

Factors that Determine Child Behavior during Dental Treatment

SUMMARY

In this review paper we wanted to summarize all the aspects which could affect the behavior of the child patients in the dental office. At the beginning, the factors that are related to the child patients are mentioned. Various segments of child psychological, cognitive, physiological and other kinds of development are discussed. Also, the reasons for dental fear and anxiety (DFA) and dental behavior problems (DBP) were analyzed, and how the child dental patients could cope with them. Finally, types of patients according to their behavior in the dental office were discussed. Furthermore, the influences of child patients' parents were studied, including parenting styles, as well as factors related to dentist, dental team and the dental office. Finally, critical evaluation of administration of assets to measure the presence of DFA and DBP is provided. Every part of the text was corroborated by the results from our own and other authors' recent bibliography data.

Keywords: dental fear and anxiety, dental behavior problems, children, parents, dentists

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Background

Dental treatment, altogether with its characteristics, represents quite stressful act that have influence on all of its participants (children, their parents and dental health care personnel). Negative effects that could arise from it have short- and long-term consequences. Short-ones are related with immediate failures of dental treatment (its start, progress, end and prognosis), which can be corrected with additional efforts of attendees. Existence of long-term consequences in child patients is of special clinical importance. It is related with dental visiting avoiding, consecutive worse oral and total health of the patients during longer periods of time. The roots of these consequences have connection with psychological state of participants toward dental treatment. Realizing and understanding this psychological dimension is in modern (pediatric) dentistry, becoming unavoidable fact to pay attention to qualitative and complete dental treatment. Clinical appearances of this psychological entities are dental fear and anxiety (DFA) and dental behavior problems (DBP).

Factors Related to Child Patients

It is important to discuss the normal behavior and development of fears (including DFA) in child patients considering their age, learned behavior patterns and coping with stresses due to better understanding of patients' behavior during dental treatment.

Table 1 shows sequence of appearance of different fears in children from newborn/infant to adolescent period^{1,2}. It is shown that these fears, appearing in every period until start of puberty, can be directly or indirectly related to the contents of dental office (the environment, personnel, sounds, noises and smells, instruments, pain, etc.). These are exact reasons why the DFA has the most common onset in child age, developed in one of the *Rachman* mechanisms. *Liddel* and *Gosse*³ conducted a research concerning existence of unpleasant dental experiences in patients and they determined that those kinds of experiences happened in 90% of cases before 15th year of life of patients who reported experiencing of unpleasant dental situations. Similar findings reported some other studies like *Ost*⁴, *Milgrom* and associates⁵,

Locker and associates⁵, as well as our research from 2010⁶. In our recent study, the results showed the differences in child patient dental behavior regarding the stressor strength, while the patients who showed DBP verbally expressed higher levels of DFA⁷.

Table 1. Types of fears in infant, child and adolescent period

Age	Types of fears
0-6 months	loud noises; loss of physical support
6-18 months	strangers; unknown situations; separation from parents; sudden and unexpected objects
2-3 years	animals; darkness; imaginary creations
3-6 years	darkness; storms; loss of close persons; body injuries
6-10 years	school; concern; darkness; body injuries and physical danger; loneliness; insects; supernatural beings
10-12 years	socialization; physical appearance; thunders and lightning
13-18 years	socialization; rejection from surroundings; physical appearance

After the contact with the stressor in the dental office the reaction pattern appears, which could be explained as follows⁸:

- some of the children show DBP, without DFA presence;
- some of the children understand DFA, know how to handle with the stressful situations, and are without DBP;
- some of the children have DFA presence with obvious DBP.

DBP that could appear in the dental office are just the manifestation of organic reactions activated after contact with the stressful factors able to cause DFA. DBP is defined as uncooperative behavior in the dental office, which results in delaying of treatment or no doing it at all⁹. Prevalence of DBP is about 9-10.5% in child and adolescent population¹⁰. DBP represents multifactorial model composed of personal (age, gender, temperament, emotional and behavior problems, cultural inheritance, general fear and anxiety presence, etc.) and situational factors (experience of pain and unpleasantness in the dental office, lack of control, inappropriate dentist behavior, etc.)¹⁰.

