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Use of Emoji in Pain Level Assessment in Pediatric Dental Patients

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Use of Emoji in Pain Level Assessment in Pediatric Dental Patients

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Dentistry at Virginia Commonwealth University.

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Abstract

USE OF EMOJI IN PAIN LEVEL ASSESSMENT IN PEDIATRIC DENTAL PATIENTS

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Purpose: The purpose of this study is to determine the efficacy of a pain scale with Emoji images in comparison to the commonly used Wong-Baker FACES® pain scale.

Methods: Healthy, English-speaking patients aged 4-17 presenting to the VCU Pediatric Dental clinic and the operating room and presenting to the MCV Pediatric Emergency Room were asked to rate their pain using the Wong-Baker FACES® and Emoji scales. These patients were then asked to select which pain scale they preferred.

Results: A total of 151 children were enrolled in the study. The proposed Emoji scale was preferred by 86% of enrolled children (n=151). Children rated their pain the same on the two scales 78% of the time indicating a weak overall agreement between the two scales as defined by Cohen's Kappa (k=0.5863, 95% CI: 0.47-0.70). In the instances of disagreement, 82% were within one image on the pain scale. There was a roughly even split between which scale corresponded to the higher pain level (56% Wong-Baker was higher and 44% Emoji was rated higher).

Conclusions: A majority of the patients surveyed presented with no pain. The Emoji scale showed moderate agreement with the Wong-Baker FACES scale. A majority of the patients preferred the Emoji scale demonstrating the strong communicative utility of Emoji.

Introduction

As one of the most common manifestations of oral disease, pain is something both dentists and our patients are very much familiar with. A multitude of factors, including physiology, psychology, development and behavior, influence a patient's ability to convey their pain sensation. While adults are able to describe the history and severity of their pain with relative ease, pain assessment is more of a challenge in pediatric patients. As a result, pain is often underestimated in children and therefore mistreated.[1,2]

There is enough of an understanding of the developmental and psychological stages of children to be able to determine the types of assessment tools and strategies to implement for various patients. Pain scales for neonates, infants and toddlers up to three years of age rely heavily on provider observations to determine pain levels. By four years of age, there is more of an expectation for the child to be able to report their pain level- with the assistance of various 4-5 item pain scales. The most common of these is the Faces or Wong-Baker FACES® pain scale.[1]

As one of the oldest forms of communications, drawings are a useful tool for children to express their emotions with adults. With the advent of the internet and the globalization of communication, pictograms have taken on an unprecedented significance in the form of Emoji. In 2015 the Oxford dictionary selected the "Tears of Joy" Emoji as their word of the year. [3] Modern smartphones are rapidly making Emoji a universal form of communication for people of all ages. The average age for a child getting their first smartphone is 10.3 years old and many children are familiar with the use of a smartphone by preschool-age. Children ages 3-5 are able to recognize popular Emoji and describe them accurately based off the emotions they were

intended to convey. The potential for Emoji-use in child-centered research is vast due to the ability to use Emoji as a language.[4]

Pain Prevalence

Oral pain is one of the most common reasons for presentation to a dental clinic. The prevalence of pain identified as a "toothache" amongst adult populations is between 7-32%, pain with "hot, cold or sweet things" is between 25-38%. Younger adults and individuals from lower socio-economic groups are more likely to experience orofacial pain regardless of gender.[5]

When parents are asked whether their children have ever experienced pain from toothache a 5-33% prevalence has been reported. Older children and children from lower socio-economic groups were reported to have the highest levels of pain in countries around the world. In lower socio-economic classes, a 5-6% increase in probability of toothache per deciduous tooth was reported as compared with patients with better access to care. [6]

In a study completed in schoolchildren in India aged 10-15, close to half of the patients (45.1%) had active caries and the prevalence of reported dental pain was 35% with 11.7% of these children reporting severe pain. [7]

The prevalence of dental pain in both adult and child populations is significant, especially amongst patients of lower socioeconomic status for whom access to care is of major concern. [8] Dental caries associated with dental pain has been noted to have detrimental effects on the overall well-being of children of all ages. The eating patterns and sleep habits of younger children are directly affected leading to disruptions in their daily routines, time spent out of school leading to these children falling behind their peers physically, mentally and socially. As these children age they display signs of decreased self-esteem, decreased participation in social

activities and more missed time from school. Children with dental pain are four times more likely to have a lower grade point average than their pain-free peers. [9]

Addressing dental caries in young populations is a crucial part of maintaining their physical health and improving their chances for positive mental and social well-being as well as educational success in the long term. The average dental clinic can expect that up to a third of the patients in dental chairs might be experiencing oral pain.[6] While adults and older children are equipped with the communication skills to report and describe this pain (whether prompted or not) younger children require some assistance in reporting their pain levels.

