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Shades of Decay: The Meanings of Tooth Discoloration and Deterioration to Mexican Immigrant Caregivers of Young Children

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Abstract

The objective of this article is to investigate parental understanding of tooth discoloration and decay and their related care seeking for young, Mexican-American children. The research design entailed semi-structured, face-to-face interviews conducted in Spanish with a convenience sample of 37 Mexican immigrant mothers of young children in a low-income urban neighborhood. Five major color terms – white, off-white, yellow, brown, and black – were used to describe tooth discoloration, the causes of which were mainly unrecognized or attributed to poor oral hygiene and exposure to sweet substances. Mothers also described three major levels of deterioration of the structural integrity of teeth due to caries, from stains to decayed portions to entirely rotten. A trend was observed between use of darker discoloration terms and extensive carious lesions. Teeth described as both dark in color and structurally damaged resulted in seeking of professional care. The paper concludes with the finding that Spanish terms used to describe tooth discoloration and carious lesions are broad and complex. Mexican immigrant mothers' interpretations of tooth discoloration and decay may differ from dental professionals' and result in late care seeking. Increased understanding between dental practitioners and caregivers is needed to create educational messages about the early signs of tooth decay.

Keywords

tooth discoloration; caries; healthcare disparities; Mexican; Americans; immigrants; parental beliefs

Introduction

Cultural beliefs about particular diseases have an influence on their management and on careseeking and preventive behaviors (Kleinman 1980). The mouth is a source of communication, pleasure, social interaction, and facial esthetics. It is thus subject to cultural interpretation and assignment of meaning to conditions such as tooth discoloration. Tooth discoloration in children has not been widely explored in the literature, particularly not from the parent or patient perspective. This paper investigates and describes urban immigrant Mexican parents' interpretations of tooth discoloration and structural integrity in young children and links these understandings to dental care seeking behavior.

The clinical literature describes a broad range of dental discoloration in children and a wide variety of causes for these discolorations (Hattab, Qudeimat, and al-Rimawi 1999; Kidd 2005; Koch and Poulsen 2001; Sulieman 2005; Welbury 1997). Though healthy teeth are commonly described as white in color, they actually vary in shade from bright to slightly dull shades of white or off-white. Dental discoloration, either of part or the whole tooth, occurs for many reasons and can result in a wide range of tooth colors, from beige or yellow through blue, gray, brown, violet, green, to brown and black. Dental discoloration may be either entirely non-indicative of clinical conditions or highly suggestive of the destruction of a tooth's structural integrity.

Dental discolorations are categorized in multiple ways. One common categorization is extrinsic versus intrinsic causation. Extrinsic causes include certain foods and beverages (e.g., tomato sauce, tea), smoking, plaque accumulation from poor oral hygiene and medications (e.g., iron, minocycline, chlorhexidine). Intrinsic causes affect the coloration of both the enamel and the dentin of the tooth and include dental trauma, genetics, developmental disorders, fluorosis, medications (e.g., tetracyclines), infection and dental caries (Koch and Poulsen 2001; Sapir 2005; Shulman et al. 2004; Welbury 1997).

Caries – dental decay – has a multi-factorial origin and is the most prevalent transmissible (infectious) and chronic disease affecting children in the United States (USDHHS 2000). Caries does not affect the population equally, as children living in poverty are twice as likely as those living above poverty level to be affected. Latino children, particularly Mexican-Americans (see Note 1), are one of the populations most affected by caries even when controlling for economic status, insurance coverage status, and parental attitudes toward preventive care (Chung et al. 2006; Dietrich et al. 2008; USDHHS 2000). *Healthy People*

¹The terms “Latino” and “Hispanic” each carry particular demographic, historical, and sociopolitical connotations (Falcon, Aguirre-Molina, and Molina 2001). A survey conducted by the Pew Hispanic Center/Henry J. Kaiser Family Foundation (2002) found that in California in 2004, approximately half the population (51%) had no strong preference with respect to being called either “Latino” or “Hispanic.” As we use the term in this paper, “Mexican-American” refers to Mexican origin immigrants to the United States and their descendants. This population is a sub-set of the “Latino” or “Hispanic” population within the United States.

2010, a U.S. federal government health promotion and disease prevention initiative, reported that nationally, 43 percent of Hispanic children aged six to eight years have untreated caries, compared with 36 percent of non-Hispanic Black children and 26 percent of non-Hispanic White children. Findings from the 2005 California Health Interview Survey, a random-sample survey including all 58 counties and designed to be statistically representative of the state, found that 32 percent of all Latino children aged 0–11 years have untreated tooth decay (Pourat and Nicholson 2009; Pourat et al. 2007).

Caries is a complex and potentially serious health problem. Severe untreated caries, especially in early childhood, can lead to systemic infections, speech and communication problems, school absence, chewing difficulties, and malnutrition (Peretz et al. 2003; USDHHS 2000). Risk factors for caries include bacteria, diet (especially at-will exposure to sweet foods and liquids), delayed weaning practices especially from the bottle, and poor oral hygiene (Featherstone 2004; Ismail 1998; Seow 1998, Seow 2003; Sohn, Burt, and Sowers 2006). Fluoride exposure has been well established as a protective factor (Twetman 2008, 2009; Weintraub et al. 2006).