In the developed stress-process, the key moment is the contact with the stressor itself in the dental office, as well as the way of individual reaction to it. This are the triggers from which it depends whether the DFA and DBP would appear in dental (child) patients. Individual reactions depend on stimulus intensity, as well as the ways of coping with stressful situations. Considering a fact that dental procedures are often stressful for children, coping with them could play important role in forming child experience in the dental office. Lazarus suggested

two main reasons why person are willing to cope with the stressor, and they are the wish for controlling and changing the situations, and managing of emotional reactions. Griffith and associates divided abilities of coping with stressors to approach based (fight solution) and avoidant based (flight solution) options. Approach based coping ability is defined as acting in the direction of attempting to change the stressful situation in order to transform it to less irritating one. More precisely, the person recognizes the stressor and uses his/her skills to decrease the negative reactions to it. On the other side, avoidant based coping option is related to responses characterized with the lack of attempts for changing situations. This is the way to miss the active participation in stressor control and management, and the focus is directed to relaxation as much far away from the stimulus¹¹.

Above mentioned coping skills in the dental office are far more different and specific from various aspects in the child and adolescent period. After first confrontation they become learned ones. The way in which the child copes with the stressor for the first time is related to individual experiences, as well as those of the parents, family and friends. It has to be emphasized that coping patterns for one stimulus do not have to suit for another one. That is why this confrontation should not be observed from general but from situational context (special for each different stressor in every single situation). Medical stimuli are specific group of stress factors. Child cognitive capabilities, emotional responses, age-specific behavior, communication skills and psychological maturity have influence to their competence to understand and adequately react on invasive medical procedures¹¹. It is also known that (younger) children are inured that their parents are struggling with the stressors instead of their offspring. However, the children are expected to cope with the medical stimuli themselves. The same case is with the dental stressors, where is determined that children developed specific coping patterns after the contact with them. These patterns are also depending from the child age and parents' influence. Recently, it is published that these DFA and DBP related coping skills could also be inheritable¹². It is also known that these ways of confrontations to stimuli are simple and unified in younger children (they are the same for almost every different stressor). With growing, they are becoming more various and specific, and also cognitively orientated, and correspond to a single stimuli or a group of them. The parents influence is in the fact where in bringing up and growing of their offspring the children learn from and imitate their parents (and also their confrontation patterns and coping skills with stressful situations, including rationalization and relaxation). It is similar but smaller influence to the children from their family members and friends. Some authors also point out that coping skills are more or less related to patient gender, socioeconomic

state of their families, previous dental experiences, kind of dental treatment, psychological state of the person, DFA presence in their parents, etc.^{11,13}.

In the next part, few studies will be presented where the models of coping patterns with medical and dental stimuli were investigated.

Versloot and associates¹⁴ defined three coping patterns: internal, external and destructive. Destructive strategies are unfavorable for dental treatment outcome (become angry, close the mouth). External strategies are about the use of some mechanical appliances or about presence of a person during confrontation with pain (outdoor, external help). Third group are strategies that need the internal help from the patient itself during confrontation with stressor. Children used the internal strategies most often than the external ones, while destructive strategies were used pretty rarely. Child patients with pain experience and DFA presence used the coping strategies more often, and those with DFA presence used internal patterns more often.

Van Muers and associates¹¹ stated that the examinees of their study used approximately 6.5 coping strategies, and the one most applied was „I'm doing what the dentist told me to“ (in 91% of cases). The children considered that the most successful strategy was „I'm telling to myself that I have to do this, because it is good for my teeth“ (in 92% of cases). Age differences in using of coping strategies were not determined. Otherwise, there were differences in the number of coping patterns between the patients with (bigger number) and without DFA presence.

Larochette and associates¹⁵ investigated face expressions in children who experienced pain, comprising 46 kinds of facial muscles movements in total. Children showed three groups of facial expressions related to the caused pain stimulus, and they were fake, real and restrained ones. Authors showed that the children were capable to control their facial expressions when they were asked to do that. However, they were more capable to hide (restrain) pain feeling than to fake it. It is also shown that the parents are able to notice fake tries of their children. Otherwise, that was not the case with real and restrained child facial expressions.

