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# Prevalence of temporomandibular disorders and bruxism in seniors

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## Abstract

**Background:** Information on the prevalence of temporomandibular disorders (TMD) or possible/probable bruxism in seniors is heterogeneous and sparse.

**Objectives:** To elucidate the prevalence of TMD and possible/probable bruxism in German adults aged 60 years and older.

**Methods:** Participants of the Interdisciplinary Longitudinal Study of Adult Development and Aging (ILSE) born between 1950–1952 (C1) and 1930–1932 (C2) were examined in 2014–2016 (fourth wave). The participants were surveyed and clinically examined by one calibrated examiner. Two questions of the Patient Health Questionnaire (PHQ) were utilised to evaluate self-reported bruxism. The clinical examination included signs of probable bruxism and the RDC/TMD examination protocol.

**Results:** Data from 191 participants were available. No RDC/TMD diagnosis was made in 83.2%. Of the participants, 15.2% received a single diagnosis and 1.6% multiple diagnoses that included disc displacements (9.4%) and degenerative joint diseases (8.9%). A total of 24.7% reported bruxism that included self-reported awake bruxism in 11.9% and sleep bruxism in 16.2%. Wear was clinically identified in 27.2% of the participants. No sex-related differences were observed. Significant differences were detected for probable bruxism between C1 (14.1%) and C2 (54.3%).

**Conclusion:** In the German population aged 60 years and older, the prevalence of TMD is 16.8%. TMD is characterised by temporomandibular joint disorders, including disc displacements and degenerative joint disorders. Bruxism was observed in a quarter of the old population.

KEYWORDS
awake bruxism, elderly, orofacial pain, seniors, sleep bruxism, temporomandibular joint disorders

## 1 | BACKGROUND

The World Health Organisation estimates that the number of people aged 60 years or older will increase from 1 billion in 2019 to 2.1 billion in 2050.[1] This development will require adaptations across all sectors of society, especially in health care. In oral health care, extensive information is available regarding tooth loss, dental caries and periodontal diseases and associated changes in terms of ageing and older people.[2,3] Research projects have attempted to detail prevalence values and focused on these oral health conditions and,

for example, their relation to common diseases in old people. Yet, information on temporomandibular disorders (TMD) or bruxism in seniors is sparse. In particular, prevalence values are necessary to identify requirements for planning further research focusing on aetiology and therapy.

The prevalence of temporomandibular disorders changes throughout life, and females have three times the odds than males.[4] During pubertal development, it was observed that women have more limitations in mandibular movements and an increase of temporomandibular joint (TMJ) clicking sounds until the age of 18 years in comparison to men.[5] After the age of 18 years, a positive association between age and the occurrence of TMD was observed until the age of approximately 45 years.[4] Afterwards, the prevalence of TMD decreases.[6] At older ages, a shift from disorders with muscular origin towards disorders with articular origin was described, while older adults perceive less pain than younger adults. For seniors, a lower severity of TMD-related problems was reported and an increase in objective joint sounds was observed.[7,8]

Data on bruxism in seniors is even more heterogeneous and sparse. A recent review concluded that the prevalence of bruxism cannot be specified in any population.[9] Another systematic review described a prevalence of 3–49% for sleep bruxism in children and adolescents and of 1–15% in adults. For awake bruxism, only values for adults were reported, ranging from 22% to 30%.[10] Another study observed that the prevalence of possible bruxism in 70-year and 80-year-olds in Sweden was 16%.[8] Nonetheless, age seems to be a relevant factor for bruxism.[10,11] It was observed that patients with TMD younger than 60 years, had a 1.7 times higher risk to report sleep bruxism than older TMD patients.[12]

In 1993, a longitudinal research project called the "Interdisciplinary Longitudinal Study of Adult Development and Aging" (ILSE) was initiated,[13] which focused on self-determined adults selected from local registries in five urban areas in Germany. In the ILSE investigation, demographics, data on the individual cognitive representation of the environment, and data on health should be collected over years. Participants were stratified by gender, age and residence and invited to take part in the study. These participants were interviewed and examined in various aspects, that is, general and oral health. Several publications have already dealt with the study design and the results gathered from ILSE.[14–18] In total, three follow-up assessments were performed, the most recent in 2014 and 2016 (fourth wave). At that time, a dental and functional examination was added in the study centre of Leipzig. During the latter, the participants who had become seniors were examined according to the Research Diagnostic Criteria for Temporomandibular Research (RDC/TMD). In addition, data concerning anamnestic and clinical signs and symptoms of bruxism were collected. The data for signs and symptoms of TMD have already been published elsewhere.[16]

The present investigation aims to identify prevalence values for TMD in German adults aged 60 years or older according to the RDC/TMD diagnostic algorithms. In addition, prevalence values for possible and probable bruxism are presented.