A study that examined the tooth color of a sample of caries-free children found that 23 percent had discoloration of some type: 4 percent had intrinsic discoloration, 6 percent had extrinsic discoloration, and 13 percent had both extrinsic and intrinsic discoloration (Mahmoodian and Hashemi 2004). Generally speaking, “white spot lesions” are characteristic of early stages of active decay or carious lesions, while later stages of active carious lesions and arrested caries are dark brown and black and are usually accompanied by loss of some degree of tooth structure (Welbury 1997). Excess ingestion of the preventive fluoride can also result in white spots or discoloration (fluorosis) but generally without loss of tooth integrity (Koch and Poulsen 2001; Sulieman 2005; Welbury 1997).

Dental esthetics, including tooth color, is an important influence on an individual’s personality, self-confidence, and social stress (Lalumandier and Rozier 1998; Mahmoodian and Hashemi 2004). Many studies have investigated the satisfaction of parents, children, and dentists with the brownish discoloration of children’s teeth specifically caused by moderate to severe fluorosis. Using various indices for color variation due to fluorosis and satisfaction scales, it has been shown that parents are more satisfied with the appearance of their children’s teeth when fluorosis is mild, that is, has caused white spots; severe fluorosis where teeth have turned beige or pale brown evokes dissatisfaction, particularly with respect to the teeth of older children. Children themselves, girls especially, have been found to be more dissatisfied with their tooth discoloration than are their parents. Dentists are more critical of younger children’s than of older children’s tooth color (Clark et al. 1993; Lalumandier and Rozier 1998; Levy et al. 2005; Martinez-Mier et al. 2004; Riordan 1993; Shulman et al. 2004).

In the United States, Mexican-American children experience disproportionately high prevalence rates and severity of early childhood caries (Call, Entwistle, and Swanson 1987; Koday, Rosenstein, and Lopez 1990; Ramos-Gomez et al. 1999; USDHHS 2000; Woolfolk et al. 1984). United States-born children of Mexican immigrants, especially those in farmworker families, experience more decayed primary teeth than Mexican-American

children in general (Nurko et al. 1998). To explain this disparity, many investigations have explored barriers in access to and differential use of oral health services (Lukes and Simon 2006; Quandt et al. 2007).

Additionally, some research suggests that Mexican immigrant parents may have poor knowledge about dentistry and oral health, may lack knowledge of effective preventive measures (Entwistle and Swanson 1989), may not understand the relationship between diet and oral disease (Woolfolk et al. 1985), and may accord low value to primary teeth (Hilton et al. 2007). These multiple factors lead to a seeming under-appreciation for the need for children to receive regular dental care, a situation exacerbated by lack of access to dental professionals (Weinstein et al. 1992).

Most reports regarding tooth discoloration in children address clinical aspects, particularly determination of cause and professional treatment. Relatively little research, however, has examined how caregivers, including Mexican immigrant caregivers, recognize or respond to signs and symptoms of dental discoloration and disease in their children. Yet, it is important to understand how disease recognition and beliefs about the causes of oral disease affect oral health practices (Butani, Weintraub, and Barker 2008; USDHHS 2000), dental utilization (Kelly et al. 2005), and communication with oral health professionals (Bedos et al. 2005; Kleinman 1980). The present analysis investigates low-income Mexican immigrant parents' understanding of and behaviors surrounding discoloration and decay of their children's teeth.

Methods

Guided by constructivist theory and a grounded-theory-like procedural approach (Charmaz 2000; Strauss and Corbin 1990), this study relies on data collection and constant comparison of themes presented by participants to develop an understanding – or conceptual model – of meanings and behaviors that emerge directly from verbal and text data (Bernard 2005; Miles and Huberman 1994). This approach is successful in explaining empirical phenomena that are presently poorly-understood and so is capable of yielding an account of people's knowledge and actions, an account that is richer than but complements a purely quantitative descriptive account (Becker 1993).

We undertook a qualitative study to gain an understanding of urban Mexican parents' conceptions and practices regarding their children's oral health. This approach consisted of in-depth interviews with caregivers about their habits and beliefs surrounding their children's oral health. Methods were modeled on and very similar to the research activities detailed elsewhere (Barker and Horton 2008) for a rural setting.

This study was conducted in a low-income neighborhood with a high proportion of Mexican immigrant residents, in San José, a large, urban city in California. Eligible participants: (1) were primary caregivers of children aged 10 years or less, with the aim that their youngest child would be aged five years or less; and (2) self-identified as first- or second-generation immigrants from Mexico. A convenience sample of participants was drawn from multiple sources in the community, such as migrant parents' support groups, preschools, dental

clinics, community festivals, and referrals from other participants. Screening specifically for children who had experience with dental caries was not undertaken.