Van Wijk and *Hoogstraten*¹⁶ emphasized that the patients with DFA presence had the tendency to overestimate the pain they expected to be caused, and also to overestimate intensity of unpleasant happenings, such as fear. According to that, the patients who were predisposed to react frighteningly on pain had increased risk to end in the magic circle of anxiety, fear of pain and dental treatment avoiding. Similar findings also have *Versloot* and associates¹⁷, and they added that the memory to previous dental experiences and earlier dental treatments probably had the great influence on the child dental behavior during the next dental visits. In case that the previous dental treatments were not stressful or invasive ones, that

could lead to decreasing of showing of negative dental behaviors and also to decreasing of DFA expressions in patients with or without previous DFA presence. *Krikken* and *Veerkamp*¹⁸ stated that subjective dental experiences during treatment in the dental office were more important than objective ones for DFA development. On the other hand, *Aoyagi-Naka* and associates¹⁹ evaluated the level of psychological stress (more precisely, psychological reactions to stimuli) in patients who did not show DBP by measuring their α -amylase salivary levels before and after dental treatment. Authors determined that certain psychological reactions appear also in children without DBP expression during the process of coping with stimuli in the dental office.

*Klingberg*¹⁰ stated in her study that is very important to have in mind the child's mental development and its psychological environment during conversation. Contextually, in psychological development of a child we must observe further:

- development of speaking abilities, which also implies ability of meaningful conversation with child patient, is possible already with the age 2.5-3 years, while use of grammar, negation and other more specific language skills is establishing later; we always must have in mind to make the conversation with the patients that is adopted according their age and mental and intellectual state;
- cognitive development, which is focused to child abilities for thinking and interpretation, and also to evolution of their learning and memory strategies;
- socioemotional and psychosocial development, focused to forming child character and their sense of representing inside their families, among friends and in the society;
- child temper, defined as emotional quality that differs individually, but is relatively stable during time.

The author states that there are clinical implications related to DFA, based on child psychological development. The pain, unpleasantness and anxiety are abstract phenomena and they demand the existence of advanced deduction as to be understood. Contextually, the problem is that general emotional state is wide and complex, and could be evaluated in many different ways. Child fears are changing while children grow in that way that younger ones have more fears, which they experience more intensively and in different ways than the older ones. That is why the pediatric dentist is responsible to treat the child patients on individual basis, to develop confidence in and towards patients, and to understand fear as normal child reaction to new unknown situations¹⁰.

*Freeman*²⁰ suggests importance of investigating the role of the family, mother-child relationship, child psychological development and their life experiences in order to better understand and give the explanation why children react differently to dental treatment.

Before mentioned *Griffith's* division of coping skills implies existence of conflict in (child) dental patient regarding choice between approaching to and avoiding of the problem (approach-avoidance conflict)²¹. This model is explained in the way that two equal tendencies appear in the person as the answer to single situation. Based on this presumption, the person would like to reach the aim, and to avoid the problem at the same time. Contextually, we have the person who understands the need for dental treatment in order to have healthy teeth and nice looks, and that gives him/her motivation for dental office visits. At the same time, the same person is afraid of going to the dentist and he/she wants to avoid that experience. These two tendencies compete and create conflict in the patient. However, they are intensifying/weakening at the same time, depending on that how is person close/far away from the desired/frightened situation. Also, approaching-to-problem tendency is stronger as the person is more far away from the goal, while the situation is opposite as the person is closer to it by avoiding tendency emerging. The example for this should be getting the dental appointment. The person develops tendency of going to the dentist while the dental appointment date is far away. This tendency is strongest on the first day and weakens as the day of the dental visit is approaching. Opposite to that, the avoiding tendency, which was the weakest the first day, now intensifies (more and more) until the day of dental appointment. Based on this conflict we could divide dental patients to four categories²¹:

- apprehensive patients - this group is comprised of large number of patients who experienced some kind of DFA presence. Additionally, experienced presence of DFA is relatively moderate and does not lead to avoiding dental treatment, neither makes problems during the dental procedure itself. The fact is that DFA expression is raising as the dental appointment is closer. These patients show various coping skills during dental treatment, and are able to deal with DFA appearance and to mask its expression. Eventually they show signs of hyperactivity, curiosity or mild nervousness²¹;
- patients who are visiting the dentist, but do not like to do that - this group feels DFA presence in a stronger way, has the more intensive component of avoiding problems, which strengthens more than in the apprehensive patients when the dental visiting day is closing by. However, these patients keep their word and are regular dental attendees. During the treatment they do not cope so well with DFA presence and are not able to mask it completely. They express more nervousness, less patience and some other elements of DBP, which could affect the duration of dental treatment more often than usual²¹;
- patients who partially avoid dental visits - this group almost coincides with the previous one, except in the fact that their tendency of dental avoiding is a

bit stronger and could lead to long period of dental visiting boycotting, which could often last several years. If the DFA presence is not managed in these patients, it is hard to expect that they would become regular dental attendees. The reason is that their approaching-to-problem tendency is pretty weak and that allows them to continue to avoid visits to dental office as long as it is possible. In some moment it could happen that they get motivation for going to dentist, mostly due to forcing of some family members or due to some oral health problem. This kind of situation extends dental treatment duration due to more extensive oral pathology as well as to DFA and DBP presence²¹;