Cognitive Development in Children

An important part of understanding how to communicate with a child is determining at what stage of their development they are cognitively capable of communication. A developmental psychologist by the name of Jean Piaget came up with a theory about the development of human intelligence.[10] This developmental stage theory involves four stages of cognitive development: sensorimotor, preoperational, concrete operational and formal operational. [11]

The sensorimotor stage ranges from birth through 18-24 months of age or “toddlerhood.” At this stage, infants are aware of and interact with only what is in their immediate vicinity. Once the milestones of object permanence and physical mobility are reached, they move onto the preoperational stage. [11]

The preoperational stage is where language development begins and matures from toddlerhood through age 7. Language use becomes more mature, children are able to think about

things more symbolically and develop memory and imagination. While able to communicate, their overall thinking is very literal and they cannot grasp complex concepts. [11]

Children aged 7-11 fall under the concrete operational stage where logical and concrete reasoning is established. At these ages children are better able to understand their own and other peoples' emotions. After 11 years of age children enter the formal operational stage at which point they are able to logically understand abstract concepts. [11]

Current Pain Scales

Keeping these developmental stages in mind there are a variety of different types of scales available to help determine pain levels in children at every stage. Figure 3 depicts the FLACC scale or the Face, Legs, Activity, Cry, Consolability scale.[12] It is used for children aged 2 months to 7 years (in the sensorimotor and preoperational stages of development) or with other individuals unable to communicate their pain. Each criteria is scored and the five criteria are added up for a total score anywhere from 0-10. This scale relies on observations of the patient made by the provider ranging from normal physical appearance, movement and communication to movements and sounds consistent with being in pain. The scoring using this scale requires no direct communication about pain by the patient themselves. [13]

The Wong-Baker FACES Pain scale (Figure 2) is commonly used in pediatric dental and medical settings for use specifically with younger children. It was developed in 1981 by a pediatric nurse consultant and a pediatrician who felt they needed a better way for children to let them know about their pain. They believed that if the children could participate in assessing their pain it would be better managed overall. They tested several different types of pain scales from cylinders with varying amounts of liquid in them to number scales to color scales. They found

that children have trouble quantifying their pain so something more visually descriptive was necessary. [14]

Their final product was based off of sketches by a 13-year-old female patient which were rendered by an artist into what you see here. This scale was the first developed specifically for children and can be used with patients aged 3 and above who would fall under the preoperational and concrete operational stages of development as well as patients who don't know how to count and patients with impaired brain function. [14]

Figure 4 shows the Visual Analog Scale for pain or the VAS pain scale. It is a continuous scale used to ask a patient's current pain intensity with zero being no pain and 10 being the worst imaginable pain. This scale is commonly used with adults who choose a number to indicate their pain level with or without the above visual aide making it easily understood by individuals in the formal operational stage of development. [15]

Pediatric Pain Assessment

In 1988, the creators of the Wong-Baker FACES® pain scale completed a study to compare the reliability, validity and preference of scales in children of different ages. In this study, 150 hospitalized children aged 3-7, 8-12 and 13-18 who were alert and not in pain were asked to list the painful events they had experienced since hospitalization from most to least painful. They were then asked to rate their pain on the simple descriptive scale, numeric scale, faces rating scale, glasses rating scale, chips scale and color scale. The results showed that children in all age groups preferred the faces scale but no scale demonstrated superiority in validity or reliability. [14]

Khatri and Kalra completed a cross-sectional study on 180 children aged 3-14 years of age in New Delhi who were asked post-extraction to rate their pain using the visual analog (VAS) scale and the Wong-Baker FACES® pain rating scale. Both scales were explained to the children with each image on the faces scale being explained individually. The results showed that pain thresholds declined with age with pain severity being highest amongst 3-6 year olds. The children also had issues understanding the VAS scale as compared to the Wong-Baker FACES® scale. The Wong-Baker FACES® scale was seen to be more sensitive as compared to the VAS scale. [16]

Garra conducted a similar study in 2009 on children aged 8-17. One hundred and twenty children presenting to the emergency department were asked to rate their pain using the Wong-Baker FACES® scale and the VAS scale. The patients were first shown only the Wong-Baker FACES® scale and each face was explained before the patient was asked to rate their pain. The VAS scale was then presented separately as to prevent the patient from comparing scales. The VAS was found to have a higher correlation with acute pain in older children and an increasing relationship with WBS implying that the Wong-Baker FACES® is a valid assessment tool. [17]