Interested participants were screened for eligibility and recruited into the study by fluent bilingual interview staff who obtained informed consent. All face-to-face interviews relied on an open-ended semi-structured interview guide approved by the Institutional Review Board of the University of California, San Francisco. Interviews lasted approximately one hour. The open-ended questions were developed based on previous studies of Mexican immigrant and low-income populations' conceptions of oral disease and experiences with the oral health care system and in consultation with a team of specialists in Mexican-immigrant studies and children's oral health. Interviews addressed caregivers' conceptions of their children's oral health and disease and oral health-related behaviors based on these conceptions. All data were self-reported; no data came from medical or dental records.

Each interview was digitally recorded, translated to English by bilingual bicultural professionals, and then transcribed. Transcription accuracy and completeness was checked by listening to the original Spanish audiotape while simultaneously reading the translated version. Typed field notes were also made. Transcripts and notes were then independently read and coded by two bilingual researchers using NVivo 7.0® qualitative data analysis software (QSR International Pty Ltd, Victoria, Australia) to attach codes to specific segments of text and to track, search, and retrieve coded text. Where translation/interpretation permitted several possible understandings, the transcriber noted all possible variants and suggested the best one. The bilingual research staff read the transcripts, listened to the tapes, and made the final choice. Following standard procedures for qualitative data analysis, the two researchers independently read through the caregivers' responses and categorized them, reaching consensus on discrepant categorizations through discussion (Bernard 2005; Miles and Huberman 1994).

Segments of the transcripts coded initially for "children's dental problems" and "dental experiences" were then further refined to a content sub-code called "stains." The text of this sub-code was located in the audio file and the original conversation listened to, with detailed notes made of the actual Spanish words and phrases being used to describe tooth color and structural integrity. These notes were then used analytically to understand in more detail the interpretations given and the contexts in which certain color terms and commentaries on tooth decay were employed, as well as for accounts of care seeking in relation to these descriptions of dental problems. Typical quotations illustrating these common themes were selected for use in this manuscript.

Results

Study Participants

Between July 2006 and August 2007, a total of 48 Mexican caregivers were interviewed. Most mothers (90%) were immigrants from the rural areas or small towns of Western and Central regions of Mexico. They were predominantly modestly educated, undocumented, stay-at-home mothers with two young children, living on or near poverty level incomes.

Sociodemographic characteristics of this sample of women and their children are given in Tables 1 and 2. Most of the children (58%) were younger than five years of age. The mothers reported some caries experience for the majority of their children (61%). In the county studied (Santa Clara County, CA), all children regardless of legal or income status have access to some form of dental insurance, though a small minority of undocumented children were on a waitlist (see Table 2).

Overall, 37 Mexican immigrant caregivers (77% of the total sample of 48) interviewed during the course of this study discussed tooth discolorations; these 37 women comprised the sample for the sub-analysis reported here. Five of these female caregivers chose to be interviewed in English; the remaining 32 interviews were all conducted in Spanish. While the actual words were different, the ideas about tooth color and structural integrity expressed by the women did not differ by language.

The 37 women discussed the color appearance of the teeth and oral health care experiences of 55 separate individuals. This group was mostly comprised of the caregivers' own children but included references to children in general, people in general, their husbands, and the caregiver herself. Approximately 40 percent of discussions were initiated by the prompts, "Have you seen people with stained teeth?" or "Have you seen people with bad or ugly teeth?" The majority of comments about tooth color and damage, however, were spontaneously generated by the caregiver without any prompting.

Spanish Terminology: Dentition and Decay

Spanish terminology for tooth discoloration and its possible association with caries is broad and complex. First, Spanish-speakers tend to differentiate between *dientes* (teeth) and *muelas* (molars). In reference to both the primary and permanent dentition, anterior teeth (the incisors and canines) are referred to as *dientes*, and posterior teeth (the premolars and molars) are referred to specifically as *muelas*. This can lead to miscommunication between health professionals and Spanish-speaking patients, when each party does not realize the difference in meaning ascribed to "teeth." In this article, however, the term "teeth" follows standard English usage and refers to all components of the full primary or permanent dentition.

Next, while the term "caries" exists in both Spanish and English, it tends to be used differently and can result in some misunderstandings. In ordinary, everyday English, the term "caries" tends not to be used at all; rather, the word "cavity" is used to indicate the result of a decay process. In everyday Spanish, "caries" is the word used to indicate an outcome of a decay process (e.g., a cavity is referred to as "caries"). For oral health professionals speaking either language, however, the term "caries" can indicate either the disease and/or its outcome, but it is likely that dentists refer to caries as the process and use the phrase 'cariou lesion' to refer to the outcome or cavity. These terminological differences can lead to miscommunication between professionals and patients. Except where it is clear through italicization or context that we are quoting directly from the Spanish commentaries, in this paper we use "caries" in its common English language usage to mean the outcome of a process of bacterial attack which damages teeth.

Color Terms

Tooth discoloration can affect one or all surfaces of a tooth. When the discoloration affected just one or a few surfaces of a tooth, or was limited to a small area, caregivers described these teeth as *manchado*, meaning “stained” or “spotted.” In rare instances, the Spanish terms *puntito* (little spot) or *rayas* (streaks) were used in association with a description of discoloration.