- patients who totally avoid dental visits - this group of patients avoid the dentist, no matter what is the real reason for that. The only situation when this kind of patient is in the dental office is when he/she suffers from urgent dental problem (mostly odontalgia). The avoiding tendency is so strong, and these patients would rather suffer (even if it is some kind of urgency), although the treatment would be even less painful than the problem they are scarifying for. This extreme and sometimes irrational kind of avoiding interferes normal daily functioning and could lead to emerging of dental phobia. It is very hard, and sometimes almost impossible to treat this kind of patients in the dental office. Additional reason for that is that they consider tooth extraction as the only possible dental procedure, but also try to escape from it. They easily manage to accomplish that, because they just vanish after the dental first aid is administered to them²¹.

Factors Related to Parents of the Child Patients

A qualitative relationship between the therapist, parents and the child patient should be established for a successful dental treatment. It is obvious that every member of this partnership has equal duties for fulfilling the goal of oral health preservation, as well as administering every kind of dental procedures to any dental patient. Contextually, the role of the parents will be explained, especially because it is neglected by dentists and also by the parents²².

The parents have to be aware that their actions are of the most importance and that they begin even before child birth. Future parents, especially the future mother, have to be introduced on time with the risks of cariogenic bacteria transmission to infants and also with the preventive measures administering in pregnancy and after birth. Parents also have to be motivated to

duly apply these measures. All of these precautions are important for preserving oral and milk teeth health from early days. If there were some oral health problems in these early periods of child development, dentists were often compelled to perform invasive or painful procedures mostly in preschool children in order to recover child oral health state. This early sanitation of caries and its complications is one of the main reasons for DFA appearance, which later lead to DBP in the dental office. If parents do not take aforementioned important part in a sense of long term application of preventive measures to their children, the consequent complications are more serious, the treatments are more invasive and the reasons for DFA appearance are stronger²²⁻²⁵.

Other important part that parents should take care is preparing their child for a dental treatment with agreement and advices of the dentist, especially in those children who express DBP. The methods are various, and mostly administered through the behavior and pain control management, as well as child upbringing. Sometimes this expected parents' role is durable and exhausting. Parents show resistance because they think that the dentist is the only person who will solve all their problems²²⁻²⁵.

However, it is well known that parents form their children's behavior from the moment of their birth. This fact is the basis for our expectation from parents to prepare their children for the dental treatment. During preschool development, children learn what kinds of behavior are acceptable and/or forbidden. In that upbringing process, there are four types of parenting styles. The division is formed regarding parents demands and the expected responsibilities of their children²²⁻²⁵.

Authoritative (democratic, balanced) parenting style - parents have high demands towards their children, but also show great responsibility to them. They set clear standards for their children, observe the installed boundaries and let the development of children autonomy. They expect the mature and independent age related behavior from their children. Bad behaviors are punished steadily and with consistence, without any despotism or violence. This kind of parenting style produces independent and self-confident children, who are happy, capable and successful. In the dental office they show normal child behavior. Cooperation with authoritative parents has the best results, including good preparations for dental treatment, good quality of planned treatment, as well as good long term collaboration²²⁻²⁵.

Authoritarian (totalitarian, rigorous) parenting style is characterized with high demands towards their children, without any duty for high responsibility. Parents set high expectations and also the rules without much explanation. They only expect the respect and achieving the results from their children. If expectations are not accomplished, parents tend to punish their children rather than to explain the reasons for punishment, or to analyze child possibilities and needs. Children of rigorous parents have

less self-confidence, because they are used to be told what the right choice is for them, and also how to behave. This kind of children are humble and obedient. In the dental office they mostly behave like the sustained or sometimes frightened child. Cooperation with this kind of parents can be a hard one. The reason is that they expect a lot from the others (their child, dentist) without any need for their own effort. They also consider that their own judgement is well enough for achieving of success²²⁻²⁵.