Emoji

Emoji or "picture word" were developed in 1997 by Shigetaka Kurita, a Japanese telecom company employee. Originally targeted for teenagers, Emoji were quickly seen as a mechanism with which to provide context and emotion that crossed the boundaries of language. Emoji were released on Apple's iOS5 in 2011, marking their international debut and the beginning of their widespread use. Cell-phone users around the world have been familiarized with various iterations of Emoji creating an internationally used pictographic language. [18,19]

All smartphones nowadays come with their own version of an Emoji keypad and this is the main mechanism of use for Emoji. A survey of 500 women completed in 2016 found that the average age for a child to get their first smartphone was 10.3 years. [20] There is limited data on the prevalence of use of technology including laptops, smartphones and tablets by toddlers and young children but, a study by Hourcade in 2015 found that 90% of two year olds showed moderate ability to meaningfully use a tablet. These children were able to correctly position a device- either by holding or lying flat- and were able to interact with apps and games by tapping and dragging on the screen with their dominant hand. This indicates that children as young as two are able to use tablets and smartphones and children nowadays grow up with phones and other devices as part of their regular environment.[21]

Conducting research with children has historically been challenging primarily due to communication issues. Fane recognized the need to move from research on children to research with children and began considering Emoji as a tool to help achieve this. In a study focused on visual research methods such as Emoji, it was found that preschool aged children were able to identify and assign specific emotions to common Emoji showing that Emoji are a powerful tool for communication with children as young as 3 years of age. [4]

Happiness, fear, anger, sadness, disgust are considered “basic emotions” and when represented in the form of graphic symbols, children are able to recognize the distinct facial features enough to be able to correctly identify and respond to questions with the above emotions. A study by Visser further noted that graphic symbols displaying prominent lower facial features (mouth) played a role in easy recognition of happy or sad emotions while prominent upper features (eyes, eyebrows) played a role in recognition of fear and anger. These features tend to be exaggerated in graphic symbols in Emoji form. [22]

Gallo in 2017 conducted focus groups to understand how children use emotion words and Emoji, specifically in reaction to food. In this study, 17 children aged 8-11 were asked to use words and Emoji to describe how certain foods made them feel before and after tasting. Children effectively used both words and Emoji in response illustrating that Emoji are an effective tool for quantitative testing with children. [23] A similar study evaluating children aged 15-18 used over 30 Emoji to record their reactions to a variety of cookie types. The results showed that Emoji were able to successfully provide information on the children's experiences to the food samples and Emoji measurements were accurate predictors of children's food choice. [24]

The world of research has begun to incorporate Emoji as a communication device when working with young children. The use of this already widespread medium of communication simple enough for even pre-school aged children would easily be accepted in the dental and medical world by our young patients due to the familiarity of these graphic images and would serve as a useful tool for the healthcare provider in assessing pain levels in these patients. The purpose of this study is to determine whether a modernized pain scale with Emoji is a viable means of determining the pain level of a child.

Methods

This experiment was conducted on patients presenting to VCU Pediatric Dentistry for regularly scheduled appointments (including recalls, new patient exams, simple restorative, and restorative under oral conscious sedation) as well as limited exams, patients who presented to the operating rooms at VCU Health System for regularly scheduled dental rehabilitation under general anesthesia and patients who presented to the emergency room with dental pain, infection or trauma. The inclusion criteria were children aged 4-17, ASA I to II, typically developing and English speaking children and parents/guardians. Exclusion criteria consisted of non-English speaking children or parents/guardians, children who had been sedated or given medication for pain prior to being surveyed, children who were unable to cooperate for the study, children ASA III or higher and children with special health care needs.

The study was described to the parents and the patient (if aged 7 or older) as a comparison of two different picture pain scales for children. After being asked to participate, the parents read over a consent form detailing the purpose, description, risks and benefits of this study. Once given a chance to ask any questions they were directed to sign the consent form. For children aged 7 and older, an assent form was provided and verbally explained to the child after which their signatures were collected as well.

These patients were then asked if they were experiencing any pain at the time of the appointment. If pain was reported it was documented on the provider questionnaire as part of the patient's chief complaint. It was then explained that the patient would be shown a few "faces" and that they had to select the face that showed how their teeth were making them feel. Unlike

previous studies, each individual level of pain was not individually described but rather the images were left for the patient to interpret on their own. The patient was shown one random scale at a time- either the Wong-Baker FACES® scale or the Emoji scale (see Figure 1 and Figure 2). Both scales were in a packet on separate sheets of paper with a blank sheet of paper in between to prevent comparison between the two. After selecting a face on the first scale shown, the other scale was shown with the same question being asked. Once the patient had indicated their level of pain on both scales, the two scales were shown together and the patient was asked to select the scale they prefer. All answers were noted directly on the packet.