All the terms that respondents used to describe tooth color were categorized into five basic groups: *blanco* (white), *beige* (beige or off-white), *amarillo* (yellow), *café* (brown), and *negro* (black). In many instances, caregivers used more than one color shade and/or more than one Spanish term for decay, describing discolorations as “yellow and brown” or “white and yellow.” In these situations, the instance was assigned to the least dark color category – thus, “yellow and brown” was classed as “yellow” in all analyses.

Blanco (white) generally described normal, healthy-looking teeth as well as white tooth discolorations, stains, or spots on a tooth.

Beige (off-white) included the Spanish terms *opaco* (dull), *beige* (beige), *no blanco* (off-white), *sucio* (dirty), and *no brillo* (not bright or shiny). Off-white tooth coloration was generally described as a “stain” and always carried a possible association with caries.

Amarillo (yellow) encompassed a wide range of descriptions of an *amarillento* (yellowish) shade, most often used to describe discoloration of the whole tooth and only occasionally used to refer to isolated spots on the tooth. The caregivers spoke broadly about *manchas* (yellow stains), and in many situations, it was added that attempts at brushing away yellow stains were not successful. In several situations, black or brown lines or spots were described in addition to overall yellow discoloration of the teeth.

Café (brown) incorporated the color brown as well as the Spanish term *oscuro* (dark). Brown was most commonly chosen as the term to describe what participants considered dental caries or decay. Caregivers who used this term were generally talking about children’s anterior teeth and sometimes described structural damage to the dentition as well.

Negro (black) also included one instance in which the color term *verde* (green) was used in combination with black. The color black was used with descriptions of a broad range of problems. The portion of the tooth that was discolored dictated whether the black discoloration was considered to be a “stain,” caries, or deterioration of the entire tooth (“rotting.”) In various instances, it was reported that attempts to brush the black color away were not successful. Explained one woman:

The three year old, my nephew, has *negro* (black) teeth. I once told him that they even looked *verde* (green). Yes! [with insistent tone.] He once came here, and I brushed his teeth really well, poor child. He even cried. His teeth still looked *negro* (black). His teeth looked *a su huesito, negro* (black to the bone).

Causes of Discoloration

Thirty-one of the 37 caregivers discussed what they thought caused discolorations, mentioning a total of 68 causes of varying kinds. While approximately one-third of caregivers offered just one reason, others mentioned up to four different possible causes of the various shades of color (see Figure 1).

The proportion of participants who offered specific causes is displayed in Figure 1. The most common explanation (offered by 59% of participants) was uncertainty about the cause of discoloration. Of these, three people did not further elaborate. The others, however, said that they did not know the cause for certain but offered at least one potential cause. Commented one woman after describing her son's teeth as *negro* (black) and *podrido* (rotten):

They just have too much sugar. I don't know. Or maybe it's in the family. I don't know. Or too much bottle-feeding at night and they left the bottle inside [the crib], or a cup... juice and baby bottle, and I think that's why. I don't know.

Fifty-two percent of the caregivers mentioned that poor oral hygiene (usually implying not brushing teeth properly) might have an impact on tooth color. Almost as many caregivers (48%) mentioned consumption of sweet foods and liquids such as sugar, candies, soda, juice, or chocolate milk as a cause of discoloration and possible tooth decay. Although many caregivers associate sweetened food and fluid consumption with subsequent discoloration and/or dental decay, mothers did not always seem to realize that even limited exposure can lead to oral health problems. The case of a three-year-old child, who did not eat a lot of candy and drank watered-down juice, was described by his mother who felt he should not have dental caries:

I do see that they are a bit *feo* (ugly), a little *sucio* (dirty).... I see that there is food there. I try to brush them [the teeth], but I can't. But, he doesn't eat candies. From what I understand, *caries* are caused by candies. He doesn't eat much candy. He does drink juice, but I water it down. I think he's not sick [with caries] yet. I think he just needs to take more care of his teeth.

Other explanations included ingestion of substances such as coffee, cigarette smoke (referring to adults), drugs, medications, or particular foods (35%), baby-bottle use (29%), the water (29%), or genetics (13%). Injury, lack of calcium, and lack of fluoride were categorized as "Other" causes of discoloration (13%). Too much fluoride was not mentioned as a cause of discoloration by any participant.

Structural Integrity of the Tooth

In addition to color terms, these Mexican immigrant mothers used a variety of terms to describe the appearance and structure of their children's teeth. Only one caregiver mentioned a connection between "plaque" and decay/caries. The Spanish terms "*manchado*" (stained/spotted), "*picado*" (decayed), or "*caries*" were commonly used by study participants as reasons why tooth discoloration was occurring. The Spanish term *podrido* (rotten) was used to describe several or extensively decayed teeth.

Manchado (stained/spotted) was a term used by caregivers to describe stained and spotted teeth. The entire five-color range was used to describe *manchas* (stains/spots). Many of the caregivers (66%) stated that discolorations were only “stains” and not evidence of caries. However, approximately one-third of the caregivers went on to further describe these instances as being associated with caries or decay and, therefore, with damage to the structural integrity of the tooth. One caregiver used the term “stains” and “rotten,” explaining that her child, aged six years, ended up having two teeth extracted.