Permissive (indulgent) parenting style is characterized with high self-responsibility, but weak demands towards their children. Permissive parents are very included in their children upbringing, they do not set the boundaries and fulfill every child demand. They do not demand situational appropriate behaviors, and they let their children to do everything. Children have no reason to learn to control their behavior, and they always expect to get what they want, and also show the problems with authorities. This kind of kids behaves in the dental office in uncontrolled way. Cooperation with permissive parents can be also a hard one. The reason is that qualitative relationship with the therapist could not be established. Active parenting role could not be fulfilled because these kind of parents are not used to demand something from their child. In some moments this could lead to misinterpreting things, because it seems that they are not trying enough, and sometimes they admit to be happy if the therapist would take over the role in child preparing for dental treatment. Oral health of children of permissive parents could be pretty bad, and this hardens the planning and performing the dental treatment²²⁻²⁵.

Uninvolved parenting style shows low demands towards their children and low need for self-responsibility in offspring upbringing. The parents generally do not want to involve in their children's lives and do not set the boundaries. They also do not consider their children's opinions and feeling as important ones, and they do not offer any kind of emotional support. This kind of parenting style should be also considered as child abuse. The children of these parents show lack of self-confidence, self-control and competence related to their peers. They are able to express various forms of behavior in the dental office, including frightened, pretentious and sustained kind of patient. Cooperation with uninvolved parents is difficult, because they do not worry about what the dentist would like to achieve in the dental treatment. They think that it is well enough just to bring the child to the dental office. Oral health in these patients can be pretty bad, and together with the parenting style, additionally hardens dental treatment planning and administering²²⁻²⁵.

Considering the contextual facts, it is sometimes necessary and desirable that parent(s) be present in the dental office. This happens in the cases where they do not worsen the child behavior with their appearance, or when they influence in that way where negative behaviors could

be fixed. In this kind of situations only one parent has to be present, because presence of many persons makes the situation more difficult and also creates tendency for developing negative behaviors. If parents insist to be in the dental office, they could do that until the autonomy of the therapist and the dental team in the process would not be compromised²⁵.

Factors Related to Dentist, Dental Team and the Dental Office

The main source of all problems that cause DFA and DBP appearance are the stimuli which are /in/directly related to the dentist, dental team and dental office. The study of *Oosterink* and associates²⁶ established 67 different stressors that directly and/or indirectly contributed to the appearance and/or engendering of DFA and DBP. The main carrier of all „problems“ is the dentist itself, but the content of the dental office and other dental team members can also (sometimes) play important role in appearance and engendering of DFA and DBP.

The characteristics related to dentists are their own appearance (mostly white uniform), the way of their behavior during dental treatment, as well as paying attention to existence of a need for behavior and pain control management techniques administration in child patients during dental treatment⁷.

Appearance of the health care personnel in white uniforms has general traditional unpopular influence. The term of health is often related to providing help in situations where the body integrity has been endangered in any way, and preventive aspect ignored. The dramatic aspect of health profession is intensified, because the conditions that demand any kind of treatment (including dental one) are often complex and request complicated and pretty unpleasant interventions. That kind of choice is always selected due to more benefits (better local and general health, saved life of the patients) despite the damages that could be made in the progress. This kind of situation produces negative perception in people for not only medical but also dental profession. The reason for this could be that sometimes the prime stressful agents are the dentists themselves. Moreover, the dental practitioners consider their profession more stressful than the other avocations^{7,27,28}.

The behavior of the dentists during the treatment is something that we are paying attention in theory as well as in practice. Everyday stress that follows dental profession is quite enormous and therapists should know how to deal with, and also not to let the patients to notice that they are under its constant influence. Special category are pediatric dentists as pediatric dental practice is (among others) about to predict the unpredictable, while performing very fast and precise manipulations in a small and narrowing

oral environment. Any other kind of behavior of the dentists (except the professional one that is dictated by clinical situations) could even produce and/or engender of DFA and DBP appearance and development (for example, the fear that is present in the dentist, for any reason, inevitably leads to fear in the patient; nervous dentist could show lack of professional efficiency, which also could lead to his incompetence and mistrust by children and their parents). That is why the pediatric dentists have to be the masters of the nonverbal communication performance, and to learn how to improve the use of their body language as the asset for behavior management control in the dental office^{7,29}.

