

## My Tooth is Ill: (Un)Healthy Tooth Profiles among Children (Phase I and II)

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### Abstract

Dental caries has been considered a public health problem insofar as it constitutes a source of burden, pain, and aesthetics with implications for the general well-being of the individual. It is essential to understand, analyse and characterize the mental representation of children about this concept, to contribute to the (re)conceptualization of oral health education in terms of the aetiology of caries. Two studies (Phase I and II) were carried out with the aim of characterizing the mental representation of an (Un) Healthy Tooth, associated with the concept of dental caries mentally internalized by children. This paper presents the results of an exploratory study divided into two distinct phases (Phase I: n = 880/4 - 9 years; Phase II: n = 812/6 - 12 years) that involved a total of 1692 children, recruited at the schools of the municipality of Lisbon and at Egas Moniz University Clinic. Data was collected for two moments: M1, where the child was asked to draw a healthy tooth on a sheet of paper and M2, where the child was asked to draw an unhealthy tooth on another sheet using only a pencil of graphite, totalling 3384 drawings. Subsequently, the child was asked to answer to an open-ended questionnaire, composed by three different questions, with the aim to evaluate the mental representation of the concept of: a) Dental decay, b) Healthy tooth and c) Unhealthy tooth. In the data from the content analysis of the drawings, that has been made by 4 - 12 year-old children, the symbolism category of the teeth that were drawn, tends to increase with chronological age between 4 - 6 years old, denoting a higher frequency of an unrealistic teeth category, drawn from phase I to phase II, and at the same time from 10 years old onwards there is a marked decrease in this pictorial (Un)Realism. Most children in both phase I and phase II associate a healthy tooth with a clean tooth with a smooth surface; In contrast, to the mental representation of an unhealthy tooth in both phases, in which the caries category is represented at the level of the categories: Stains, fractures and cavitation. Analysis of the pictorial contents of the drawings made by the participating children denotes significant discrepancies, inherent to the illustration profiles of healthy tooth versus unhealthy tooth. Such discrepancies bear implications at the level of oral health promotion and prevention, suggesting the need to create ludic-pedagogic instruments for oral health education in very early development stages.

**Keywords:** Oral Health Education; Drawings; Dental Decay; Healthy Tooth; Unhealthy Tooth; Mental Representation

### Introduction

Since dental decay is an aetiological source of worry and has been considered as a relevant public health problem, because constitutes a source of discomfort, pain and aesthetics with implications for the general well-being of the individual and sometimes configured as a chronic disease [1-6], with multifactorial aetiology that affects every age group through the course of a lifetime. However, it is during

childhood, that a concern with the eruption of deciduous tooth is triggered [5,6]. In 2016, a descriptive study was made to determine the representation profile of a (un) healthy tooth, associated with the concept of dental decay, with the objective to determine, through drawings content analysis, children's internalized mental representations of a (un) healthy tooth profile. So, the pictorial representation of healthy tooth is mainly suggestive of a clean tooth, suggesting that children cognitively perceive and/or associate a clean tooth to a healthy tooth. On the other and in pictorial representations of unhealthy tooth the drawing of the tooth is soiled by the presence of holes/cavities and lines/stains, with fillings (underlined in graphite) and fractures. So, it is important to recognize the mental representation of children about the internalized concept of tooth decay to contribute to the (re)conceptualization of oral health education to the level of caries aetiology [5,7-9].

In Portugal, a study conducted in 2019, focused on the self-perception of the dental Decay in the change of Deciduous Tooth (50 Children of both genders, aged 5 - 12 years), caries does not appear to be associated with the loss of deciduous tooth [7]. However, it was observed that the subjects represent caries mostly using bugs in the subcategory animals and bugs, of the teeth's drawings. In the same way, Dental Decay when depicted alone was rather represented with cellular contours and with the presence of flagella, which points to a mental representation (imago) associated with bacteria and microorganisms [7,10,11]. In another study [9] focused on the content analysis of anthropomorphized drawings - The anthropomorphized Emotional profile of a (Un) healthy tooth - namely of human teeth, in particular on what was children's mental representation of the image of healthy tooth and of an unhealthy tooth, the mental representation of an unhealthy tooth has been drawn with eyes (97.2%), a sad smile (95%), nose (8.3%), neutral smile (7.6%), eyebrows (4.2%) and tears (12.7%). According to the results of the study named bug and the bacteria; are these the unique mental representation of tooth decay? [11], the subcategory stain (dark spot) was the most associated with dental caries and the predominant age of respondents in this subcategory were 10-year-olds. Extra drawings such as thermometer, ice bag and bandages seem to be drawn in association with the treatment of an unhealthy tooth. Animals and bugs, as well as stink, were represented more frequently because they may be associated with a consequence of dental decay or as being the caries itself [6,11-14].