Well, I’m not sure what happened but they [teeth] started to go *negros* (black), all *manchados* (stained/spotted), until they went *negro, negro, negro* (black, black, black).

Picado/caries (decayed/carious, cavities) were two terms frequently used interchangeably in the same sentence. So we considered these analytically as a single category. Both terms referred to visible signs that a tooth had structural problems. These signs included discoloration as well as visible damage:

When my daughter [age five years] had *caries*, you could see them on her teeth, on her canine teeth, little *ollitos* (dents/holes), but I can’t see anything with him [her son, age three years].

Caregivers used other words to describe visibly severe decay and deteriorating teeth: *poner chiquitos* (to get smaller), *romper* (to break), *cuarteado* or *partido* (cracked), *fragiles* (fragile), *ollito* (dent/hole), *quebrado* (chipped, broken off), and English phrases such as “there is none” and “eaten up.” When terms such as these were used, caregivers seemed in the rest of their description to be mostly talking about dark-yellow to black coloration and severe *picado* (decay) or caries.

Podrido (rotten) was a term always associated with *negro* (black) discoloration. These individuals described the complete deterioration of an entire tooth or set of teeth. Often, the teeth were said to be *feo* (ugly) and falling out or crumbling away; one instance was described as being accompanied by an abscess. Two mothers commented thus:

I have seen many children who have *podridos* (rotten) teeth. You can see that their teeth at the front are *carcomidos* (rotten/eaten away). I’ve seen that.

Like I said, her [child, age five years] teeth started to *romper* (break) because of the juice. I don’t know what that is called. She had something here in her teeth, and she had *caries*. Her molars were *picadas* (decayed). They were *negras* (black). She had four molars that were *oscuras* (dark); some were darker than others. That’s when we decided to take her to the dentist.

When the caregivers talked about black *manchas* (stains), they were generally describing spots and black lines on the edges of teeth (e.g., discoloration of part of the tooth). When they discussed black decayed/carious (*picado*), with caries and *podrido* (rotten) teeth, they were generally talking about black discoloration of the whole tooth or a set of teeth. *Negro* (black) teeth were often said to be “falling out” on their own or were eventually extracted.

In order to examine if there was a pattern to the ways in which these low-income Mexican mothers used various terms, a matrix was constructed to show how descriptions of tooth color related to descriptions of tooth integrity. In the commentaries spontaneously generated by the mothers in this sample, darker shades of discoloration were associated with extensive visible decay and destruction of tooth structure, as Table 3 demonstrates.

Care Seeking

Twenty-one of the 37 caregivers talked about responses to tooth discoloration, which affected a member of their immediate family, a discussion of 31 individuals in total:

I had a problem with her [child, age one year]. Her teeth started to go black (*poner negros*). I took her to the dentist because I had questions regarding her teeth....

Seeking care from oral health practitioners in response to tooth discoloration varied, from no action (16%) through self or home care (23%), to eventual consultation during a regularly scheduled visit (29%), to immediate seeking of professional assessment and treatment (32%). Another matrix was constructed to discern any pattern to the connection these women were making between tooth color and care seeking. Table 4 depicts how darker discolorations seemed more likely to lead to care from a professional dental source than lighter discolorations or no visible damage.

Usually, no action was taken for teeth described as having very light discolorations, particularly if the color term used was *beige* (beige) and there was no recognized or visible structural damage to any teeth. The cases of a child with *manchas blancas* (white spots and stains), a husband with *manchas amarillas* (yellow spots and stains), and the three caregivers who felt their own teeth were not very white, all resulted in no care seeking.

“Home care” was a commonly reported response to lighter shades of discoloration, especially to yellow (*amarillo*) discolorations. “Home care” responses involved actions such as improving oral hygiene by brushing teeth more frequently and by using floss, mouthwash, or toothpaste, as well as decreasing a child’s juice consumption. Sometimes, caregivers spoke of continuing to brush discolored teeth rather than seek professional care, under the assumption that the color would eventually fade and the condition of the teeth would improve or not deteriorate further, or in the belief that the child was too young to visit a dentist:

When she was three years old, I started to see that her teeth were *amarillos* (yellow) and *picados* (decayed). That was because of the bottle.... I tried to give her less juice in her bottle, because that’s what they had told me at Women, Infants, and Children (WIC). ...I took her [to the dentist] when she was three years old because she fell and they [upper front teeth] *se le partió* (cracked) down the middle. They [teeth] were already really sensitive because they were so *picados* (decayed). I took her, and they [dentist] pulled them out from the root.... If that [fall] hadn’t happened, then I wouldn’t have taken her. I probably would have taken her when she was older....

For some people, “home care” was a compromise, as their desired response to seek professional help was thwarted because of financial constraints or other difficulties in

accessing care. In this particular county, however, where all children had access to dental insurance, financial constraints affected the caregiver's other adult family members far more than it did their children.

