A Longitudinal Epidemiologic Study of Signs and Symptoms of Temporomandibular Disorders from 15 to 35 Years of Age

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Aims: *To study the development over 20 years of signs and symptoms of temporomandibular disorders (TMD) in an epidemiologic sample and to analyze possible correlations between these signs and symptoms and some other variables.* **Methods:** *The original group comprised 135 randomly selected 15-year-old subjects who were examined clinically and by means of a questionnaire for signs and symptoms of TMD. The examination was repeated after 5, 10, and 20 years by the same methods. After 20 years, when the original group had reached the age of 35 years, 124 individuals (92%) could be traced, and they were sent a questionnaire and invited for a clinical examination. The response rate was high: 114 subjects (92%) completed and returned the questionnaire, and 100 subjects (81%) attended the clinical examination.* **Results:** *There was a substantial fluctuation of both reported symptoms and clinically recorded signs over the 20-year period, but progression to severe pain and dysfunction of the masticatory system was rare. In both the 15-year-old and 35-year-old subjects, 13% reported 1 or more frequent TMD symptoms. At age 35, only 3 subjects (3%) were classified as having severe or moderate clinical signs of dysfunction according to the Helkimo Index, fewer than in previous investigations. Women reported TMD symptoms and headache and had muscle tenderness and joint sounds more often than men. Correlations between the studied variables were mainly weak. Among the highest correlations found (r_s = 0.4) were those between reported clenching and bruxing habits and TMJ sounds and jaw fatigue.* **Conclusion:** *In this epidemiologic sample followed from age 15 to 35 years, a substantial fluctuation of TMD signs and symptoms was found over time. Progression to severe pain and dysfunction was extremely rare.*
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Key words: bruxism, epidemiology, headache, orofacial pain, temporomandibular joint

It has been stated that "epidemiological research is primarily concerned with the description of health status and prevalence of disease in a population. In a broader context, however, the aims of epidemiology are to provide a scientific basis for analysis of etiological factors, for efforts to prevent and control disease, and to supply information on assessment of needs and potential demand for treatment of a disease."[1p159] Since the early 1970s, a large number of epidemiologic investigations have been performed in the field of temporomandibular disorders (TMD). During the first part of this era, these studies were mainly cross-sectional.[2] The results from these and more recent investigations have not been conclusive concerning prevalence and incidence of TMD, and many of the controversies about the etiology of TMD are still not resolved.

During the last 15 years, much interest in epidemiologic research of TMD has focused on longitudinal studies.[3–17] Some of these investigations are based only on information from questionnaires,[13,14] some have focused only on single signs and symptoms of TMD,[12] and some examine only small groups of subjects[10] or only younger[3–8,11,13,14] or older[9] individuals. However, the results from these investigations have shown that signs and symptoms of TMD in children are of low prevalence and are mostly of a mild character, that prevalence increases with age on a group basis from childhood to young adulthood, levels out in middle age, and decreases in older individuals. It is also obvious from these studies that spontaneous fluctuation of signs and symptoms occurs frequently.

However, these longitudinal studies have not solved the controversial issue about the etiology of TMD, and the results have also been interpreted differently. The increase of signs and symptoms during childhood and adolescence has been taken by some that TMD is progressive, at any rate in women,[14] while the large fluctuation of signs and symptoms, where spontaneous remission is very common, has been interpreted by others[18] that TMD is a self-limiting disorder.

