

# Stages and transitions in the development of tooth brushing skills in children of Mexican immigrant families: a qualitative study

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## Abstract

**Objectives:** Compared with white children, the oral health of Latino children in the United States is much worse. One factor contributing to oral health is tooth brushing. Few studies have addressed the formation of the tooth brushing habit in children, and only one of them studied a Latino population. The purpose of this study is to explore the development of the tooth brushing habit in children of Mexican immigrant families and develop hypothesis based on its results.

**Methods:** This is an exploratory qualitative study, with a case study design based on 20 in-depth interviews. Participants were Mexican immigrant mothers living in Pittsburgh and Philadelphia, PA. Participants had at least one child six-years-old or younger. Interviews were recorded, transcribed verbatim, and analyzed using qualitative analysis procedures.

**Results:** Four stages were identified in the tooth brushing learning process: initiation and entirely dependent tooth brushing, assisted tooth brushing, road to tooth brushing independence, and independent tooth brushing. Two factors influenced parents' teaching approaches: parents' perceptions of their child's achievement of physical, cognitive, and motor developmental milestones and parents' knowledge about oral hygiene.

**Conclusions:** We identified four distinct stages and found evidence to hypothesize that transitions from one stage to the next are triggered not by the age of the child but by parents' knowledge about oral hygiene and their perceptions of their child's achievement of physical, cognitive, and motor developmental milestones. Future quantitative research studies should be conducted to test this hypothesis in larger groups of Latinos as well as other ethnic groups.

## Introduction

Oral health influences quality of life and overall health. Compared with the white population, the US Latino population is at higher risk of developing caries and having untreated caries and gingivitis (1,2). Data from the 2003 and 2007 National Survey of Children's Health revealed that over half of Latino children had suboptimal dental health, compared with 20 percent of white children (3). Mexican American children have the highest number of primary teeth with caries, as well as the highest proportion of untreated decayed teeth compared with other ethnic groups (4). Even though caries in

children has diminished throughout the years, caries among nonpoor Mexican American children aged 6-8 increased significantly from 52.1 percent in 1988-1994 to 67.6 percent in 1999-2004 ( $P \leq 0.005$ ), and among poor Mexican American children aged 9-11 from 38 to 55 percent ( $P \leq 0.005$ ) (5).

Poor oral hygiene is a major risk factor for the development of cariogenic lesions (6). Although there is conflicting evidence regarding the effects on caries risk of tooth brushing without fluoride tooth paste (7), tooth brushing with fluoride toothpaste unambiguously prevents dental caries (8).

Income, education, social environment, and cultural beliefs affect peoples' oral health and willingness to seek care

(9-11). Cultural differences in oral hygiene behaviors, such as tooth brushing, between Latinos and whites may partially account for oral health disparities. Little is known, however, about how children develop a tooth brushing habit in general (12-14), let alone cultural differences in this process.

Suzuki *et al.* conducted two studies of children's tooth brushing habit formation (15,16), surveying mothers of children attending kindergarten or day cares in Nagoya, Japan ( $n = 1,396$ ). Approximately 49 percent of the parents endorsed "eruption of teeth" as the main motive for starting to brush their child's teeth. They also identified ways parents taught their children to brush their teeth: 51.6 percent of parents brushed their children's teeth, 37.1 percent brushed their children's teeth after their children had done it by themselves, and 6.8 percent stated that their children brushed their teeth by themselves with no help. Thus, from these studies, we learn that in Nagoya, Japan, tooth cleaning starts with the eruption of teeth and takes the form of brushing. We also learn that for some children there is at least one stage that occurs prior to independent tooth brushing. Information about the child's age when parents switch from one stage to the next and the factors that trigger these switches remain unknown.

Childhood development is marked by a number of developmental milestones with motor and cognitive skills at its core. These skills are essential to successfully learn new behaviors (17,18), yet their role in the development of tooth brushing habits in children has not yet been studied. Identifying these skills may help understand how children acquire new habits at early ages.

Focusing on Mexican immigrants in the United States, Hoefft *et al.* (19) conducted in-depth interviews with 48 low-income mothers whose youngest child was 5 years old or younger to examine mothers' initiation and understanding of children's oral hygiene practices. Results showed that mothers initiated oral hygiene by wiping their children's teeth and/or gums (48 percent) or by brushing their teeth with a toothbrush. Thus, in this population, the initiation of oral hygiene sometimes started with wiping the teeth with a cloth instead of a toothbrush. Parents' exposure to dental education from health professionals affected the initiation of their children's oral hygiene (cleaning of gums, but not tooth brushing). Tooth brushing initiation occurred at 1.8 years old on average, later than the age of initiation observed in the Japanese sample and later than the American Dental Association recommendations to start brushing children's teeth as soon as they erupt (4-6 months) (20). The study offered no information about stages following initiation.