The use of drawing as a projective technique constitutes an instrument of choice in these empirical projects, assuming itself as a research methodology that has proven to be remarkable in the field of studies in the area of health sciences and social and behavioural sciences, namely, with children of preschool and school age [5-7,9,11,14,15]. The task of drawing freely thus allows the child to refer their psychic functioning to the free movement of their symbolic thinking, allowing them to access their own conflicts, motivations, and aesthetic representations that populate their thinking [16-20]. Drawing as a projective and playful instrument surpasses the mental replica of a mere visual image, as it constitutes a product that has already been the target of an internal interpretation of the external world [21] and manages to overcome the limitations imposed by the acquisition of written and spoken language [16].

Dental caries, when untreated, have a significant impact on the child's quality of life. Dental pain is one of the main consequences of dental decay and influences oral health self-perception and fear associated with a dentist appointment. However, these aspects should be introduced into a child's life at an early age, especially once they represent the starting point for good choices in adulthood [19,22,23].

Two studies (Phase I and Phase II) were carried out with the aim of characterizing the mental representation of an (Un)healthy tooth, associated with the concept of dental caries mentally internalized by children. It is essential to understand, analyse and characterize the mental representation of children about these concepts, to contribute to the (re)conceptualization of oral health education in terms of the aetiology of caries.

This article presents the results of an exploratory study divided into two distinct phases - Phase I (n = 880/4 - 9 years) and - Phase II (n = 812/6 - 12 years), that involved a total of 1692 children, recruited at the Schools of the Municipality of Lisbon and at Egas Moniz University Clinic.

### Materials and Methods

#### Participants

This article presents the results of an exploratory study divided into two distinct phases - Phase I (n = 880/4 - 9 years) and - Phase II (n = 812/6 - 12 years), that involved a total of 1692 children, recruited at the Schools of the Municipality of Lisbon and at Egas Moniz University Clinic.

#### Instruments

The use of drawing as a projective technique has revealed to be of great use on accessing children's perceptions and experiences regarding general health and oral health issues [5,7,17,20]. Moreover, drawings can be used with children of all ages, it is a familiar task in the child's life and is a form of non-verbal communication that does not require an immediate response, giving the child the opportunity to deliberate on it [18].

In phase I (4 - 9 years), the content analysis (Grid) of the collected drawings (N = 1760) was scrutinized according to nine categories: appearance, figure design, investment, number of teeth, size, perspective, shape, fill and anthropomorphization. However, the original pictorial content analysis grid was modified from phase I to phase II, according to the evolving needs of the empirical study, not only with regard to the floating analysis of the drawings collected in phase II, but also in relation to the readjustment of the objectives and theoretical support model of the study; Namely, the categories figure design and investment were replaced respectively by symbolism and detail, while the categories fill and shape were indirectly absorbed by other categories.

In phase II (6 - 12 years), the content analysis of the collected drawings (N = 1624) was scrutinized according to the changes made to the grid, maintaining, however, a total of nine categories: appearance, symbolism, perspective, detail, number of teeth, presence of fractures, stains, cavitations and anthropomorphization.

#### Procedures

This study combined a qualitative methodological strategy with quantitative parameters at the level of the research analytical model. Data was collected for two moments: M1, where the child was asked to draw a healthy tooth on a sheet of paper and M2, where the child was asked to draw an unhealthy tooth on another sheet using only a pencil of graphite, totalling 3384 drawings. Subsequently, the child was asked to answer to an open-ended questionnaire, composed by three different questions, with the aim to evaluate the mental representation of the concept of: a) Dental decay, b) Healthy tooth and c) Unhealthy tooth. In case of doubt about any graphic component drawn by the subjects, the researcher questioned the subjects and proceeded with their written subtitling.

Quantitative data were analysed using SPSS (Statistical Package for the Social Sciences). All ethical issues were considered due to the sensitive nature of the detailed data, the respective informed consent, confidentiality limits, and information about the ethics and technician's impartiality. Informed consent was obtained from all tutors of the children involved in the study.