It is possible that a 10-year follow-up period, even if it is the longest follow-up period for TMD so far, is too short a period of time to solve these issues. Because of this, the authors decided to reexamine an epidemiologic sample, originally 15 years old and previously examined after 5 and 10 years, after 20 years. The aims were to evaluate the long-term development of, and analyze possible correlations between, TMD signs and symptoms and some other variables. The age of the reexamined subjects, 35 years, is also of special interest, since many investigations of clinical materials have shown that the majority of patients seeking treatment for TMD are between 20 and 50 years old.[19]

Materials and Methods

Subjects

Initially, 135 randomly selected 15-year-old subjects were examined by means of a questionnaire on TMD symptoms, headaches, and oral parafunctions, and by a clinical assessment of signs of TMD and occlusal factors. The results were published in a doctoral thesis by one of the present authors.[20] The examination was repeated after 5 and 10 years, respectively, using the same methods, and the results were published earlier.[3–6] Twenty years after the first examination, 124 individuals (92%) from the original group could be traced. The remaining 11 subjects comprised 5 who had moved from the country and 6 whose addresses could not be traced. The traced subjects were all sent a questionnaire as well as an invitation to participate in a clinical examination. The response rate was high: 114 subjects (92%), 49 women and 65 men, completed and returned the questionnaire, and 100 subjects (81%), 44 women and 56 men, were also examined clinically. The percentage of subjects participating on the 4 different occasions varied and was relatively low at the 10-year follow-up (Fig 1).

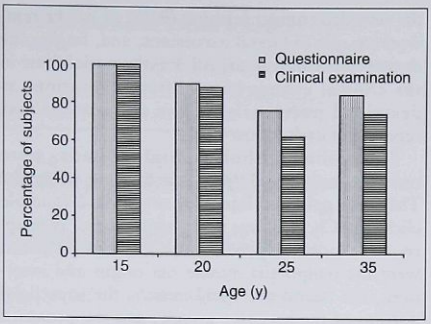

Fig 1 Percentage distribution of subjects who answered the questionnaire and were clinically examined at the ages of 15, 20, 25, and 35 years (original sample, n = 135).

Methods

The questionnaire asked about the presence of symptoms in the masticatory system, including headaches and whether the subject often felt stress or was worried or depressed, as well as questions about oral parafunctions, previous trauma to the face, and previous TMD treatment.

The standardized clinical examination[20,21] comprised measurements of the range of movement of the mandible, presence of deflection during mouth opening, registration of temporomandibular joint (TMJ) sounds, joint locking or luxation, pain on movement of the mandible, TMJ or muscle pain on palpation, number of occluding tooth pairs in maximal intercuspation, occlusal interferences in

the retruded contact position (RCP) or on the non-working side in lateral excursions, and, finally, the degree of occlusal wear. All 3 authors took part in the clinical examinations after calibration, as described previously.[22] The calibration was repeated at each follow-up.

Temporomandibular joint sounds were recorded as grade 1 (palpable clicking when the TMJ was palpated laterally) or grade 2 (audible clicking). Clicking was also characterized as reciprocal or non-reciprocal. The muscles palpated were the temporalis muscle (its origin and insertion), the lateral pterygoid muscle, the superficial portion of the masseter muscle, and the posterior belly of the digastric muscle. All muscles were palpated bilaterally. Tooth wear was classified according to a 5-point scale: 1 = no or slight wear, 2 = wear of enamel only, 3 = wear into the dentin in single spots, 4 = exposure of dentin in an area of more than 2 mm^2, and 5 = wear of more than one third of the clinical crown. From the following 5 clinical parameters—mandibular mobility, TMJ function, pain on movement of the mandible, TMJ pain on palpation, and muscle pain on palpation—a Clinical Dysfunction Index according to Helkimo[23] was calculated. The clinical examination was previously described in further detail.[6,20]

Comparisons were made with the clinical findings and the subjective symptoms 20 years ago, as well as with the findings at the 5- and 10-year follow-ups. Eighty-five subjects returned the questionnaire on all 4 occasions, and 66 subjects participated in all 4 clinical examinations. All statistical comparisons between the 4 different examinations relate only to subjects included in the respective examinations. Consequently, the prevalence figures presented for the previous examinations may differ slightly from those presented earlier.