There may be cultural differences in how children develop a tooth brushing habit that may partially account for differences in oral health outcomes. How children develop this habit and how the parent/child dynamic evolves remain unknown. This study aims to explore tooth brushing prac-

tices in children of Mexican immigrant families and generate hypotheses regarding their onset and development. The findings of this study may help develop oral health promotion interventions for Mexican and Latino families to diminish oral health disparities.

## Methods

### Design

This exploratory qualitative research study with a case study design based on in-depth interviews with Mexican immigrant mothers who shared information about 47 children.

All procedures were approved by the Institutional Review Board of the University of Pittsburgh. Verbal consent was obtained prior to the interviews.

### Sampling strategy and data collection

We recruited a purposive sample of participants who had at least one child between 1 and 6 years old. Parents of children with developmental disabilities that prevented them from brushing their teeth by themselves were excluded from the study. Given the relative homogeneity of participants (all Mexican), a sample size of 20 families was considered an adequate target (21,22). We reached saturation at 20 interviews and stopped data collection. We recruited participants using flyers and word of mouth at Latino community events and gathering places throughout Pittsburgh and Philadelphia, PA.

### Interviews

The interview questions were open-ended and addressed the participant's tooth brushing knowledge, experiences, and habits. We modified the initial questionnaire following suggestions of a qualitative methods expert and two Mexican natives and made final changes after pilot-testing it with one participant. We added an introductory section acknowledging the Latino origin (not Mexican) of the interviewer to explain the possible use of different idioms during the interview. If participants did not understand an expression, the interviewer used the equivalent Mexican expression.

The final questionnaire had 19 questions and took approximately 30 minutes to complete. The first author obtained verbal consent, conducted and audio-recorded all interviews in Spanish. Participants received a \$30 gift card in compensation for their time. The Institutional Review Board of the University of Pittsburgh approved all procedures.

### Data analysis

Interviews were transcribed verbatim and analyzed using NVivo 10 (QSR International Pty Ltd., Version 10, 2012). Two

researchers used an inductive coding process guided by factors the literature described as related to tooth brushing habits as well as cognitive and motor ability. To ascertain intercoder reliability, we compared the same text coded by the two researchers who then discussed differences until they agreed on definitive codes. Next, the researchers used axial coding to develop categories that corresponded to potential stages in the development of the tooth brushing habit. Children's motor control was classified as absent or little, some, or good. Finally, researchers explored relationships among categories.

## Results

Between November 2013 and March 2014, we conducted 20 interviews with Mexican immigrants between 28 and 43 years old. Participants lived with children between 6 months and 22 years old; 11 participants had at least one child younger than 3 years, and three were first-time parents. Participants provided information about tooth brushing experiences for all children in the family. Using information from the 47 children who were 16 or younger, we identified four toothbrush stages, as detailed below.

For transparency, we present themes with the number of interviewees who mentioned them as suggested in the literature (23,24). Simple counting will be used as an analytical tool to identify the pervasiveness of varied topics.

### Stage 1: initiation of oral hygiene and entirely dependent tooth brushing

This stage marks the start of oral hygiene practices in children. Participants described practices such as cleaning their child's gums, brushing their teeth, and letting children play with the toothbrush. Three participants reported starting with a soft cloth to clean the child's gums/teeth. One of them, mother of a 13-month-old child, stated she was currently using a soft cloth to clean her child's gums; the other two said they remembered having used a soft cloth or a finger toothbrush to clean their children's gums ("I used to use that [soft cloth] with my daughter, but when she saw her brother using a toothbrush she wanted to use one too"). These children ranged in age from 13 to 31 months.

Nine participants said that the appearance of teeth prompted them to initiate oral hygiene in their children. Other cues included the child starting to walk and talk ( $n = 1$ ), doctor's recommendation ( $n = 1$ ), and child's request ( $n = 1$ ). Three parents of children between 6 and 19 months old reported not having started to brush their child's teeth or clean their gums. When asked about brushing her daughter's teeth (13 months old), one participant stated, "There still is time, she only has one tooth!"

Participants described children in this group as having little or no motor control. For example, participants said,

"[she] grabs the toothbrush and start biting it," "all he wants to do is hold [the toothbrush]," and "She doesn't brush her teeth correctly, but at least she tries to put the toothbrush [in her mouth]."