## 2 | METHODS

Participants born between 1950- 1952 (C1) and 1930–1932 (C2) were examined regarding orofacial/dental aspects during the third follow-up (fourth wave) assessment of the ILSE study at the study centre of Leipzig.[13] The participants received a questionnaire and were examined according to the RDC/TMD guidelines. Among other things, the questionnaire included the Patient History Questionnaire (PHQ) that contained the following questions:

> Have you been told, or do you notice that you grind your teeth or clench your jaw while sleeping at night? (PHQ question 15c),
> During the day, do you grind your teeth or clench your jaw? (PHQ question 15d).
> These questions were used to describe possible bruxism.

In addition to the assessment of manifold dental, prosthetic and functional aspects, the clinical examination included signs of probable bruxism, that is, indentations on the tongue, linea alba on the inner cheek, and visual assessment of (artificial) tooth wear. Moreover, the RDC/TMD examination protocol was used and a diagnosis according to decision trees was made. The clinical examination was performed by a single calibrated dentist (C.A.). All participants gave their signed informed consent to take part in the study. The study was conducted in accordance with the Helsinki Declaration. The local ethical committee approved the investigation (341/13-ff).

The statistical analysis (SPSS 29; IBM) was performed with descriptive statistics and Chi-square tests. The level of significance was set to $p < .050$.

## 3 | RESULTS

Between 2014 and 2016, 192 participants were recruited. For one participant, no information regarding sex was available; thus, the corresponding data were excluded from statistical calculations. Data from 191 participants were analysed, including subgroup C1 with 121 participants (64.4 ± 1.4 years, 47.1% female) and subgroup C2 with 70 participants (83.6 ± 1.2 years, 45.7% female).

### 3.1 | RDC/TMD diagnosis

According to the RDC/TMD diagnostic algorithms, 159 participants (83.2%) received no RDC/TMD diagnosis, 29 participants (15.2%) received a single diagnosis, and three participants (1.6%) received multiple diagnoses (Figure 1). All diagnoses were related to RDC/TMD diagnostic algorithms for disc displacements (DD/group IIa; $n = 18/191$, 9.4%) or degenerative joint diseases (DJD/groups IIIb and IIIc; $n = 17/191$, 8.9%). In subgroup analyses, no significant differences were identified between females and males ($p \geq .117$) or between C1 and C2 ($p \geq .240$).

### 3.2 | Possible and probable bruxism

Out of the 191 participants, 166 participants answered both questions addressing self-reported bruxism. A total of 24.7% participants reported bruxism. Self-reported awake bruxism was observed in 11.9% of the participants and self-reported sleep bruxism in 16.2% of the participants. The clinical examination revealed (artificial) tooth wear in 27.2% of the participants. Clinical signs for linea alba were detected once (0.5%) and indentations on the tongue twice (1.0%). For more details please see Table 1.

In group comparisons, no significant differences between C1 and C2 were identified for possible bruxism ($p = .380$; Figure 2). Within each group, no significant differences were detected for sex ($p \geq .614$).

For probable bruxism, a significant difference between C1 and C2 was detected, as 14.1% of C1 and 54.3% of C2 had clinical signs of bruxism (probable bruxism $p < .001$; tooth wear $p < .001$). No sex-related differences were observed for probable bruxism in the subgroups ($p \geq .115$).

## 4 | DISCUSSION

The present study revealed that only RDC/TMD diagnoses with articular origin were present in the senior cohort. Most of the participants had no RDC/TMD diagnosis according to the diagnostic algorithms (83.2%). Self-reported bruxism was detected in 24.7% and clinical signs of bruxism – especially (artificial) tooth wear – were observed in 28.8% of the participants. In very old Germans (C2), significantly more participants showed clinical signs of bruxism.

The results of this investigation are in contrast to observations in the general adult population. A systematic review by Manfredini et al. reported prevalence values for the RDC/TMD diagnosis 'myofascial pain (Ia)' ranging from 6.0% to 12.9% for.[19] However, in a cohort of older Vietnamese people, the prevalence of myalgia was low (3.5%).[20] These results are similar to the results of the current investigation, since no RDC/TMD diagnosis with muscular origin was observed. Nevertheless, diagnoses with articular origin were observed in the Vietnamese cohort (37.6% DD, 34.9% DJD) and in the current German cohort (9.4% DD, 8.9% DJD). This corroborates results from other investigations that observed a shift from disorders with muscular to those with articular origins while ageing.[7,8] However, the values of the current German senior cohort were relevantly lower than in a recent systematic review by Valesan et al. who included results from the RDC/TMD and DC/TMD in the general population. They determined higher prevalence values of 31.1% for joint disorders, which included 19.1% DD and 9.8% DJD.[21] Nevertheless, the systematic review by Manfredini et al.[19] focusing on the RDC/TMD revealed similar prevalence values ranging between 8.9 and 15.8% (for DD) or even lower ranging between 0 and 3.6% (for DJD) than in the current German cohort. The higher prevalence of TMJ-related diagnoses is not a surprise, since an increase in degenerative alterations of the TMJ was reported with the age of 60 years and older.[22,23] For 30 participants of the ILSE, these degenerative alterations were verified by using MR images in an earlier follow-up assessment. In MR images, 70% of the investigated joints showed radiological signs of DJD and 27% of DD.[24,25] The smaller prevalence of TMJ-related RDC/TMD diagnoses in the present study might be due to the moderate reliability of detecting TMJ sounds and the diagnostic algorithms of the RDC/TMD.[26,27] However, the observed co-existence of diagnoses DD and DJD is typical in older people and has already been described in the literature with an odds ratio of 2.9.[28]