Statistical Analyses

Wilcoxon's matched-pairs signed rank test was used for analysis of differences between the 4 examinations, and Pitman's nonparametric permutation test was used to test for sex differences.[24] Correlations between variables were calculated by means of Spearman's (r_s) rank correlation test.[25] The following levels of significance were used: $P > 0.05$ not significant; $^{*}0.01 < P < 0.05$; $^{\dagger}0.001 < P < 0.01$; $^{\ddagger}P < 0.001$.

Results

Questionnaire

Subjective Symptoms of TMD. Reports of TMJ sounds, jaw fatigue, and difficulties in mouth opening increased from 15 to 25 years of age, and the increase was statistically significant for the first 2 of these symptoms ($P < 0.05$). Between 25 and 35 years of age, these 3 cardinal symptoms of TMD did not change ($P > 0.05$) (Table 1). One or more such symptoms were now reported as occurring frequently by 10% and occasionally by 25% of subjects. If pain during chewing was added as a fourth symptom, the prevalence of 1 or more of these symptoms was 60% (frequently in 13% and occasionally in 47% of subjects) (Table 1).

All the registered symptoms of TMD varied considerably during the 20 years of observation, as illustrated by the fluctuation in reported TMJ sounds (Fig 2). Eighteen percent of the participants reported TMJ clicking on 1 of the examinations at age 15, 20, 25, or 35 years, 11% on 2 of the exams, 16% on 3 exams, and 9% on all 4 occasions, whereas 46% never reported TMJ clicking.

Twenty-one subjects (18%) reported that they had received some type of TMD treatment during the 20-year period.

Oral Parafunctions. Both daytime tooth-clenching and nocturnal bruxing increased markedly from age 15 to 25 years and remained at that level up to age 35 (Table 1). As for TMJ clicking, spontaneous fluctuation was considerable. Reports of frequent clenching in the daytime and nocturnal bruxing were very similar at the age of 35 years (16% and 15%, respectively), whereas the subjects were more aware of occasional daytime clenching than occasional nocturnal bruxing.

Nail, lip, cheek, and tongue biting and biting on foreign objects decreased with age but were still quite common parafunctions at age 35 (Table 1). Sixty percent of the 35-year-old subjects were aware of performing 1 or more oral parafunctions frequently (18%) or occasionally (42%).

Headache. Sixty-three percent of the 35-year-old subjects said that they never or only occasionally had headaches, whereas 12% reported headaches once a week or more often. The prevalence of headaches once a month or more often was similar at 15 and 35 years of age (35% and 37%, respectively). There was evident fluctuation in reported headaches over time among the subjects (Fig 3), and only 1 individual reported frequent headache on all 4 occasions. In most cases the location of the headache varied, but 25% experienced it in the

Table 1 Frequency (%) of Reported Symptoms and Orofacial Parafunctions in Subjects Examined at Ages 15, 20, 25, and 35 Years

Sign/symptom	Age (y)			
	15 (n = 135)	20 (n = 121)	25 (n = 103)	35 (n = 114)
1. TMJ sounds				
Frequent	2	8	12	8
Occasional	21	22	22	23
2. Jaw fatigue				
Frequent	0	1	2	4
Occasional	5	3	14	14
3. Difficulties in mouth opening				
Frequent	0	0	3	4
Occasional	6	9	6	11
4. Pain or fatigue in the jaws or face during chewing (eg, chewing gum)				
Frequent	11	16	11	10
Occasional	54	43	56	40
5. One or more of symptoms 1 to 3				
Frequent	2	8	12	10
Occasional	23	31	34	25
6. One or more of symptoms 1 to 4				
Frequent	13	21	19	13
Occasional	57	48	58	47
7. Daytime tooth clenching				
Frequent	1	2	13	16
Occasional	10	19	32	30
8. Nocturnal bruxing				
Frequent	1	4	12	15
Occasional	14	10	26	18
9. 7 and/or 8				
Frequent	1	5	15	17
Occasional	16	27	39	34
10. Nail, lip, cheek, or tongue biting or biting on foreign objects				
Frequent	30	21	16	11
Occasional	48	39	35	31
11. 9 and/or 10				
Frequent	31	26	27	18
Occasional	51	45	49	42