Participants described children in this group as having an incipient understanding of tooth brushing ("... when we go to the bathroom she points to her toothbrush and I hold her and start brushing her teeth..."). However, participants reported their children did not understand tooth brushing instructions or explanations about its importance. One mother said, "No. I haven't talked about it. Because he is only two-years-old and he doesn't understand what I tell him."

Participants' knowledge about tooth brushing affected initiation of oral hygiene. For example, one participant described the interaction with her daughter's pediatrician at her 18 month old checkup, "We asked the doctor: Is it ok? [to brush her teeth] And he looked at us and said hadn't you already started doing it?, [I said] No! But we really didn't know when it was the right age to start doing it! Once he gave us the authorization we started." Initiating tooth brushing with their first child gave participants experience. A participant stated "... it's easier because with the first child you are all new, and all how do I brush them, and at what age I should start, and for how long... And you learn and then you have your second child, and the third..."

### Stage 2: assisted tooth brushing

Parents of children in this stage described assisting their children in brushing their teeth every time ( $n = 12$ ). Ten participants said they would let their children brush their teeth first and then brush their children's teeth, and two said they would brush their children's teeth first and then let them use the toothbrush and practice. A participant described this process with her 2-year-old son as "... he doesn't like us to brush his teeth, but I give him the toothbrush and tell him: go on try to do it yourself; and sometimes I take his hand so that he starts brushing but he gets anxious, or I don't know... feels funny holding the toothbrush. So I end up taking the toothbrush and brushing his teeth for him." Another participant reported, "I'm letting her brush her teeth first so she starts practicing and when she is done I brush them for her, because she doesn't do it right and she already practiced so I brush them again." Children in this stage were between 17 months and 8 years old, and most were between 2 and 5 years old.

Participants described children in this stage as having some motor control. They said their child does "not brush well" or "only brushes the teeth in the front." One 8-year-old child received his parents' assistance because they felt he did not "brush well." In general, parents perceived their children's motor dexterity as normal for their age.

Parents of children in this stage reported that their children understood instructions and explanations about tooth

brushing. For example, a mother expressed that her 4-year-old child “. . . learns everything one teaches him. Do it like this, move it upwards like this. . . .” Referring to a 3 and a 5-year-old, a participant stated, “They understand that behind not being allowed to eat candies there is a reason. . . . I don’t know to what extent they understand, but they do have a vague idea that we are looking after their health and their teeth.”

### Stage 3: road to tooth brushing independence

Children in this stage were 4 to 9 years old and brushed their teeth by themselves occasionally without any assistance ( $n = 6$ ). Referring to her 8-year-old son’s tooth brushing, a participant stated “during the day, when I’m preparing things, or later when I can’t, he does it [by himself]. But he always comes to me so I can check them.”

Participants reported that their children had some motor control. A mother of a 9 years old stated “He brushes his teeth every once in a while, but two or three times a week my husband or myself brush his teeth for him because we notice that he only brushes here [showing front teeth] and doesn’t do it well.” The mother of a 4 years old that occasionally brushed his teeth by himself reported “he can leave food in his teeth and he would still think he did it well. So I have to take turns, one day I let him so he can feel that he is doing it by himself, and one day I do it so that I can make sure that he is doing it correctly or that the teeth are clean.”

Participants reported that children in this stage understood why they had to take care of their teeth. A participant reported using movies to introduce oral hygiene to her son “We were watching *Up* and there is a part where he loses his teeth . . . and I said if you don’t take care of your teeth you are going to end up like him . . . and every time he sees the movie he says mommy I am going to take care of my teeth because if not I’m going to end up like that man.”

### Stage 4: independent tooth brushing

Children in this stage were capable of brushing their teeth without assistance ( $n = 20$ ). A participant said about her 14-year-old daughter, “She knows. She brushes her teeth. She has breakfast, and brushes her teeth again, and at night she brushes her teeth.” Children in this stage ranged in age from 4 to 16 years old.

Some comments participants made about their children tooth brushing skills were “[they] still don’t brush well, but they were already taught how to brush their teeth;” “she already is 14 years-old, so she goes to brush her teeth by herself;” “he brushes his teeth well. He doesn’t have any cavities.”

Participants’ reports of their children understanding of information varied in this stage. For example, a mother of two girls (8 and 6 years old) who brushed their teeth indepen-

dently stated that after their dentist provided her daughters information about the importance of taking care of their teeth, “the elder understood, because she said ‘Oh no! I have to take better care!’ But the younger was like ‘I listened but did not understand what you are saying’.”

Across stages 10 participants expressed uncertainty about tooth brushing practices. A participant that actively assisted her son in brushing his teeth said “I don’t know how I’m gonna do it with the middle one, because I don’t know if I’m right or not in helping him so much.”

