniyle, ne sıklıkta gittim semektiler ve kaıkalar almaktasınız?
- Hiç
 - Neredeyse hiç
 - Ara sıra
 - Genellikle
 - Çok sık
 - Bilmiyorum
- 9) Çocuklarınız diş problemleri ve tedavileri nedeniyle, ne sıklıkta konuşmaktasınız?
- Hiç
 - Neredeyse hiç
 - Ara sıra
 - Genellikle
 - Çok sık
 - Bilmiyorum
- 10) Çocuklarınızın diş problemleri ve tedavileri nedeniyle, siz veya diğer aile bireyleri ne sıklıkta rahatsız oldu?
- Hiç
 - Neredeyse hiç
 - Ara sıra
 - Genellikle
 - Çok sık
 - Bilmiyorum
- 11) Çocuklarınızın diş problemleri ve tedavileri nedeniyle, siz veya diğer aile bireyleri ne sıklıkta kendilerini rahatsız hissetti?
- Hiç
 - Neredeyse hiç
 - Ara sıra
 - Genellikle
 - Çok sık
 - Bilmiyorum

12) Çocuklarınızın diş problemleri ve tedavileri nedeniyle, siz veya diğer aile bireylerinizin sıkıntı yaşamadan izin aldı?

- 0. Hiç
- 1. Neredeyse hiç
- 2. Ara sıra
- 3. Genellikle
- 4. Çok sık
- 5. Bilmiyorum

13) Çocuklarınızın diş problemleri ve tedavileri nedeniyle, siz veya diğer aile bireylerinizin maddi problemleri oldu?

- 0. Hiç
- 1. Neredeyse hiç
- 2. Ara sıra
- 3. Genellikle
- 4. Çok sık
- 5. Bilmiyorum

8.5 APPENDIX E: Turkish Version of The Scale of Oral Health Outcomes for 5-year-old (5 Yaş için Ağız Sağlığı ile İlişkili Yaşam Kalitesi Etki Ölçeği) (T-SOHO-5) Parent and Child Versions

 YEDİTEPE ÜNİVERSİTESİ DİŞ HASTANESİ	Ağız Diş Sağlığı ile İlişkili Yaşam Kalitesinin Değerlendirilmesi Çocuk Diş Hekimliği Ana Bilim Dalı	Hastanın Adı Soyadı:
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Aşağıdaki sorular, çocuğunuzun ağız diş sağlık durumunun yaşam kalitesini hangi ölçüde etkilediğini değerlendirmek üzere size yöneltilmektedir. Lütfen, soruların her biri için, çocuğunuzun ve sizin deneyimlerinizi en iyi tanımlayan yanıt seçeneğinin yuvarlak içine alarak işaretleyiniz. Her soruyu cevaplarken, çocuğun doğumdan günümüze kadar olan tüm yaşamını dikkate alınız.

- 1) Çocuğunuz dişleri yüzünden hiç yemek yemekte zorluk yaşadı mı?
0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum
- 2) Çocuğunuz dişleri yüzünden hiç konuşmakta zorluk yaşadı mı?
0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum
- 3) Çocuğunuz dişleri yüzünden hiç oyun oynamakta zorluk yaşadı mı?
0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum
- 4) Çocuğunuz dişlerinin görünümü yüzünden hiç gülmekten sakındı mı?
0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum
- 5) Çocuğunuz dişlerinin durumu (dişindeki oyuk, ağrı) yüzünden hiç gülmekten sakındı mı?
0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum

Araştırma Yürütücüsü: Dt. Dilek DÜZENLİ – 05325774377



Ağız Diş Sağlığı ile İlişkili
Yaşam Kalitesinin
Değerlendirilmesi
Çocuk Diş Hekimliği Ana Bilim Dalı

Hastanın Adı Soyadı:

6) Çocuğunuz dişleri yüzünden hiç uyumakta zorlandı mı?

0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum

7) Çocuğunuzun özgüveni hiç dişleri yüzünden etkilendi mi?