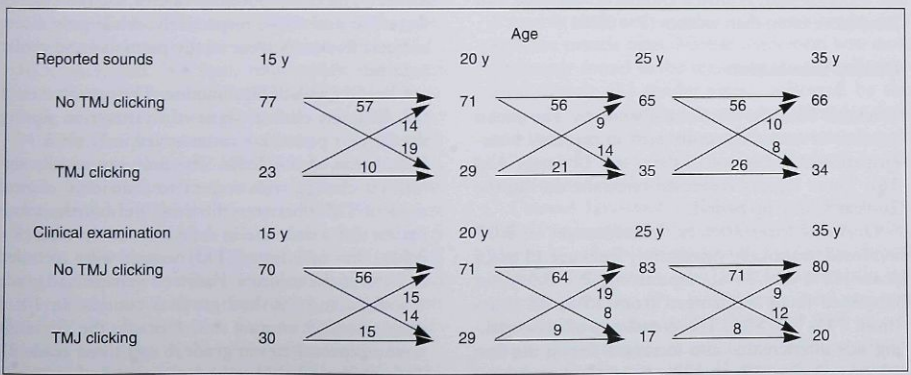

Fig 2 (*Above*) Reported and (*below*) clinically recorded temporomandibular joint clicking, in percentages, in 85 and 66 subjects, respectively, examined on 4 occasions.

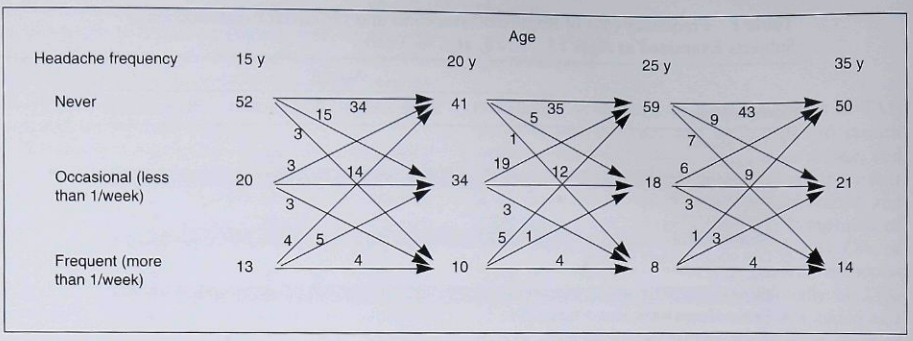

Fig 3 Fluctuation of headache in 85 subjects examined on 4 occasions.

forehead and 12% in the temples. Of those with headaches, 49% had noticed an association with stress. Six percent judged their headache to be severe, and 10% said that they often took analgesics because of their headaches. No less than 16% stated that they had consulted a doctor at least once because of headache complaints.

Gender Differences. Reports of 1 or more of the subjective symptoms TMJ sounds, jaw fatigue, difficulties in mouth opening, and pain during chewing were more common among women than among men ($P < 0.05$). Women also reported that they were more often stressed ($P < 0.001$), worried ($P < 0.05$), or depressed ($P < 0.01$); suffered headache more frequently ($P < 0.05$); and had sought medical care because of headache more often than men had ($P < 0.05$). Men reported trauma to the face and head more often than women ($P < 0.001$).

Clinical Examination

Occlusal Factors. *Occlusal Contacts.* The mean number of occluding tooth pairs in maximal intercuspation at the age of 15 years was 12 (range 4 to 16). These figures remained constant during the 20-year follow-up period.