Regarding possible bruxism, only few studies are available that focused on older people. For Italians aged 60 years or older, a prevalence of 26.9% was observed,[29] which is similar to the German cohort (24.7%). In a Swedish cohort of seniors, the prevalence was 16.3%.[8] In another Swedish cohort, the prevalence for awake bruxism (19%) was similar to the German cohort (11.9%), yet relevantly lower for sleep bruxism (2%/16.2%).[30] The differences in possible bruxism might be due to the poor validity of self-reported sleep bruxism. This circumstance might be especially relevant in seniors, since external

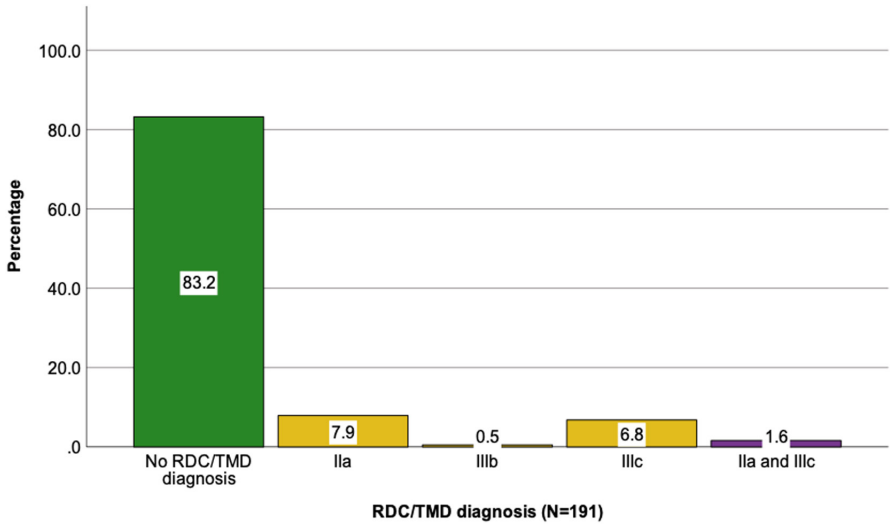


FIGURE 1 Summary of the RDC/TMD diagnoses according to diagnostic algorithms; IIa disc displacement with reduction; IIIb osteoarthritis; IIIc osteoarthrosis.

**TABLE 1** Overview of self-reported or clinical findings of bruxism

| Number | Self-report | *N* | Percentage (*n*) |
|---|---|---|---|
| 1a | Awake bruxism (Patient History Questionnaire: question 15d) | 168 | 11.9 (20) |
| 1b | Sleep bruxism (Patient History Questionnaire: question 15c) | 167 | 16.2 (27) |
| Summary of 1a-1b | Possible bruxism | 166 | 24.7 (41) |
| | Clinical examination | | |
| 2a | Wear | 191 | 27.2 (52) |
| 2b | Linea alba on inner cheek | 191 | 0.5 (1) |
| 2c | Indentations on the tongue | 191 | 1.0 (2) |
| Summary of 2a-2c | Probable bruxism | 191 | 28.8 (55) |