A questionnaire on the first page of the packet was completed by the provider. The patient's age and chief complaint was reported for all patients. For patients who reported pain, additional questions regarding the duration, location, triggers, severity, additional diagnostic information and diagnosis of the pain were asked.

Data-Collection Instruments

The Emoji scale (see Figure 1- Emoji Pain Scale) involves six commonly used Emoji starting with a smiling/laughing face and ending with a crying face. This scale was developed in collaboration with a student from the VCU School of Arts and is an original set of Emoji inspired by the most commonly used Apple Emoji.

The Wong-Baker FACES® scale (see Figure 2- Wong-Baker FACES® Scale) involves 6 picture projections starting with a very happy smiling face and ending with a sad tearful face.

The packets with the pain scales shown to the patient were prepared with the Emoji scale first in half of the packets and the Wong-Baker FACES scale first in the other half. These

packets were then shuffled so that a random packet was selected for each patient and the order the scales were presented was randomized.

Statistical Methods

Agreement between the two scales was assessed using descriptive statistics and Cohen's kappa with values between 0.2-0.4 being fair, 0.41-0.6 being moderate, 0.61-0.8 being substantial and over 0.81 being almost perfect. [25]

A chi-squared test was completed to determine association between agreement or overall preference based on age group.

All analyses were performed using SAS EG v.6.1 (SAS Institute, Cary, NC) with the significance level set at 0.05.

Results

A total of 151 children were enrolled in the study. The average age was 8.4 (SD=3.4) and ranged from 4-16. The majority of appointments were for recall (57%), but also included limited exams (26%), treatment (13%), and consults or referrals (4%). The majority of patients were asymptomatic (71%), but 21% had current pain and 8% reported past/intermittent pain. Patient characteristics are given in Table 1.

The proposed Emoji scale was preferred by 86% of enrolled children (n=151). Preference was marginally significantly associated with age group (p-value=0.0699) as seen in Table 2 . Preference for the Emoji scale ranged from 77% among those 13-17 to 94% among those 8-12 (84% among those 4-7).

A summary of the pain ratings for each of the scales is given in Table 3. The majority of patients reported no pain on either scale (66-67%). For the patients reporting pain the most common diagnosis was exfoliating or erupting teeth (13 patients) followed by caries (12 patients), abscessed teeth (11 patients) and trauma (2 patients). There were nine diagnoses classified as “other” including angular cheilitis, fixed appliance causing pain, hypersensitivity, nocturnal clenching and patient being “sad”.

Children rated their pain the same on the two scales 78% of the time (see Table 4) indicating a moderate overall agreement between the two scales as defined by Cohen’s Kappa (k=0.5863, 95% CI: 0.47-0.70). In the instances of disagreement, 82% were within one image on the pain scale. There was a roughly even split between which scale corresponded to the higher

pain level (56% Wong-Baker was higher and 44% Emoji was rated higher). Cohen's Kappa agreement was not associated with patient age group (p-value=0.3909).

Discussion

Overall, 71% of the patients surveyed reported no pain. A total of 21% reported pain at the time of their appointment and 8% reported past or intermittent pain but were asymptomatic at the time they were surveyed. In the review by Slade, parents rating their children's pain reported a pain prevalence of 5-33%. [6] The prevalence of pain recorded in this study falls within this range found by Slade but the pain levels we recorded were reported by the children themselves as opposed to by the parents. This indicates that, according to this study, 29% of pediatric dental patients self-reported being in pain. This shows that our patient population is representative of what one would expect in a dental clinic as far as prevalence of pain is concerned.

We found that a majority (66-67%) of patients reported no pain on either scale They selected the same pain rating on both scales 78% of the time with a κ score of 0.5863 which falls within the “moderate” agreement range of 0.41 to 0.6. This indicates that the two pain scales display moderate agreement when agreement by random chance is taken into account.

A majority or 82% of the disagreement was off by only one image. This shows that the responses on both scales matched a majority of the time and when they didn’t the disagreement was mostly within one image.

A majority or 86% of the children surveyed preferred the Emoji scale with a marginally significant association with age group. The primary group of interest or the youngest age group of children 4 to 7 had an 84% preference for the emoji scale. There are many potential explanations for this preference but with the information available on cognitive development in

children and the widespread use of Emoji we suspect that children prefer the Emoji scale because of the familiarity of the Emoji themselves. [11]

This was the first study to use a pain scale with Emoji in a dental setting. Previous studies using pain scales primarily compare the FACES scale or similar scales with images or cartoons with numerical scales such as the VAS scale or the glasses rating scale. This study differs in that it compares two picture pain scales with each other. Another difference between this and previous studies is that in other studies using the Wong-Baker FACES scale, each individual image is explained to the patient. We did not do so for this project in order to better determine if the children are understanding the scale itself or the explanations of each image.