Occlusal Interferences. Interferences in RCP increased statistically significantly from age 15 to 25 years (56% and 74%, respectively; $P < 0.01$) but remained fairly unchanged from 25 to 35 years (from 74% to 78%). The prevalence of non-working side interferences also increased during the first 10 years (from 15% to 32%; $P < 0.01$) but did not change much during the last 10 years (to 28%). At the first examination, 4% of non-working side interferences were registered during the first 3 mm of lateral excursion. The corresponding figure was 7% at age 25 but had decreased to 3% in the 35-year-olds; these changes were not statistically significant.

Tooth Wear. The degree of tooth wear increased in all 4 dental regions between 15 and 20 years of age (Table 2). It then slowed during the next 5-year period, when the change was statistically significant only in the canine region. The progression of the wear between 25 and 35 years of age was also minor, and statistically significant changes were noted only for the incisor and canine regions during this period (Table 2). More pronounced wear in the incisor region, ie, exposure of dentin in an area of more than 2 mm^2, was now recorded in 25% of the subjects, compared to 7% 10 years earlier. The corresponding figures for the canines were 7% and 15%, respectively, while only a few subjects had such wear in the premolar and molar regions.

Clinical Signs of Dysfunction. The prevalences of the different clinical signs of dysfunction during the 20-year period are summarized in Table 3.

Function of the TMJs. The only statistically significant change with respect to individual clinical signs of TMD between the third and fourth examination was a decrease in deflection on opening ($P < 0.01$). Uni- or bilateral TMJ sounds were recorded in 22% of the subjects. Fourteen percent had grade 1 sounds and 8% had grade 2 sounds. In 10 of these cases (9 women and 1 man), the clickings were reciprocal (seven grade 1 and three grade 2). Two of these subjects had reciprocal clickings in both TMJs. As for reported TMJ sounds, clinically recorded TMJ sounds fluctuated considerably

Table 2 Degree of Tooth Wear in 4 Dental Regions

	15 y (n = 135)	20 y (n = 119)		25 y (n = 84)		35 y (n = 100)	
Dental region	Tooth wear	Tooth wear	*P*	Tooth wear	*P*	Tooth wear	*P*
Incisor	2.1	2.9	‡	2.9	NS	3.1	‡
Canine	1.9	2.5	‡	2.8	‡	2.9	*
Premolar	1.2	2.0	‡	2.1	NS	2.1	NS
Molar	1.6	1.9	‡	1.9	NS	2.0	NS

Values represent means on a 5-point scale.
Level of significance of change between investigations: NS = non-significant; *P < 0.05; ‡P < 0.001.

Table 3 Prevalence (%) of Clinical Signs of TMD in Subjects Examined at 4 Occasions over 20 Years

	Age (y)			
Variable	15 (n = 135)	20 (n = 119)	25 (n = 84)	35 (n = 100)
Reduced movement capacity	2	10	5	3
Deflection on opening	10	24	18	3
Locking of the mandible	1	1	0	0
Pain on movement	1	3	4	2
TMJ clicking				
Grade 1	18	22	10	14
Grade 2	10	10	7	8
TMJ crepitation	1	2	1	0
TMJ tenderness	10	3	10	3
Muscle tenderness				
1 or 2 muscle sites	31	25	27	25
More than 2 muscle sites	10	14	19	10

during the 20 years of observation (Fig 2). No cases of crepitation in the joints or locking of the jaws were recorded.

Mandibular Mobility. There was no change in mandibular movement capacity during the 20-year follow-up period. The mean maximal mouth openings at the 4 different examinations were 56.9, 56.5, 56.5, and 55.5 mm, respectively, but on all occasions the interindividual differences were large; at age 35, for example, the range was 43 to 74 mm. The protrusive movement as well as the lateral excursions to the left and right, respectively, were also without any statistically significant changes during the follow-up period. At the last examination, the mean values were: 9.2 (range 5 to 14), 10.4 (range 5 to 15), and 10.1 mm (range 5 to 15), respectively. Only 3 subjects had a reduced movement capacity according to the Helkimo Index[23]; in all cases, this was a result of a reduction of 1 or more of the horizontal movements.