In one-third of the instances discussed ($n=11$ of 31), *negro* (black) and *café* (brown) discolorations ultimately resulted in consultation with a dentist. In seven of these 11 instances, tooth discoloration was the specific prompt for a more or less immediate trip to the dentist, whereas in the other four instances, the issue of the tooth discoloration was eventually addressed during a regular visit to the dentist:

I started brushing them [black stains] when she was one year old. At the beginning, it was going away, but then they [stains] became more apparent. I'd brush them, but they wouldn't go away. I am still brushing them, but it [black color] doesn't go away. Maybe when she gets her teeth cleaned at the dentist, it will make them go away. I don't know.

Treatment

These caregivers provided limited commentary on the kinds of professional responses received upon professional consultation. For the 19 individuals who eventually or immediately sought professional care (61% of all 31 individuals discussed), however, some sense of the oral health providers' responses could be gleaned from the mothers' accounts.

Caregivers recalled the treatment provided in 11 of the 19 instances presented to a dentist. These children received fillings (two instances), crowns (four instances), and extractions (five instances). A two-year-old child's mother commented with some surprise and regret:

The teeth were not completely *picado* (decayed), they were just *amarillento* (yellowish), as if they were *carcomiendo* (rotting/being eaten away) – not *negro* (black) or anything. They [dentist] decided to take all his teeth out.

For those mothers who waited to address the discoloration of the child's teeth during a regular dental visit ($n=4$), three children ended up with teeth being extracted while another child had crowns placed. Two of the children who had teeth extracted had teeth described as *negro* (black) and *podrido* (rotten) and also ended up having other teeth filled. The child who had crowns placed had caries *amarillo* (yellow) and also had restorations (fillings) in other teeth.

For those who took a trip to the dentist specifically because of the discoloration ($n=7$), two children received fillings, two received extractions, and three had crowns placed.

Caregivers reported that – for a variety of reasons – no treatment was provided for eight of the 19 individuals who sought professional care. These reasons included, but were not limited to, being reassured by the dentists that the discoloration was normal, not having the financial means to obtain radiographs and treatment, receiving a recommendation to monitor the discoloration at a follow-up appointment, and waiting for young children's discolored baby teeth to fall out. Some women reported not receiving a clear explanation from the dentist on what caused the discoloration or what should be done about it.

I don't know if that's what made her [three-year-old] teeth get so *fragiles* (fragile) and what made them go *café*s (brown) – not *amarillos* (yellow), but *café*s (brown)! I'm telling you, her teeth would *deshacer* (crumble) on the inside and one molar.... When her molar was coming in, I think it already had a problem because it had an *ollito* (dent/hole) in it, and it started to *picar* (decay). The dentist said that it wasn't *caries*. We don't know what it was, but it wasn't *caries*. From when the tooth came out, it looked *amarillo* (yellow) on the outside, with an *ollito* (dent/hole) in the middle.

Discussion

In this convenience sample of low-income Mexican-origin mothers of young children, a relationship was observed between descriptions of dark discoloration and disintegration of the tooth structure and of dark color and subsequent care seeking from an oral health professional. When a Mexican-origin caregiver enters a clinic talking about dark tooth discoloration in a young child, it is very possible that he or she is also alluding to a structural problem with the child's tooth.

We did not assess how well the color terms used matched a standard color sample or whether one woman's description of a color, say *Amarillo* (yellow), matched any other woman's use of that term. We were not trying to assess the accuracy or "truth" of their expressions but rather to find out how and when they used the terms and the context and meaning ascribed. We aimed to discern whether women associated particular color shades with particular degrees of tooth decay and what actions they took as a result. As the color terms invoked were always analytically assigned to the lightest shade category mentioned (i.e., "yellow-brown" was classed as "yellow,") the associations between dark color and deteriorated teeth and between dark color and care seeking may in fact be under-estimates. Generally speaking, Mexican caregivers did not fully understand what caused the discoloration they noticed in their children's dentition, though they had many alternative, albeit often tentative, ideas about this process. Many offered suggestions based on what they had heard, learned, or understood from a variety of sources, including federal nutrition sites (e.g., WIC), parental education programs, dentists, and general beliefs in the community (Horton and Barker 2008, 2009a, 2009b). These suggestions reflected a reasonably accurate, though usually partial, knowledge that poor oral hygiene, ingestion of sweet substances, and use of a baby bottle can cause decay and associated discolorations in young children's teeth (Hoeft, Barker, and Masterson 2010).

Such knowledge, however, was not well transformed into action. Though dissatisfied with the color of their children's teeth, often these Mexican parents did not recognize the seriousness of changes in tooth color or structure and, therefore, did not necessarily seek professional advice or care, especially for light shades of discoloration or slight structural defects to the tooth. The association revealed in these women's verbal accounts is bolstered by the trends discernible in Tables 3 and 4 between discoloration and structural damage to a tooth and between discoloration and the decision to consult a dentist. Very dark shades were more likely to lead to professional care seeking while less severe discoloration did not. This is concerning, as early stages of caries are associated with lighter shades of tooth

discoloration (e.g., “white spot lesions” as an initial sign). These can be re-mineralized by fluoride treatment, whereas dark discolorations often indicate active, even severe, decay as well as partially or fully arrested caries which require restoration or extraction (Kidd 2005; Koch and Poulsen 2001).