### Results and Discussion

In this work, the data from the content analysis of the drawings, made by 6 to 12 years-old (Phase I and phase II) children, clearly show a discrepancy in the level of anthropomorphized teeth (less realistic teeth) according to age groups. Anthropomorphized teeth were predominant in drawings performed by children till 10 years of age (24.7%). In fact, the healthy tooth was associated with positive emotions, namely by the representation of a happy smile (Figure 1). Contrary, the unhealthy tooth presented a negative connotation, namely by the representation of physiological traits that transmitted negative emotions (Figure 2) [5,8,9,11].



Figure 1: Mental representation of a healthy tooth profile.

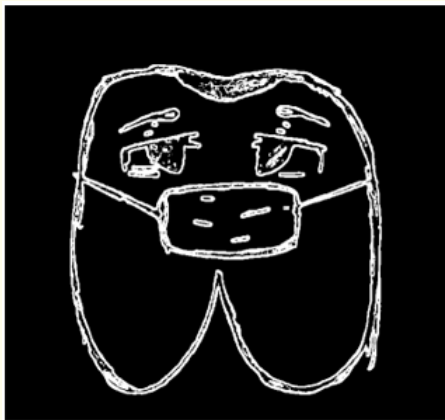
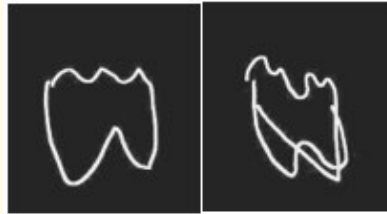


Figure 2: Mental representation of an unhealthy tooth profile.

In phase I, the unhealthy tooth has a higher percentage of styled tooth (83%) and non-invested tooth (83.3%), but regarding the design profile of a healthy tooth, we observed that the tooth-precepts drawn fit into the stylized category (82.1%) and in the non-invested subcategory (87%).

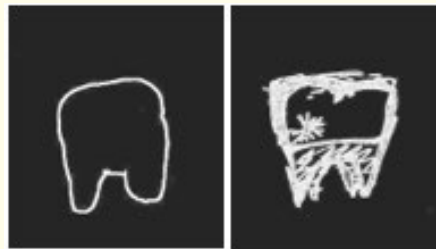
According to the results obtained in both research projects, we were able to observe that, in phase II, in the symbolism category, the profile of an unhealthy tooth has a higher percentage of at tooth that fall into the unrealistic category (18.7%) when compared to the profile of a healthy tooth (17.0%) [9].

Regarding the appearance category, Phase I - profile of a healthy tooth, we highlight in the profile obtained, a clean tooth, represented by the absence of stains, scratches, holes, fractures, and “bugs”, and is also, a tooth with smooth surfaces (73%) and mostly represented in 2D (93%) (Figure 3).



**Figure 3:** Mental representation of perspective category (Phase I).

In both phases (I and II), the stains subcategory predominates in terms of the mental representation of caries, in phase I (54.3%) and phase II (24.3%/54.4%), followed by the cavitations subcategory in phase I (21.4%) and the fractures subcategory in phase II (17.6%) (Figure 4) [5,6].



**Figure 4:** Mental representation of perspective category (Phase II).

The results clearly reveal that, from the age of 10, there is a marked decrease in pictorial irrationalism. The use of the symbolic seems to prevail, regardless of the perception drawn and follows the line of the developmental trajectory - that is, the use of pictorial realism increases with age and the use of pictorial irrationalism at the drawing level decreases, as realism pictorial evolves with the age variable [9].

In the context of the profile of the mental representation of the unhealthy tooth (Phase I) at the level of the detail category, most respondents (63.4%) represent the healthy tooth with associated details (Figure 5).



**Figure 5:** Mental representation of detail category - unhealthy tooth (Phase I).

In the representation of the unhealthy tooth (Phase II) at the level of the detail category, many respondents represent the unhealthy tooth with associated details (53.9%) (Figure 6). It is worth noting that the 10-year-old respondents (Phase II) mostly represented the details in the profile of a healthy tooth (11.2%) (Figure 7).



Figure 6: Mental representation of detail category - Unhealthy tooth (Phase II).

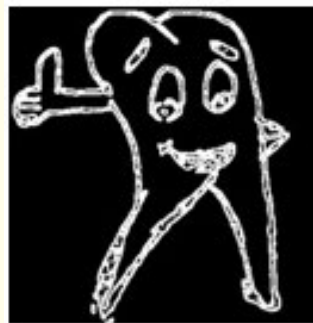


Figure 7: Detail category - Healthy tooth (Phase II).