Some of the limitations to this study are that the age range was large. A majority of the patients studied were younger (ages 4-7) but a larger patient population or focus on younger age groups would be better for future studies. This scale is intended for younger populations so it would be beneficial to focus on using it with younger children and to let older children/teenagers to rate their pain with numeric scales.

A majority of the patients surveyed were pain free providing more data on the lower end of the scale and less data on the higher end. Close to one third of the patients reported pain and while this matches up with what one would expect with your average patient population in a dental clinic it would be beneficial to survey more children in pain to better validate the entirety of the scale and not just the mostly asymptomatic portion. Originally we wanted to survey patients in the emergency department who present with pain from trauma or infection but we found that by the time a dental provider was able to examine the patient they had received pain medication which would confound the results.

Patients presenting to the OR for dental treatment typically have gross caries and abscesses and it was expected that these patients would report pain but the patients surveyed often had a history of pain but would report no pain at the time of the appointment due to temporary treatments or antibiotics which managed their pain until treatment under general anesthesia was completed.

Another limitation is that there's no way of proving pain exists when a person reports or ranks their pain. This makes it difficult to assess whether one particular pain scale is better than another or not since the accuracy cannot actually be measured. In this case, the Emoji scale shows an overall agreement with the Wong-Baker scale but there's no means of determining which scale is more accurate when it comes to pain sensation.

For future research with the Emoji scale, a larger sample size with younger patients, specifically the 4-7 age range and more symptomatic patients could be targeted to determine how well this scale works with its target population and across a larger spectrum of pain experience. It would also be beneficial to attempt to survey patients immediately presenting to the emergency department as these patients are likely to be experiencing the most severe pain. It would be valuable to assess the utility of this scale in both medical and dental settings as these types of pain scales (like the WB) were originally created for use in hospitals.

Conclusion

A majority of the patients surveyed presented with no pain; which is what you would expect in your regular dental clinical setting. The most common causes for dental pain, when present, were exfoliating or erupting teeth, caries or dental abscess. The Emoji pain scale showed moderate agreement with the Wong-Baker FACES scale. While we did not find a strong agreement between the two scales, children overwhelmingly preferred the Emoji scale over the Wong-Baker scale. We think that this is an important result from this study and indicates that this scale should be further researched. Emoji have a strong communicative utility and are essentially an international language making them a valuable tool for communication with children.

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List of Tables

Table 1- Patient Characteristics

	Mean (SD)
Age (mean, SD)	8.4 (3.4)
	n (%)
Appointment Type	
Recall	84 (57%)
Limited Exam	39 (26%)
Treatment	19 (13%)
Consult/Referral	6 (4%)
Pain Status	
Current	31 (21%)
Past/Intermittent	12 (8%)
None	105 (71%)

Table 2- Preference for Emoji and Wong-Baker Scales

Age Group	**Emoji**	**Wong-Baker Faces**
4-7	62 (84%)	12 (16%)
8-12	47 (94%)	3 (6%)
13-17	20 (77%)	6 (23%)
Total	**130 (86%)**	**21 (14%)**

*Patient age was missing from dataset for 3 subjects so columns will not add up to total

Table 3- Reported Pain Levels by Scale

Pain Level	**Emoji Scale**	**Wong-Baker Faces**
0	66%	67%
2	13%	12%
4	7%	6%
6	9%	8%
8	1%	3%
10	3%	4%

Table 4- Comparison of Reported Pain between the Two Scales

	Wong-Baker Faces:					
Emoji:	**0**	**2**	**4**	**6**	**8**	**10**
0	91	8	1	0	0	0
2	9	8	2	0	1	0
4	1	1	5	3	1	0
6	0	1	1	8	2	1
8	0	0	0	1	1	0
10	0	0	0	0	0	5