Thus, more caregiver education is needed about early signs of tooth decay, especially in young children. By making caregivers aware of the connection of light-colored stains with the decay process as well as the potential for earlier, less-invasive and cheaper treatments (such as fluoride varnish and sealants) from dentists at this early stage of decay may help to foster not just earlier care seeking practices but greater preventive activity.

One recent report, for example, notes that rural Mexican immigrant parents who notice dark discolorations on their children’s teeth view these simply as “stains” warranting tooth cleaning and do not associate discoloration with possible carious decay. These parents do not seek professional care for restorative or preventive treatment unless the child also complains of pain (Horton and Barker 2009a). It is also possible that some children who needed dental care did not receive that attention because of parental misunderstandings about costs of treatment, difficulties in access to professional care, or dental fear and anxiety. The type of treatment generally received by individuals who sought professional dental care emphasizes the effects of delayed care seeking. Delay in seeking care resulted in invasive and substantial treatment, even extraction. A child’s loss of teeth – permanent teeth in particular – due to early extraction is an especially severe consequence, as it has a lifelong deleterious impact. It not only affects the alignment of the remaining teeth but also the individual’s ability to bite and chew food, to speak clearly, as well as their appearance, even their employability (Hyde, Satariano, and Weintraub 2006).

This study is limited by its small convenience sample and single urban location. Other limitations are a lack of access to professionally determined clinical status especially with respect to caries. Caution must be taken when making generalizations especially to other Mexican-American populations, other socioeconomic strata, or different geographic regions. Nevertheless, as one of few studies that has investigated how children’s caregivers interpret and respond to signs of dental discoloration and damage in children’s teeth, this study makes a valuable contribution. It is important to understand how parents of young children interpret dental discoloration because parental perceptions and actions based thereon are so influential in care seeking for their children. This is particularly important in minority communities, such as the low-income Mexican community, which often have quite distinct oral health beliefs, understandings, and responses, as well as a high prevalence of oral disease, especially among young children.

Spanish terminology used to describe the various shades of tooth discoloration and the structural integrity of children’s teeth, was broad and complex. Spanish terms like “*manchado*,” “*picado*,” “*caries*,” and “*podrido*” have nuanced meanings, which allude to the level of structural damage and decay. We urge clinicians and language interpreters who work with oral health professionals to know not just the Spanish terms used to describe discolored or damaged teeth but also the meanings of these to Mexican patients so that

culturally-sensitive, focused educational messages can be developed about the early signs of tooth decay.

Discoloration or tooth disintegration was often visible to and noticed by these low-income urban Mexican caregivers long before they actually recognized these as signs of an oral problem and certainly before they sought care outside the home. Children were taken to the dental clinic only after parents recognized that the deleterious changes in the appearance of their child's tooth signaled a problem. Recognition of a problem has to involve the assignment of a particular meaning – namely, that the observed change or difference in tooth color or integrity represents an abnormality that is sufficiently serious as to constitute a problem that needs to be addressed. Mothers often delayed professional assessment until the discoloration or deterioration was severe, resulting in a need for extensive restorative treatment or extraction because they did not recognize or act on early signs of a problem. This is consistent with reports of rural Mexican and Salvadoran caregivers' conceptions of their children's oral disease in which some caregivers believe that dental "stains" (most probably carious lesions) are a reversible condition able to be brushed away or at least improved by increased tooth-brushing or other oral hygiene practices (Horton and Barker 2008, 2009b). This is also consistent with care seeking practices, with parental interpretations of what constitutes disease (decay) being different from those of dental professional interpretations (Horton and Barker 2009b).

It is likely that the level of discoloration and structural damage that constitutes a "problem" to caregivers is informed by their experiences growing up in Mexico, where much lower levels existed of both childhood tooth decay and preventive dental care than is currently available for their children in the United States. Horton and Barker (2009b) have suggested that Mexican immigrant parents have readily adopted the "American" cariogenic diet and feeding practices for their children after moving to the United States but without a similar uptake of oral health prevention behaviors. Recognition and interpretation of dental decay is another culturally influenced factor, which has not yet been adjusted to match clinical definitions in the American health care system.

Delayed recognition of discoloration by parents is a problem, and the subsequent delayed care seeking are likely contributing factors to disparities in caries risk and prevalence rates for this population. It additionally contributes to "stigmatized biologies." Here, late care seeking, due to cultural interpretations of discoloration and disease (caries), coupled with strictly limited public or no insurance combine to create embodied disparities in oral health status and facial appearance which perpetuate social inequalities (Horton and Barker 2009b, 2010a, 2010b).

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Figure 1.