Regarding the tooth size category, the results vary between large, normal and small sized tooth, in both phases (I and II) and the vast majority of subjects (43.7%) drew a normal tooth, followed shortly by the subjects (32.2%) who drew a large tooth and 23.9% of the total sample who drew a small tooth (Figure 8). In this line of recording, curiously, when we reflect on the age variable of the respondents, it is the subjects who belong to the 6-year-old age group (1.3%), those who least drew a large tooth (Figure 9), thus seeming to coincide with the mental representation of the change in deciduous tooth at the level of the developmental trajectory of the latency age [7,12].

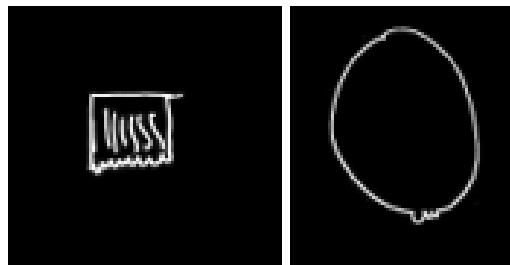


Figure 8: Mental representation of size tooth category - small subcategory (Phase I).

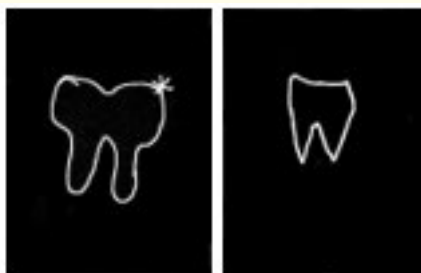


Figure 9: Mental representation of size tooth category - large subcategory (Phase II).

In phase I, respondents assumed that a healthy tooth was above all a clean tooth, represented at the level of the drawn percept, with the absence of stains, scratches, holes, fractures and “bugs”. The healthy tooth is also assumed to be a tooth with a smooth surface (73.2% of children in the 8 - 9 age group), being designed, mostly, by the age range of children aged 9 years, with a root (59%) (Figure 10), represented in a single dimension - 2D (93% of children - 8 A), also verifying, in the majority of percepts drawn, the absence of props (extra drawings) added [5].



Figure 10: Mental representation of an healthy tooth profile - root subcategory (Phase I).

In the same line of recording, the majority of children surveyed in phase II, associate a healthy tooth with a clean tooth and a smooth surface, with only a small percentage of respondents who represented the subcategories stains, fractures and cavitations being recorded. However, some children do not necessarily seem to associate stains or fractures with an unhealthy tooth, or dirt (Figure 11) [6].

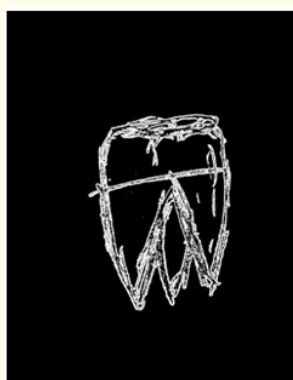


Figure 11: Mental representation of an healthy tooth profile - stains/fractures subcategory (Phase II).

In the symbolism category, the profile of the unhealthy tooth has a higher percentage of unrealistic teeth drawn (18.7%). In the tooth appearance category, in phase I (4 - 9 years), respondents represented a single tooth 77.1% (represented by 46.3% of children aged 8 - 9 years), of normal size (45.6%) (Figure 12). The tooth is anatomically anthropomorphized (Figure 13), and portrayed as an emotionally “Sad tooth”, with a sad (16.1%) or neutral (7.60%) smile.