*Cells shaded green indicate agreement between the two scales

List of Figures

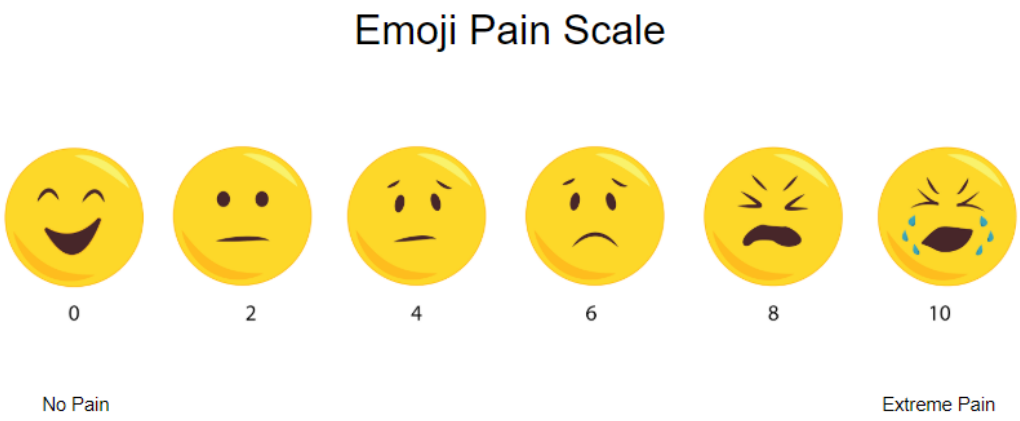


Figure 3: FLACC Pain Scale

Criteria	Score - 0	Score - 1	Score - 2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

Figure 4: VAS Pain Scale

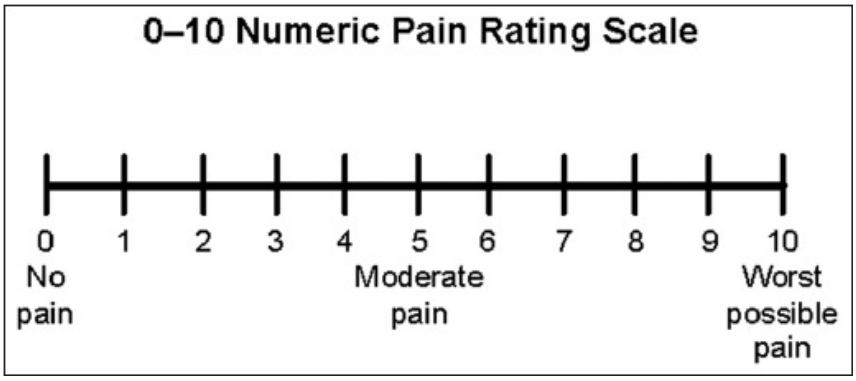


Figure 5- Reported Pain Levels

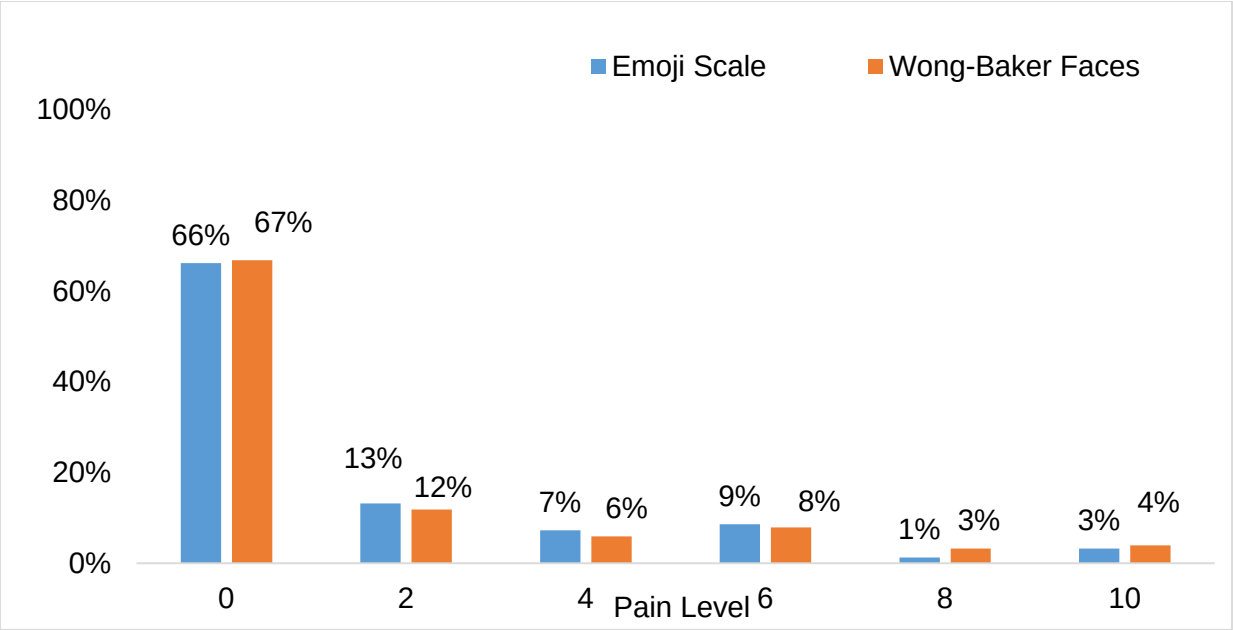
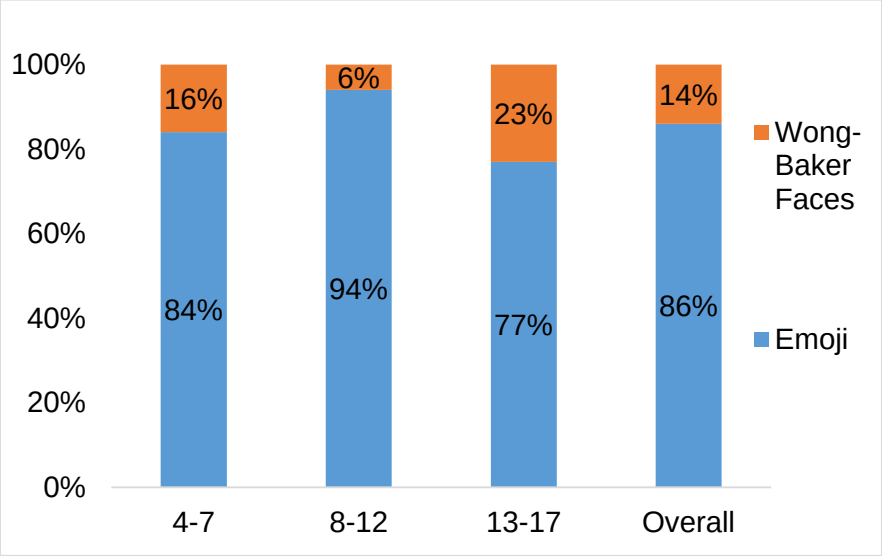