## Discussion

This study’s objective was to explore tooth brushing practices in children of Mexican immigrant families. From our interviews, we were able to develop several hypotheses related to the tooth brushing habit formation among these children. The main hypothesis emerging from this study is that there are four stages in the formation of a tooth brushing habit: entirely dependent tooth brushing, assisted tooth brushing, road to tooth brushing independence, and independent tooth brushing. These stages, previously unknown in this field, and cues that initiate transitions from stage to stage can be examined in future studies. Longitudinal studies following children from 6 months forward (age at which first tooth erupts on average) should study the trajectory of the tooth brushing stages, the characteristics of each stage, and the profiles of the children in them. This information will aid in designing interventions targeting children in stages where changes are more possible. By studying this process in the Mexican immigrant population, we can develop oral health promotion interventions that are culturally relevant.

Most mothers reported starting to clean their children’s teeth based on the emergence of physical, motor, or cognitive milestones in their children. Others started after being prompted by authority figures, such as a pediatrician. Our results support Hoefl et al.’s (19) finding that parents initiated oral hygiene by using soft cloths to clean their children’s gums, as well as identified health professionals as sources of information to initiate dental hygiene. Our results also support Suzuki et al.’s (15,16) findings that the presence of teeth are a cue to start brushing children’s teeth. Although many of the cues used by parents to initiate oral hygiene would trigger initiation at an appropriate time, some of the cues, such as waiting for the presence of more than one tooth, trigger initiation later than recommended. To the extent that initiation cues are culturally determined, they could account for cultural disparities in oral health. Additionally, Mexican immigrants in the United States have less access to pediatricians who can provide health information, which could exacerbate disparities. These possibilities should be examined in future studies.

Another important finding was that in general parents aligned their child's stage to their motor and cognitive abilities rather than aligning to their age. Children who had not yet developed the ability to manipulate a tooth brush in their mouths or were unable to follow a multistep sequence still needed assistance for tooth brushing. Similarly, children who were not brushing adequately, even if they were 8 years old, were still brushing with assistance. Additionally, the age range in each stage was wide. For example, there were 4-year-old children in all but the first stage. This alignment of stage to developmental ability is seen in other milestones such as when parents delay the start of kindergarten for a relatively immature child (25). Such alignment does not occur with all milestones, however. Some transitions occur based on cultural norms regarding what is appropriate given the age of the child, such as getting a driver's license or having a *quinceañera* party. Finally, we observed instances where a participant was uncertain whether she was aligning her child's stage appropriately. Although the source of this uncertainty was not pursued in the present study, one hypothesis is that cultural norms regarding the appropriate stage were competing with the mother's perception of her child's ability.

Participants perceived that younger children had low dexterity, consisting of grasp, release, and some direction. This is normal for their developmental stage; only at 8 years of age does children's dexterity enable them to brush all areas of their mouth for themselves (17). Although some participants reported that their children were still unable to brush correctly at age 8, it is possible that their inability to do so stemmed from poor tooth brushing techniques rather than poor dexterity. Parents may need guidance in distinguishing between poor dexterity and poor technique. Short educational brushing interventions, based on the tell-show-do strategy (26), at the dental clinic or the doctor's office may improve brushing techniques.

Children's ability to understand simple instructions about how to brush their teeth is essential. By 2-3 years of age, children can follow simple, two-step commands (18). Yet in the present study, most participants believed their 2- to 3-year-old children could not follow such commands. In general, participants had low expectations regarding what younger children could understand, especially when giving instructions about tooth brushing or talking about its importance. Low expectations may limit the information parents provided to their children, possibly contributing to disparities. These findings address the importance of encouraging parents to talk to their children about the importance of tooth brushing and how to do it even before they have the motor skills to implement the behaviors.

The qualitative nature of this study provides strengths as well as limitations. Its exploratory design enabled us to identify a number of hypotheses. One of the limitations of this

study is that retrospective reports are prone to recall bias. Participants' memories may be incomplete or distorted over time. Prospective studies could address this limitation. Because of the nature of this study, we cannot generalize results. In order to study the prevalence of these stages a quantitative study would be needed.

In summary, we provide preliminary evidence of four stages in the development of tooth brushing in children of Mexican immigrant families. We also raise hypotheses about the influence of access to resources and cultural factors in tooth brushing initiation. Tooth brushing habits were found to be initiated by physical, motor, cognitive cues in their children, or by information provided by authority figures. Parents' perceptions of children's cognitive and motor development as well as their knowledge about the topic influenced the transition between each stage. This information can help intervene at early stages to diminish oral health inequalities.

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