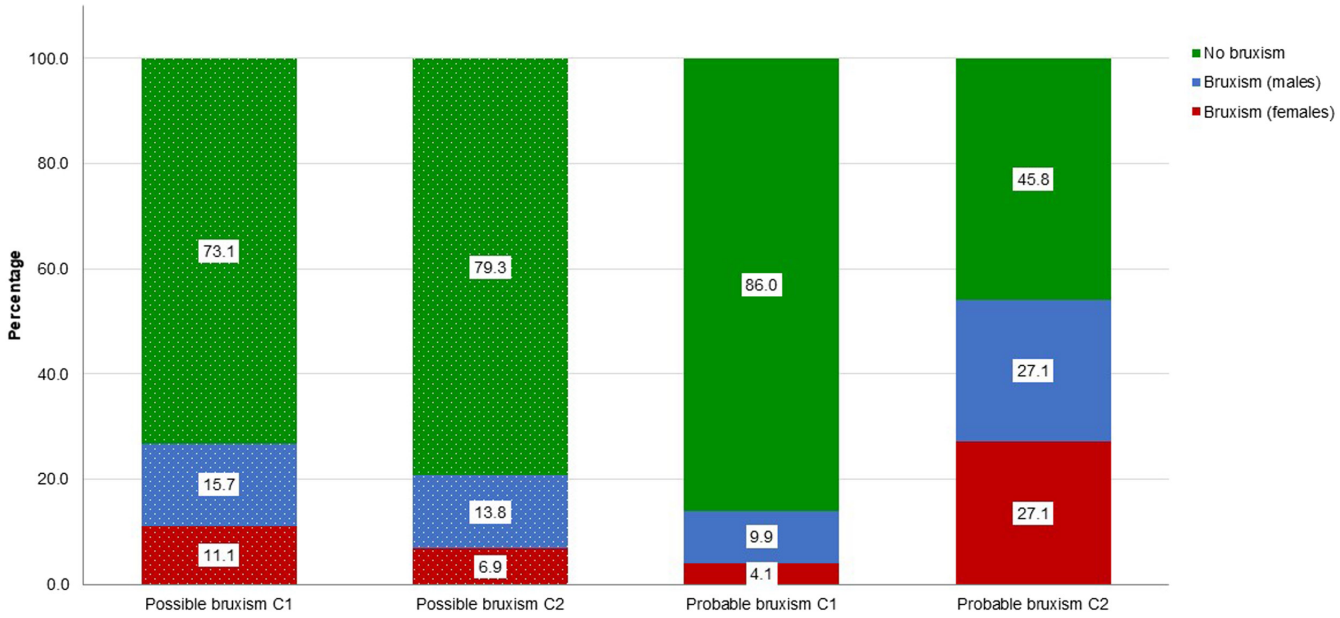


**FIGURE 2** Prevalence of possible and probable bruxism in the German seniors; C1 born between 1950 and 1952; C2 born between 1930 and 1932.

validity might not be provided as, for example, spouses with whom a bed is shared might already be deceased.[31] However, the prevalence of possible sleep bruxism identified in the current investigation is similar to results from the general adult population with values ranging from 1% to 15%.[10]

For probable bruxism, three clinical signs were taken into account, that is, (artificial) tooth wear, linea alba and indentations. Other clinical signs such as, for example, muscle hypertrophy, tongue traumatic lesions or alveolar bone exostosis were not assessed but should be evaluated in further studies.[32] However, the prevalence values of probable bruxism (28.8%) were similar to those of self-reported bruxism. Nonetheless, clinical signs were mostly due to wear of the (artificial) teeth, which might be overestimated due to physiological tooth wear that is about 16 µm (incisors) to 29 µm (molars) per year.[33] Moreover, wear due to excessive abrasion of long-term used removable dental prostheses might also be possible.

A limitation of the present study is the small number of available participants at the third follow-up assessment of ILSE. Thus, especially comparisons between subgroups should be regarded with caution. For bruxism, only anamnestic and clinical signs were examined, which should be supported by instrumental devices to verify bruxism and to obtain a definite bruxism diagnosis.[34] Nonetheless, this procedure is more time-consuming and cost-intensive than the approach used in this investigation. Moreover, as this publication aimed to present prevalence values, no correlations to comorbid conditions such as concurrent (sleep-related) conditions, prescribed medications or psychosocial assessments were drawn, which might influence bruxism or temporomandibular disorders. Therefore, standardised examination sheets might be useful to classify the manifold information. These aspects might be part of future publications correlated to ILSE. Future studies are encouraged to use a standardised tool to assess bruxism like the Standardised Tool for the Assessment of Bruxism (STAB) that is available since the beginning of 2023.[32] Nonetheless, the results of this investigation allow comparisons to a population-based representative cohort of older Germans regarding functional disorders.

## 5 | CONCLUSIONS

The prevalence of TMD in the German population aged 60 years and older is 16.8%. TMD in older people from Germany can be characterised as temporomandibular joint disorders, that is, disc displacements (9.4%) and degenerative joint disorders (8.9%). Possible bruxism was reported by 24.7%. Of the German seniors, 11.9% had awake bruxism and 16.2% had sleep bruxism. Probable bruxism was observed in 28.8%, which was especially associated with (artificial) tooth wear.

### AUTHOR CONTRIBUTIONS

Conceptualization/Methodology (IN, AZ), Formal analysis/Data curation/Writing (AR), Visualisation (SH, OS, SW), Writing-Review (IN, AZ, SH, OS, SW).

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### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

### PEER REVIEW

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### DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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