Figure 6- Patient Preference



Appendix

Appendix 1: Consent Form

RESEARCH SUBJECT INFORMATION AND CONSENT FORM

TITLE: Use of Emojis in Pain Assessment in Pediatric Patients

VCU IRB NO: HM20012066

INVESTIGATOR: William Dahlke

If any information contained in this consent form is not clear, please ask the study staff to explain any information that you do not fully understand. You may take home an unsigned copy of this consent form to think about or discuss with family or friends before making your decision.

PURPOSE OF THE STUDY

The purpose of this research study is to find out if a pain scale (used to see how much pain a patient is in) using emojis is easier for a child to understand.
You are being asked to participate in this study because you have a child who will be asked to tell us if they are in pain or not and how much pain they're in.

DESCRIPTION OF THE STUDY AND YOUR CHILD'S INVOLVEMENT
If you decide to be in this research study, you will be asked to sign this permission form after you have had all your questions answered and understand what will happen to your child
In this study your child will be asked to select an image from page 1 (which has pictures showing different levels of pain) that shows how much pain they are in right now. They will then be asked to do the same on page 2. Your child will then be asked to select which pain scale (page 1 or page 2) they prefer or understand better.
Significant new findings developed during the course of the research which may relate to your willingness to continue participation will be provided to you.

RISKS AND DISCOMFORTS
Sometimes talking about pain can be frustrating for a child. Aside from this no foreseeable risks are involved with participation in this study. If you or your child become upset at any time during the questionnaire, you or your child can stop taking the survey.

BENEFITS TO YOU AND OTHERS
You may not get any direct benefit from this study but the information we get might help us understand a child's pain better when they visit the dentist.

ALTERNATIVES
Alternative to this research project is to not participate in the study at this time

COSTS
There are no costs for participating in this study other than the time you will spend in filling out the questionnaire.

CONFIDENTIALITY
Potentially identifiable information about you will consist of a survey. Data is being collected only for research purposes. Consent and Assent forms will be kept in a locked file cabinet and will be destroyed after the study ends.
All personal identifying information will be kept in password protected files and these files will be deleted after data collection statistics have been gathered. A data and safety monitoring plan is established.
If, as part of this research, we learn about real or suspected child abuse, the law says that we have to let people in authority know so they can protect the person(s) at risk.

VOLUNTARY PARTICIPATION AND WITHDRAWAL
Your participation in this study is voluntary. You may decide to not participate in this study. Your decision not to take part will involve no penalty or loss of benefits to which you are otherwise entitled. If you do participate, you may freely withdraw from the study at any time. Your decision to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled.

Your participation in this study may be stopped at any time by the study staff or the sponsor without your consent. The reasons might include:
- the study staff thinks it necessary for your health or safety;
- you have not followed study instructions;
- the sponsor has stopped the study; or
- administrative reasons require your withdrawal.