0. Hiç
1. Neredeyse hiç
2. Ara sıra
3. Genellikle
4. Çok sık
5. Bilmiyorum

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Araştırma Yürütücüsü: Dt. Dilek DÜZENLİ – 05325774377

 YEDİTEPE ÜNİVERSİTESİ DİŞ HASTANESİ	Ağız Diş Sağlığı ile İlişkili Yaşam Kalitesi Ölçeği Doktora Tez Çalışması Çocuk Diş Hekimliği Ana Bilim Dalı	Tarih: Hasta Adı Soyadı: Sayfa: 1/2
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Birazdan soracağım her soru için sana üzerinde 3 tane yüz ifadesi olan bir kart göstereceğim. Hiç zorlanmadıysan gülen yüzü, biraz zorlandıysan ifadesiz yüzü, zorlandıysan üzgün yüzü seçebilirsin. Dişlerinle ilgili hissettiğin duyguyu en iyi gösteren yüz hangisi bilmek istiyorum.

- 1- Dişinde rahatsızlık hissettiğin için yemek yemekte zorlandığın oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez
- 2- Dişinde rahatsızlık hissettiğin için bir şeyler içmekte zorlandığın oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez
- 3- Dişinde rahatsızlık hissettiğin için konuşmakta zorlandığın oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez
- 4- Dişinde rahatsızlık hissettiğin için oyun oynamakta zorlandığın oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez
- 5- Dişin acıdığı için gülemediğin oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez
- 6- Dişinin görüntüsü yüzünden gülmekten çekindiğin oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez
- 7- Dişinde rahatsızlık hissettiğin için uyumakta zorlandığın oldu mu?
 - a. Hayır
 - b. Bazen
 - c. Çok kez

Araştırma Yürütücüsü: Dt. Dilek DÜZENLİ – 0532 5774377



A



B



C

8.6 APPENDIX F: Items of The Scale of Oral Health Outcomes for 5-year-old Parent and Child Versions (in English and Turkish)

Cons	Original Questions of SOHO-5 Parents (Eng)	Questions in Turkish
1	Has your child ever had any difficulty eating because of his/her teeth?	Çocuğunuz dişleri yüzünden hiç yemek yemekte zorluk yaşadı mı?
2	Has your child ever had any difficulty speaking because of his/her teeth?	Çocuğunuz dişleri yüzünden hiç konuşmakta zorluk yaşadı mı?
3	Has your child ever had any difficulty playing because of his/her teeth?	Çocuğunuz dişleri yüzünden hiç oyun oynamakta zorluk yaşadı mı?
4	Has your child ever avoided smiling because of the appearance of his/her teeth?	Çocuğunuz dişlerinin görünümü yüzünden hiç gülmekten sakındı mı?
5	Has your child ever avoided smiling because of the state (holes in teeth, pain) of his/her teeth?	Çocuğunuz dişlerinin durumu (dişindeki oyuk, ağrı) yüzünden hiç gülmekten sakındı mı?
6	Has your child ever had difficulty sleeping because of his/her teeth?	Çocuğunuz dişleri yüzünden hiç uyumakta zorlandı mı?
7	Has your child's self-confidence ever been affected because of his/her teeth?	Çocuğunuzun özgüveni hiç dişleri yüzünden etkilendi mi?

Parent Answers in English	Parent Answers in Turkish
Not at all	Hiç
A little	Neredeyse Hiç
Moderate	Ara Sıra
A lot	Genellikle
A great deal	Çok sık
Don't know	Bilmiyorum

C1	Original Questions of SOHO-5 Children (Eng)	Questions in Turkish
1	Has it ever been hard for you to eat because of your teeth?	Dişinde rahatsızlık hissettiğin için yemek yemekte zorlandığın oldu mu?
2	Has it ever been hard for you to drink because of your teeth?	Dişinde rahatsızlık hissettiğin için bir şeyler içmekte zorlandığın oldu mu?
3	Has it ever been hard for you to speak because of your teeth?	Dişinde rahatsızlık hissettiğin için konuşmakta zorlandığın oldu mu?
4	Has it ever been hard for you to play because of your teeth?	Dişinde rahatsızlık hissettiğin için oyun oynamakta zorlandığın oldu mu?
5	Have you ever not smiled because your teeth were hurting?	Dişin acıdığı için gülemediğin oldu mu?
6	Have you ever not smiled because of how your teeth look?	Dişinin görüntüsü yüzünden gülmekten çekindiğin oldu mu?
7	Has it ever been hard for you to sleep because of your teeth?	Dişinde rahatsızlık hissettiğin için uyumakta zorlandığın oldu mu?

			
Child Answers in English	No	A little	A lot
Child Answers in Turkish	Hayır	Bazen	Çok Kez