Pain on Movement of the Mandible. Only 2 subjects experienced pain on 1 or more mandibular movements.

TMJ and Muscle Pain on Palpation. Tenderness of the TMJ on palpation was found in only 3 subjects. In contrast, the most common clinical sign of TMD was muscle pain on palpation. One fourth of the subjects reported pain on palpation of 1 or 2 muscle sites, and another 10% were tender in 3 or more muscle sites. Muscle tenderness was most frequently found in the region of the lateral pterygoid muscle (31 tender sites), followed by the insertion of the temporalis muscle (23 tender sites) and the superficial portion of the masseter muscle (17 tender sites), while positive findings in the other muscles palpated were rare.

Clinical Dysfunction Index. At the age of 35, only 3 individuals (3%) were classified as having severe (1 subject) or moderate (2 subjects) clinical signs of dysfunction, which was a statistically significant reduction ($P < 0.001$) from the 3 previous investigations, when 16%, 17%, and 20% of subjects, respectively, showed moderate or severe signs of dysfunction (Fig 4). Overall, the Clinical Dysfunction Index fluctuated in a seemingly unpredictable way (Fig 5).

Gender Differences. Only a few statistically significant differences between men and women were found. As at the examination 10 years earlier, men exhibited more occlusal wear in all 4 dental regions (P values varied between 0.01 and 0.001). Of the variables included in the Clinical Dysfunction Index, men had a statistically significantly larger maximal mouth opening than women (57.0 mm versus 53.7 mm; $P < 0.01$). This sex difference was also found at previous examinations. Both clinically recorded muscle tenderness ($P < 0.01$) and joint sounds ($P < 0.05$) were more common in women than in men.

Correlations Between Variables

Subjective symptoms of TMD were in most cases statistically significantly correlated to each other, but with few exceptions, the correlations were weak (Table 4). Weak to moderate correlations were found between both clenching and grinding and all the separate subjective symptoms (Table 4). A positive correlation was found between subjective reports of joint sounds and reports of 1 or more of the other subjective symptoms of TMD ($r_s = 0.38$; $P < 0.001$). Headache showed only weak and mainly non-significant correlations with TMD symptoms and oral parafunctions (Table 4). The Clinical Dysfunction Index was moderately correlated to the presence of 1 or more subjective symptoms of TMD ($r_s = 0.45$; $P < 0.001$), and to the presence of reported TMJ sounds ($r_s = 0.46$; $P < 0.001$), and it was weakly correlated to reports of bruxism ($r_s = 0.23$; $P < 0.05$). Furthermore, the maximal jaw opening capacity showed a weak negative correlation ($P < 0.05$) to both clinically recorded and subjectively reported joint sounds ($r_s = -0.22$ and -0.21, respectively), as well as to any of the other subjective symptoms of TMD ($r_s = -0.26$; $P < 0.01$).

Discussion

The most important finding of this study was a substantial fluctuation in TMD signs and symptoms over the 20-year observation period as this group of adolescents matured into adults. It was also obvious that progression to severe signs and symptoms of pain and dysfunction of the masticatory system was rare. Nevertheless, 13% of the 35-year-old subjects reported that they frequently had 1 or more of the symptoms TMJ sounds, jaw fatigue, and difficulties and/or pain in mouth opening and chewing. The same prevalence was found when the subjects were 15 years old.