Today especially the child patients have need and every right to underwent to appropriate behavior and pain management control techniques administration during dental treatment³⁰. The dental practitioner is the only responsible person (but also the most responsible one) who has to judge properly and timely which of these methods has to be applied in the clinical circumstances, starting from everyday use of non-pharmacological methods (for example tell-show-do approach, distraction, gradual desensitization) to rarely indicated dental treatments in general anesthesia. The reasons for non-administering (or administering of wrong) behavior management techniques are in the fact that there is not enough attention directed to detection of signs of DFA and DBP presence in child patients. These failures are due to underestimation of the situation (DFA and DBP do not exist, no matter what), or opposite overestimation (every „problematic“ patient is at least a candidate for treatment under nitrous oxide sedation)^{7,31}.

Evaluation of DFA Presence Made by Child Examinees, Their Parents and Dentists (Observers)

Characteristics of DFA appearance regarding the mental maturity of the patients are various, especially in child patients. So, good evaluation of DFA presence becomes more complex. There are two ways of instruments application in studies of DFA presence in children^{32,33}:

- indirect administering, where the observation is made by dentist or other person during the dental treatment, and
- direct administering, where the child itself (or with the help of mostly the mother) uses these instruments (psychometric scales for example). Contextually there are two versions of these kind of administering of the scales, depending who is using it: the child and the parental version.

Stallings and *March*³⁴ proposed that these instruments when administered to children and adolescents should: a) allow the reliable and valid measuring of symptoms, b) make the difference between the groups of symptoms, c) evaluate the severity of appearance, d) include multiple observations, and e) be sensitive towards changes in dentistry.

Finally, these measuring instruments for evaluation of DFA presence in children are divided to instruments for evaluation of patients behavior, psychometric scales, instruments for measuring of psychological parameters and projective scales (projective techniques)³². Every kind of quoted assets has its advantages and disadvantages, and these should be evaluated properly before the application of the instruments in clinical practice⁷.

Psychometric scales: this is the most used kind of DFA evaluation assets characterized by simplicity of design and application. They comprise certain (smaller or bigger) number of stimuli for DFA and DBP appearance. Their greatest imperfection is their practical usage without certain dose of criticism. Mistakes are numerous⁷:

- non-determining the instruments for certain region of application before their usage - only after the normative values are properly determined and contextual results obtained, we would know if we do (or do not) have good assets for evaluation of DFA and DBP presence. The normative procedure is simply just like the calibration of any other measuring instrument before their first usage.
- random choosing of time and place of application (before or after the dental treatment, in the dental office, in the classroom, or in the house of examinees) - if we did not choose the place for administration for a reason, then we could not claim that the study had controlled environmental conditions. Home conditions are the most relaxed option for the examinees where the dental stressful stimuli are not present, but with possible parents influence on child judgement. School conditions are similar to previous, but also differ considering the phenomenon of a group and possible uncontrolled bias. Dental office conditions are ideal due to presence of almost all dental stimuli, but do not comprise the children who do not (in regular basis) attend there as a patients. This last alternative could lead to forming of non-representative sample.
- non-determining of age limit in children for these assets administration - depending on their age (younger!) children are not always capable to perceive and understand the things around them, nor to articulate them, neither to react to them properly. This should be under concern for children bellow 7 years of age.
- uncritical equalizing of usage of parent and child version of a scale - if it is not agreed or stated differently, it is not correct to automatically equalize the parent judgement of DFA and DBP presence

in their children with child expression and self-evaluation of the same (this parent evaluation goes from under- to over-estimation of DFA and DBP presence in child patients).

Instruments for evaluation of patients behaviors - these DFA and DBP presence evaluation assets are used by trained persons (dentists mostly), and their judgement of objective evaluation affects to measuring accuracy of observed appearances. There are tendencies for detailed categorization of patient behavior in the dental office during the treatment (from extremely positive to extremely negative behaviors), but overlapping between these categories could often occur. Also, there is not always exact set border between positive and negative behaviors, neither instructions for their administering (whether it is about general evaluation during the whole dental treatment, or only some of the parts of it; do we notify only the most negative behavior despite to its arising, duration or causes)⁷.