Table 1

Socio-Demographic Profile of Caregiver Participants

CHARACTERISTIC	TOTAL * (N=37)
Country of Birth	
Mexico	32 (86%)
U.S.	5 (14%)
Gender	
Female	37 (100%)
Age (n=36)	
Mean $\pm$ SD	31.2 $\pm$ 5.7
Median	31.5
Range	20–44
21–30 years	15 (42%)
31+ years	21 (58%)
Years of Education Completed (n=36)	
Mean $\pm$ SD	9.3 $\pm$ 2.8
Median	9.0
Range	2–15
0–3 years	1 (3%)
4–6 years	6 (17%)
7–9 years	15 (42%)
10–12 years	11 (30%)
13+ years	3 (8%)
Annual Household Income (n=32)	
Mean $\pm$ SD	\$24,000 $\pm$ 13,000
Median	\$23,000
Range	\$4,500–70,000
<\$15,000	10 (31%)
\$15,000 – \$30,000	13 (41%)
\$30,000	9 (28%)
Marital/Partner Status	
Mother has partner	32 (86%)
Mother is single	5 (14%)
Occupation	
Homemaker	29 (78%)
Employed	8 (22%)
Rural or Urban Origin (n= 32)^{† ‡}	
Rural origin	18 (56%)
Urban origin	14 (44%)

CHARACTERISTIC	TOTAL * (N=37)
Years in the U.S. (n=32)[‡]	
Mean ± SD	9.7 ± 5.0
Median	9.0
Range	1–21
<10 years of residence	19 (59%)
10+ years of residence	13 (41%)
Legal Status (n=35)	
Undocumented	24 (69%)
Documented	6 (17%)
Citizen	5 (14%)
Dental Insurance Type (n=35)	
No Insurance	24 (69%)
Denti-Cal (Medicaid)	8 (23%)
Private Insurance	3 (8%)
Children per Household	
Mean ± SD	2.4 ± 1.0
Median	2.0
Range	1–5
1 child	7 (19%)
2 children	14 (38%)
3 children	10 (27%)
4 children	5 (13%)
5 children	1 (3%)
Age of Youngest Child (yrs)	
Mean ± SD	3.2 ± 2.8
Median	3.0
Range	3 wks–13
< 1 year	6 (16%)
1–2 years	11 (30%)
3–5 years	17 (46%)
6+ years	3 (8%)
Families with at least one child 5 years	34 (92%)
Age of Oldest Child (yrs) (n=30) [¶]	
Mean ± SD	8.9 ± 4.0
Median	9.0
Range	3 – 18
< 5 years	4 (13%)
5–10 years	17 (57%)
11+ years	9 (30%)

Because the distribution of responses is skewed, where applicable, both means and medians are provided

* The number of respondents varied slightly by question; so number of replies is noted for each item when other than N=37

[†] Respondents self-identified their origins as either rural or urban. Generally, a rural town or “*pueblo*” was interpreted as having a population of 15,000 or less; an urban area as having a population larger than 15,000. Despite their larger size, these urban areas in Mexico were not major metropolitan areas, but rather central communities primarily serving the surrounding rural region.

[‡] Excludes U.S.-born participants (n=5)

[¶] Excludes families with only one child (n=7)

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Table 2

Socio-Demographic Profile of Children

CHARACTERISTIC	TOTAL* (N=90)
Age	
Mean $\pm$ SD	6.0 $\pm$ 4.1
Median	5.0
Range	3 wks–18 yrs
5 years	52 (58%)
Gender (n=64)	
Female	32 (50%)
Male	32 (50%)
Country of Birth	
U.S.	77 (86%)
Mexico	13 (14%)
Age at arrival in U.S. (n=13) †	
Mean	6.8 $\pm$ 5.1
Median	5.0
Range	0–17
Dental Insurance Type (n=85)	
Uninsured/on wait list	2 (2%)
Denti-Cal (Medicaid)	48 (57%)
County Insurance	29 (34%)
Private Insurance	6 (7%)
Parent-Reported Dental Status	
Age of toothbrush initiation (yrs) (n=61)	
Mean	1.7 $\pm$ 0.8
Median	1.7
Range	0–5
Ever had dental caries (n=74)	45 (61%)
Ever had tooth discoloration	23 (26%)

Because the distribution of responses is skewed, where applicable, both means and medians are provided

* The number of respondents varied slightly by question; number of replies is noted for each item when other than N=90

† Excludes U.S.-born participants (n=77)

Table 3

Association of Color Terms with Terms Describing Structural Deterioration of Teeth*

	Stained/Spotted <i>Manchado</i>	Decayed/Caries <i>Picado/Caries</i>	Rotten <i>Podrido</i>
White <i>Blanco</i>	5	0	0
Beige <i>Beige</i>	2	1	0
Yellow <i>Amarillo</i>	15	4	0
Brown <i>Café</i>	2	4	0
Black <i>Negro</i>	5	2	4

*
 $r_s=0.435$, $N=44$ instances, $p=.003$

Table 4

Association of Care Seeking in Response to Tooth Discoloration*

	No Action	Self Care	Asking the dentist	Trip to the dentist
White <i>Blanco</i>	1	1	1	0
Beige <i>Beige</i>	3	1	1	0
Yellow <i>Amarillo</i>	1	5	3 [†]	3 [†]
Brown <i>Café</i>	0	0	0	1
Black <i>Negro</i>	0	0	4	6

*
 $r_s = -0.657$, $N = 31$ instances, $p < 0.001$