The participation rate in this longitudinal study over 20 years was very high. In comparison to most published longitudinal surveys, both the follow-up period and the participation rate were exceptional. If the explainable losses are deducted

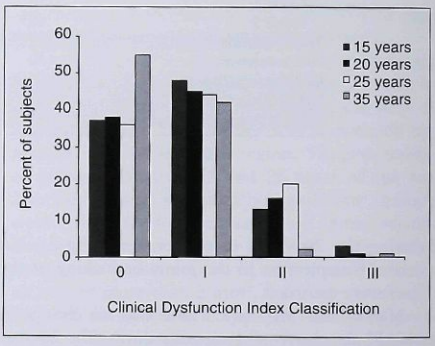

Fig 4 Distribution of the Clinical Dysfunction Index (according to Helkimo[23]) on 4 occasions.

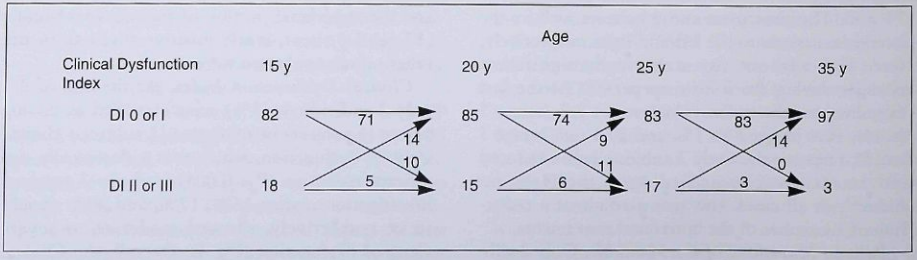

Fig 5 Clinical Dysfunction Index, expressed in percentages, of 66 individuals examined on 4 occasions. 0 = no dysfunction; I = mild dysfunction; II = moderate dysfunction; III = severe dysfunction.

Table 4 Spearman Rank Correlation Coefficients Between Subjective Symptoms and Oral Parafunctions in 114 35-year-old Subjects

Variable	Variable					
	1	2	3	4	5	6
1. TMJ sounds	—					
2. Jaw fatigue	0.28†	—				
3. Difficulties in mouth opening	0.41‡	0.17 (NS)	—			
4. Pain or fatigue in the jaws during chewing (for example, chewing gum)	0.28†	0.39‡	0.19*	—		
5. Headache	0.04 (NS)	0.23*	0.11 (NS)	0.23*	—	
6. Daytime tooth clenching	0.42‡	0.35‡	0.19*	0.35‡	0.15 (NS)	—
7. Nocturnal bruxing	0.44‡	0.44‡	0.24*	0.29†	0.01 (NS)	0.55‡

NS = not significant; *$P < 0.05$; †$P < 0.01$; ‡$P < 0.001$.

(6 unknown addresses, 5 living abroad), 92% and 81% of the original sample took part in the questionnaire and clinical part of the 20-year follow-up, respectively. When our results are interpreted, it should, however, be stressed that only 63% of the subjects returned the questionnaire on all 4 occasions and 49% participated in all 4 clinical examinations. Since the original group of 15-year-old subjects comprised an acceptable epidemiologic sample of Swedish adolescents,[20] this study seems to guarantee good representativeness of Swedish individuals followed from 15 to 35 years of age. Those who were lost to the 20-year follow-up did not differ significantly from the remaining subjects with respect to gender or to any of the originally recorded signs and symptoms of TMD, according to statistical analysis.

Internal non-response in the questionnaires was very low and did not exceed 1% for any question. This strongly indicates that the questions were found to be of interest and relevance for the participants. Only minor changes had been made in the questionnaires used at the follow-up examinations, which facilitated the longitudinal analyses.

The increases in TMD symptoms between age 15 and age 25 observed at the 10-year follow-up seemed to have leveled out, and in general no significant increase was found up to the age of 35 years. On the other hand, fluctuation in TMD symptoms was evident also during the last 10-year period. Continuing development into more serious conditions was rare, eg, clicking did not develop into locking in any subject, and the prevalence of frequent TMD symptoms was about the same (10% to 12%) at both 25 and 35 years of age.

