# Self-reported temporomandibular joint disorder symptoms, oral health, and quality of life of children in kindergarten through grade 5

## Do sex, race, and socioeconomic background matter?

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## ABSTRACT

**Background.** The authors' objectives were to determine the percentage of children in kindergarten through grade 5 who reported symptoms of temporomandibular joint disorder (TMJD); to assess whether sex, race, and socioeconomic background mattered; and to explore the relationships between TMJD and children's oral health and oral health–related quality of life (OHRQoL).

**Methods.** The research team conducted face-to-face interviews with 8,302 children in kindergarten through grade 5 (51% female, 49% male; 53% African American, 42% white). They conducted oral health screenings with 7,439 children.

**Results.** Overall, 23.6% of the children reported pain when chewing tough food, and 18.8% reported pain when opening their mouth wide; 23.2% reported hearing a sound (clicking) when opening their mouth wide. Female students were more likely than male students and African American children were more likely than white children to report TMJD symptoms. The prevalence of TMJD symptoms did not correlate with whether the children had a need for oral health care services or whether they had an abscess or carious teeth with pulpal involvement. TMJD symptoms were associated significantly with children's OHRQoL.

**Conclusions.** Considerable percentages of 4- to 12-year-old children reported TMJD symptoms, with girls and African American children being more likely than their counterparts to be affected. Experiencing TMJD symptoms was associated significantly with poorer OHRQoL.

**Practical Implications.** Dental practitioners need to be aware that substantial percentages of kindergarten and elementary school–aged children experience TMJD symptoms. Taking a dental history and conducting an oral examination, therefore, should include assessments of the signs and symptoms of TMJD; treatment recommendations should be provided for affected children.


**Key Words.** Temporomandibular joint; children; oral health; sex; socioeconomic factors; quality of life; oral health–related quality of life; dental care for children.

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Self-reported symptoms of temporomandibular joint disorder (TMJD) include reports of problems related to the masticatory system, such as pain when chewing tough food, limitations of mandibular movement, and joint sounds.[1] Although investigators have widely discussed and analyzed adult dental patients' TMJD issues since the early part of the 21st century,[2,3] fewer investigators have conducted studies about TMJD among children and adolescents. However, research results published as early as 1995 showed that considerable percentages of children and adolescents do indeed experience symptoms of TMJD.[4] For example, the results of studies with younger children showed that 16.5% of 3- to 5-year-old children had 1 or more signs of TMJD[5] and that 17% of 4- to 6-year-old children were affected by TMJD.[6] These percentages tended to be even higher in studies with older children. For example, Thilander and colleagues[7] showed that 25% of the 5- to 17-year-old children in their study had 1 or more signs of TMJD, and Feteih[8] found that 21.3% of their 12- to 16-year-old study participants exhibited at least 1 sign of TMJD. In 2014, Franco-Micheloni and colleagues[9] reported that 25.2% of 12- to 14-year-old children in their study had TMJD-related pain. Although the reported prevalence of TMJD

Supplemental material is available online.

in children has ranged considerably (7% in a study by List and colleagues[10] in 1999, 33% in a study by Moyaho-Bernal and colleagues in 2010,[11] and 35% in research conducted by Vierola and colleagues in 2012[12]), there is no doubt that TMJD in children deserves attention. One question is whether certain subgroups of children differ in how likely they are to report TMJD symptoms.

Among adult patients with TMJD, there is clear evidence that women are more likely than men to report TMJD symptoms.[13-18] The evidence for a sex difference in the prevalence of TMJD in children has been mixed. Although some authors found that girls were more likely than boys to experience TMJD,[4,5,8,19-25] the investigators of other studies found no sex differences[26-31] or inconclusive results.[32] Therefore, it is worthwhile to explore further whether girls and boys differ in the frequencies with which they report TMJD symptoms.

A second, less well-studied sociodemographic characteristic that investigators have found to be a risk factor for TMJD in adults is the patients' ethnicity or race.[33,34] For example, Slade and colleagues[34] found that Asian American participants had a lower incidence of TMJD and African American participants had a greater incidence compared with white participants. Among children, Widmalm and colleagues[4,26,35] found that African American children were more likely to report TMJD-related pain compared with white children. However, socioeconomic differences might play a role when comparing the prevalence of TMJD in black participants versus white participants.[36] Given that patients in all age groups in the United States are likely to experience more dental disease if they come from socioeconomically disadvantaged backgrounds,[37] it might be interesting to explore whether these differences also can be found regarding TMJD symptoms. More than 50 years ago, Franks[38] suggested to consider this relationship in adult patients, and in 1995, Widmalm and colleagues[4] proposed considering socioeconomic background as a contributing factor to TMJD in children. Helöe and colleagues[39] provided the first empirical evidence that there might be a relationship between socioeconomic status and the prevalence of TMJD in adult patients. Given these early considerations, it seems to be timely to explore the question of whether such a relationship exists in children.

To our knowledge, no researchers so far have explored whether there is a relationship between poor oral health and TMJD. This is not surprising because there is no reason to assume that TMJD would be related to the presence of caries or periodontal disease. However, one could make an argument that pain caused by abscesses or caries with pulpal involvement might radiate and thus lead to higher reports of TMJD symptoms. We therefore explored this question in our study. Although there is no empirical evidence so far that supports a relationship between poor oral health and TMJD, 2 groups of authors have explored whether children's experience of TMJD symptoms would be related to a poorer oral health–related quality of life (OHRQoL) overall. Both Jedel and colleagues[40] and Barbosa and colleagues[19] found that children with TMJD symptoms had a poorer OHRQoL than did children with no TMJD symptoms.

In summary, our objectives for this research study were to determine the percentages of children in kindergarten through grade 5 who reported TMJD symptoms and to assess whether male versus female children, African American versus white children, and students in schools with lower versus higher percentages of participants in the free school lunch program would be more likely to report TMJD symptoms. In addition, we explored the relationship between self-reports of TMJD symptoms and experiencing other oral health problems and between TMJD symptoms and having a poorer OHRQoL.

## METHODS

The Institutional Review Board (IRB) for the Behavioral and Health Sciences at the University of Michigan, Ann Arbor, MI, and the IRB of C.S. Mott Children's Health Center, Flint, MI, approved this study.

**Respondents.** We collected data from 8,302 children in 35 different schools. On average, 339 children were enrolled in each school. Overall, 72% of the children returned a consent form signed by their parents, and we screened and enrolled 56% of the total number of students in the study. Approximately one-half of the children were boys (n = 4,099; 49%) and approximately one-half were girls (n = 4,193; 51%). Most of the children were African American (n = 4,414; 53%), and 42% were white (n = 3,518). On average, 72% of the children in these 35 schools participated in the free school lunch program.[41] Children from families with incomes at or below 130% of the federal poverty level[42] were eligible for free meals and milk and could participate in this program.

**Procedure.** Before the start of the school year, the parents of students in the 35 participating schools received information about the study and a consent form. The parents returned the completed consent form to the school by sending it along with their child. A total of 72% of the parents gave written consent for their child to participate in the study. Over the course of 2 school years, the research team visited each of the 35 schools twice and conducted oral health screenings and face-to-face interviews with students who had submitted parental consent that they could participate in the study, were present on the day of the school visit, and gave their assent to participate.

**ABBREVIATION KEY.** **IRB:** Institutional review board. **MOHRQoL-C:** Michigan Oral Health–Related Quality of Life Scale–Child Version. **OHRQoL:** Oral health–related quality of life. **TMJD:** Temporomandibular joint disorder.