**Figure 12:** Mental representation of a symbolism category - realistic subcategory - Unhealthy tooth (Phase I).

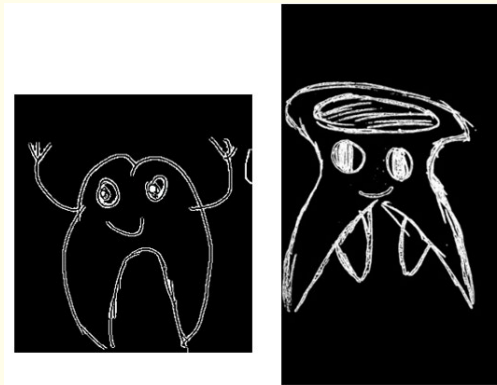
On the profile of a healthy tooth (Phase I /4 - 9 years), the drawings of the tooth precepts, was mostly stylized (82.1%) and not invested (87%). In the profile of a healthy tooth, a clean tooth emerges, represented by the absence of stains, scratches, holes, fractures, “bugs” and filling, it is also a tooth, mostly, with a smooth surface (73%). This suggests that children cognitively perceive and/or associate a clean tooth to a healthy tooth. The anthropomorphized symbolic representations are small (9.77%); however, the figure of the healthy tooth is portrayed with a happy face, joyful countenance, sketching the anatomic features of a human face, with eyes, a nose and a mouth (Figure 14). Anthropomorphized representations were more patent in drawings made by children who had dental appointments [5].



**Figure 13:** Mental representation of a symbolism category, unrealistic subcategory - Unhealthy tooth (Phase II).

In the profile of a healthy tooth (Phase II/6-12Y), perceptions were mostly unrealistic (18%), but most of the respondents invested in the details (63%). the tooth is drawn mostly clean, however contrary to phase I, we still find stains (0.3%) and fractures (0.1%), nevertheless, they were represented without cavitations. The anthropomorphized symbolic representations assume the value of 17.04%, however the figure of the healthy tooth is portrayed with a happy face.

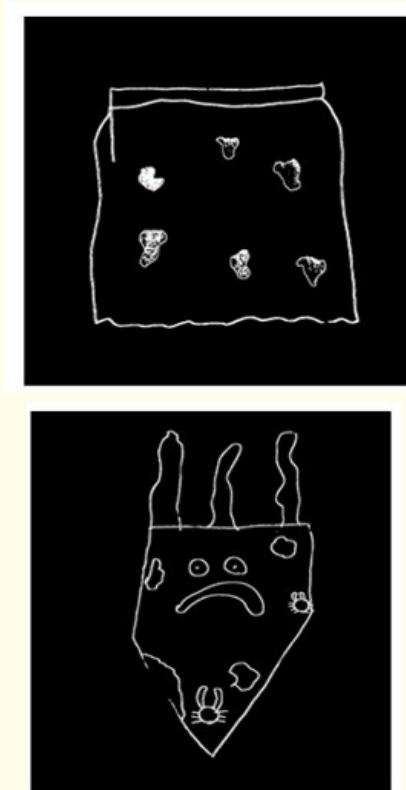




**Figure 14:** Mental representation of an healthy tooth is portrayed with a “happy face” (Phase I).

The unhealthy tooth has a higher percentage of stylized (83%) and non-invested (83.3%) tooth drawn.

In tooth appearance category, phase I, the respondents represented only a single tooth (89.8%), small in size (51.6% of which, 23.8% are 6 years old). The profile of the unhealthy tooth is anatomically anthropomorphized and portrayed as an emotionally “sad tooth” (Figure 15).



**Figure 15:** Mental representation of an anthropomorphized and portrayed as an emotionally “Sad tooth” (Phase II).

### Conclusion

In both, a healthy and an unhealthy tooth profiles (Phase I and phase II), it was possible to recognize the depiction of the emotional expression of a human face, fundamentally by the curvature drawn in the - smile category. Indeed, in the a healthy tooth profile, the smile denounced notoriously emotional traits of joy, in clear opposition to the an unhealthy tooth profile, in which tears falling down the face were highlighted, as well as sad or neutral smiles. There also seems to exist a clear fluctuation in anthropomorphizing levels according to age; Results point to an increase in subject's mental representation of reality in drawings in accordance with the child's chronological age, most significantly from 10 years and on; At this age, children seem to be able to, (re)elaborate their thinking, as well as to resort to fundamental logic. Generally, subjects categorize a healthy tooth with a well-defined outline and with white colouring, in contrast to an unhealthy tooth that seem to be perceived as decayed, presenting dental caries, stains, fractures and sometimes depicting the presence of bacteria (bugs) as well as ice bags, foul odours, hospital beds, thermometers and canes. We also noticed that children do not necessarily associate the existence of stains or fractures with a sick tooth, but unanimously in both phases of the study, children associate cavitations with an unhealthy tooth. The results obtained in these studies also highlight that the mental representations of a healthy tooth vs. unhealthy tooth, appear to be psychically internalized, at very early ages during the childhood stage.