QUESTIONS
If you have any questions, complaints, or concerns about your participation in this research, contact:

Dr. William Dahlke (804) 828-2362

The researcher/study staff named above is the best person(s) to call for questions about your participation in this study.
If you have any general questions about your rights as a participant in this or any other research, you may contact:

Office of Research
Virginia Commonwealth University
800 East Leigh Street, Suite 3000
Box 980568
Richmond, VA 23298
Telephone: (804) 827-2157

Contact this number to ask general questions, to obtain information or offer input, and to express concerns or complaints about research. You may also call this number if you cannot reach the research team or if you wish to talk with someone else. General information about participation in research studies can also be found at http://www.research.vcu.edu/human_research/volunteers.htm.

CONSENT

I have been given the chance to read this consent form. I understand the information about this study. Questions that I wanted to ask about the study have been answered. My signature says that I am willing for my child to participate in this study. I will receive a copy of the consent form once I have agreed to participate.

_____

Participant name printed

_____

Name of Parent or Legal Guardian
(Printed)

_____ _____

Parent or Legal Guardian Signature Date

_____

Name of Person Conducting Informed Consent Discussion
(Printed)

_____

Signature of Person Conducting Informed Consent Discussion Date

_____

Principal Investigator Date [3]

Appendix 2: Assent Form

YOUTH ASSENT FORM

STUDY TITLE: Use of Emojis in Pain Assessment in Pediatric Patients

RESEARCHER'S NAME: Dr. William Dahlke

Why are we meeting with you?
I am asking you and other children to take part in a research study. A research study is a way to learn more about something. You are being asked to join this research study because you are a child between the ages of 3 and 17. After we tell you about it, we will ask if you'd like to be in this study or not.

This form may have some words that you do not know. Please ask me to explain any words that you do not know. You may take this form home to think about and talk to your parents about before you decide if you want to be in this study.

What is this study about?
The purpose of this study is to find out if a pain scale using emojis will make it easier to tell how much pain a patient is in.

What will happen to me if I choose to be in this study?
In this study you will be asked to:

1. Look at two different pain scales, one with emojis
2. Pick the picture that shows your pain level right now
3. Pick the pain scale that you prefer

If you decide to be in this study, you will be asked to sign this form. Do not sign the form until you have all your questions answered.

What might happen if I am in this study?
If you get upset for any reason during this study you can stop taking the questionnaire at any time and no questions will be asked.

Will you tell anyone what I say?
We will not tell anyone the answers you give us. However, other members of your group will know what you say. We will not share your answers with your teachers or parents or friends.

If you tell us that someone is hurting you, the law says that we have to let other people know so they can help you. If you tell us that you might hurt yourself or someone else, then we have to let people know.

Do I have to be in this study?

You do not have to be in this study. It is up to you. You can say okay now and change your mind later. No one will blame you or get mad at you if you don't want to do this. All you have to do is tell us you want to stop.

Do you have any questions?
You can ask questions at any time. You can ask now or later. Just tell the researcher when you see them, or ask your parent or another adult call

Dr. William Dahlke (804) 828-2362

Before you say **yes or no** to being in this study, we will answer any questions you have now.

If you don't want to be in this study, just say so, and don't sign this form.

YOUTH ASSENT

*If you sign here, it means you agree to participate in this study.

_____ _____
Youth Participant's Name (Printed) Date

_____ _____
Youth Participant's Signature Date

_____
Name of Person Conducting Assent Discussion (Printed)

_____ _____
Signature of Person Conducting Assent Discussion Date

_____ _____
Principal Investigator Signature (if different from above) Date

Appendix 3: Questionnaire

QUESTIONNAIRE

Which of the two pain scales did you like better? Please circle below

A. Emoji Pain Scale

B. Wong-Baker Faces Pain Scale

PROVIDER QUESTIONNAIRE

Patient Age- _____

Patient's chief complaint-

_____

_____

Please answer the following questions if patient is experiencing pain:
How long has the patient been experiencing pain? If applicable list any cause of initial onset.

_____

_____

_____

In which area of the mouth is the patient experiencing pain? List tooth numbers when possible

_____

_____

Check the boxes if any of the following produce pain:

- ❑ Hot
- ❑ Cold
- ❑ Pressure on chewing
- ❑ Other: _____

Is the patient experiencing spontaneous nocturnal pain?

- ❑ Yes
- ❑ No

List any radiographs that were taken and any relevant findings

_____

_____

_____

_____

Diagnosis of pain

_____

_____

_____

_____