The large spontaneous fluctuation of TMJ sounds is in agreement with previous reports.[12] This corroborates the opinion that such sounds per se are no indication for treatment, and it can be questioned whether clicking without pain should be seen as a symptom or sign of TMD. On the other hand, a correlation was found between subjective reports of joint sounds and reports of other subjective symptoms of TMD, and these symptoms taken together might indicate a disturbed function of the masticatory system and possibly a treatment need. Reports of TMJ sounds can thus justify an extended patient history and functional examination.

The finding that different symptoms of TMD were positively correlated to each other is interesting and underlines the clinical experience that TMD are often multisymptomatic. It must be remembered, however, that most of the correlations were weak (Table 4). From the correlation analyses, it was obvious that many subjects who reported TMD symptoms also were aware of oral parafunctions. Whether this is the result of a causal relationship between the parafunctions and the symptoms, or a consequence of the TMD symptoms having increased the subjects' awareness of the presence of such habits, is impossible to determine from this study. It has been observed that patients with TMD signs and symptoms often report that they know that they brux their teeth, because their previous dentists informed them of such a probable habit, even if the evidence was uncertain.[26] Parafunctional habits are still regarded as important causative factors in TMD by most clinicians, but their role is confusing, and there is no strong evidence of a close relationship between bruxism and TMD.[27,28]

The degree of tooth wear increased slowly with increasing age, but pronounced wear was still, at the age of 35 years, found in only a few individuals. This evidence strongly supports the opinion that rapid occlusal wear is uncommon, and in

most cases, it is not necessary to do more than follow the individual wear longitudinally, preferably with study casts. If a significant loss of tooth substance is recorded, an interocclusal appliance can be advocated to protect the teeth from further excessive wear.[21]

The finding that only a few patients had molar tooth wear with dentin exposure contrasts strongly with observations in skull materials from earlier periods of time. For example, 2 samples from the 15th and 17th century, respectively, both from the same general area of western Sweden, showed extensive tooth wear, such that most of the occlusal morphology of the first molars had been lost, in spite of the fact that most of the subjects had died before the age of 35 years,[29,30] the age of our present-day sample. The great difference in tooth wear between the 2 materials is probably mainly a result of differences in consistency and abrasiveness of the food between the 2 time periods.

The statistically significant decrease in clinical signs of TMD from 25 to 35 years of age is remarkable and difficult to fully explain. The interobserver variation was probably small, since the 3 examiners were well-trained together and calibrated,[22] a process that also was repeated at the beginning of each follow-up examination. However, a possible explanation that cannot be excluded is that the examiners' evaluation of the semi-objective clinical signs of TMD had changed over time. It is, for example, unlikely that deflection of the mandible of > 2 mm during mouth opening would decrease spontaneously from 18% to 3%. Another possible explanation is an actual decrease in TMD signs due to spontaneous regression. Many subjects said that they experienced the present period of their lives as much calmer with respect to family and work compared with their situation 10 years previously. A third possible explanation is a decrease in clinical signs because of TMD treatment performed during the period covered by the investigation. No less than 21 subjects (18%) had undergone some kind of TMD treatment.

Gender differences were most evident in a higher prevalence of reported TMD symptoms in women than in men, whereas differences in clinical signs were limited to muscle tenderness and TMJ sounds. These findings are in line with recent epidemiologic studies,[19] but they do not give strong support to the suggestion that TMD signs and symptoms take different courses in men and women.[14]

Trauma to the face and TMJs has been associated with TMD etiology,[18] and TMD patients without trauma showed more favorable long-term response to treatment than those with trauma.[31] The results of this epidemiologic study, where men reported trauma to the face and head more often than women but had fewer TMD signs and symptoms, may therefore seem confusing. However, epidemiologic samples and TMD patients vary in many ways.

The present material will be subjected to further analyses regarding possible associations between occlusal factors, oral parafunctions, and current TMD signs and symptoms, as well as consequences of previous TMD treatment.

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