Instruments for measuring of psychological parameters - they occurred as an attempt for more objective judgement, and were based on proved existence of correlation between measurable indicators of body changes and reaction to stressful situations (blood pressure, pulse, amylase salivary levels, etc.). Although they were in a good way of progress in the beginnings, their practical application showed many imperfection with time. Besides economical aspects of their (non-) usage (additional space, financial and human resources are required), their administration often could cause higher levels of general fear and anxiety, with consecutive obtaining false positive results. That is why this method has more academic than practical application⁷.

Projective scales - these kind of instruments have the narrowest practical implementation due to their design. They are limited to child patients of younger ages, and have suggestive nature with in advance determined scenarios and categories of (general) psychological states. They mostly were not created precisely, with the accent to attract the targeted population⁷.

In the next final part, several studies will be presented where the parents-children relations in DFA presence evaluation were analyzed.

Luoto and associates³⁵ showed that fathers and mothers had weak knowledge about their children DFA presence, which improved as the offspring got older. On the other hand, they better recognized absence than the presence of DFA in a way that parents with DFA presence poorly recognized the same DFA presence in their children.

Gustaffson and associates³⁶ stated that results of parental and child version were in weak correlation, especially in children with DBP presence. That is why they proposed to further evaluate parents' judgement of DFA presence in their children, especially in the populations with high levels of DFA prevalence. Authors

recommended to use the child versions of the instruments as addition to parental versions.

Krikken and associates³⁷ published the results of DFA evaluation where parents overestimated tendency with the few combinations: parents of children with DFA presence under-estimated these child DFA expressions, and completely adversely in children without DFA presence; parents with DFA presence overestimated the child judgements.

De Oliveira and associates³⁸ stated that mothers considered the reasons for DBP appearance in offspring to be child temper, behavior characteristics (hyperactivity, aweness, un-secureness, nervousness, anxiety, bossing, etc.), child developmental stage, mother presence in the dental office, and simple rejection of dental treatment.

Some authors investigated judgement of patient behavior during dental treatment from the dentist itself.

Wondimu and Dahllof³⁹ determined that almost half of the children were not capable to differ between pain and unpleasantness, while one third of them thought that the children reported pain in the dental office with certain level of un-secureness. Almost 35% of the dentists showed certain stage of non-interesting to pain experiences of the patients.

Murtomaa and associates⁴⁰ showed in their study that none of the groups of dentists did routinely examined the patients before the treatment regarding the pain, but rather during the treatment. Also, none of the dentists did evaluate dental treatment procedures as particularly painful or unpleasant ones. Majority of the dentists believed to the child statements about the pain, but also did not consider them as much credible ones.

Rasmussen and associates⁴¹ claimed that only a quarter of the examinees did not consider complaints to pain of preschool children as precisely determined. 80% of them stated that they always wanted to provide completely painless treatment to their patients. Only some of them agreed that children forget pain faster than the adults. Almost 90% of the examinees said that they often or always use topical and local anesthesia during dental treatment.

Moore and Brodsgaard^{41,42} investigated reasons for different ways of evaluating DFA and DBP presence in children and adolescents that were caused by dentists. Almost 92% of dentists considered that they usually or always noticed signs of DFA presence in their patients, while only 4% of them did not want or had not chance to treat the patients with DFA presence.

Some authors also published their results considering determined correlations and differences between the parent and child evaluation of DFA presence, and the same evaluation by the dentist-observer. Klaassen and associates⁴² determined that there were no correlations in the results of evaluation of DFA and DBP presence between the parent and the dentist. Araposthatis and associates⁴³ determined the existence of statistically

significant correlations between the negative child behavior and parental evaluation of child DFA presence. Similar results were published by Yamada and associates⁴⁴ and Klingberg⁴⁵.

When we observed the DFA presence in our recent study⁷, there were statistically significant differences and correlations in the judgement of DFA and DBP presence between these three kinds of observers. The differences were determined between the child examinees and their parents (higher scores) and between the same examinees and the dentist (higher scores). On the other hand, statistically significant correlation in judgement of DFA presence was found between the all of three observers (the child examinees, their parents and the dentist). The correlation was the smallest and quite weak in the judgement between the children and their parents, while parents overestimated evaluation of their children. Correlation between child examinees and the dentist was quite higher and the best between the parent and the dentist. The thing was the same with analysis of measure of agreement values⁷.

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