Thus, an umbilical cord emerges in these research projects (Phase I + Phase II) that constitutes a common denominator that focuses on - the mental representation of dental decay -, having as basic support a sample of children at very early ages. Although, the two studies presented do not allow an analysis of the intraindividual changes of the participants because they allow an interindividual approach that agree to understand the changes along the child's developmental route. Such discrepancies bear implications at the level of oral health promotion and prevention, suggesting the need to create ludic-pedagogic instruments for oral health education in very early development stages.

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### Conflict of Interest

No conflict of interest.

### Bibliography

1. American Academy of Pediatric Dentistry. "Symposium on the prevention of oral disease in children and adolescents". *Pediatric Dentistry* 28.2 (2006): 96-198.
2. Calado R., *et al.* "Caries prevalence and treatment needs in young people in Portugal: the third national study". *Community Dental Health* 34.2 (2017): 107-111.
3. Frencken JE., *et al.* "Global epidemiology of dental caries and severe periodontitis-a comprehensive review". *Journal of Clinical Periodontology* 44.18 (2017): S94-S105.
4. GBD. Disease and Injury Incidence and Prevalence Collaborators. "Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the global burden of disease study 2015". *Lancet* 388.10053 (2016): 1545-1602.

5. Dias MR and Simões NP. "On the mental representation of (un) healthy tooth:(un) healthy tooth profiles among children". *Journal of Educational and Developmental Psychology* 6.1 (2016): 110-116.
6. Dias MR and Neves AC. "My tooth is ill: (Un) Healthy tooth profile among children (Phase I and II)". In Fernandes AI, Loureiro F, Almeida I, Oom M, Ramalho E, Vicente S (Eds). Abstracts Book of 6<sup>th</sup> International Congress of the Egas Moniz Center for Interdisciplinary Research, Jul 5-7, Almada, Portugal (2023): 106.
7. Do Rosario Dias M., et al. "Dental decay in change of deciduous teeth: the child's self-perception". *EC Dental Science* 18 (2019): 2214-2220.
8. Dias MR., et al. "Drawing as a process of psychic mediation along the child's developmental trajectory". *Journal of Educational and Developmental Psychology* 12.2 (2022): 57-63.
9. Dias MR., et al. "The anthropomorphized emotional profile of a (Un) healthy tooth". *European Scientific Journal* 16.26 (2020): 1-10.
10. Dias MR., et al. "My tooth is ill: about the mental representation of the concept of caries in children (phase I)". *Annals of Medicine* 53.1 (2021): S54-S54.
11. Dias MR., et al. "Bug and the bacteria: Are these the unique mental representation of tooth decay?". *EC Psychology and Psychiatry* 11.1 (2022): 8-14.
12. Dias MR., et al. "A Fada Dentinho: a auto-percepção da criança sobre a perda da dentição decidua" (no prelo).
13. Dias MR and Ventura I. "The child's self-perception about dental decay in the change of deciduous teeth". *Annals of Medicine* 53.1 (2021): S61.
14. Dias MR., et al. "Drawing as a process of psychic mediation along the child's developmental trajectory". *Journal of Educational and Developmental Psychology* 12.2 (2022): 57-63.
15. Dias MR and Neves AC. "Mente São em Corpo São: Representação Mental do Corpo Saudável e Doente na Criança". *Omnia* 4 (2016): 55-64.
16. Dias MR. "Non-verbal communication in the pediatric dentistry appointment setting". *International Journal of Developmental and Educational Psychology* 1.1 (2013): 357-365.
17. Baghdadi ZD., et al. "Children's drawing as a projective measure to understand their experiences of dental treatment under general anesthesia". *Children* 7.7 (2020): 73.
18. Christensen P and James A. "Research with children: Perspectives and practices". New York: Routledge (2008).
19. Lesmana F and Rahman YX. "Designing of the illustration book as a learning media about dental health for children ages 4-7 years". Paper presented at the 5<sup>th</sup> Bandung Creative Movement International Conference on Creative Industries (2008).
20. Pinto LM., et al. "O uso de desenhos como técnica projetiva em odontopediatria - revisão de literatura". *Revista da Faculdade de Odontologia do Porto Alegre* 61.2 (2020): 103-112.
21. Fialho O. "Desenho infantil: espelho do mundo interno da criança". Lisboa: Edições Colibri (2018).
22. Areias C., et al. "Saúde Oral em Pediatria". *Acta Pediátrica Portuguesa* 39.4 (2008): 163-170.
23. Dullaghan K. "George and the happy tooth". *Dental Nursing* 16.6 (2020): 290-291.

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