

An 8-year Follow-up Study of Temporomandibular Disorder and Psychosomatic Symptoms from Adolescence to Young Adulthood

Tuija I. Suvinen, DDS, PhD
Research Fellow

Marjatta Nystrom, DDS, Odont Dr
Associate Professor
Department of Pedodontics and
Orthodontics

Marjut Evälahti, DDS
Clinical Assistant
Department of Pedodontics and
Orthodontics

Eija Kleemola-Kujala, DDS, Odont Dr
Associate Professor
Department of Pedodontics and
Orthodontics

Antti Waltimo, DDS, Odont Dr
Associate Professor
Department of Prosthodontics and
Stomatognathic Physiology

Mauno Könönen, DDS, Odont Dr
Professor and Chair
Department of Stomatognathic
Physiology and Prosthetic Dentistry
Senior Consultant
Department of Oral and Maxillofacial
Diseases
Surgical Hospital (HUCH)

University of Helsinki
Helsinki, Finland

Correspondence to:
Prof Mauno Könönen
Institute of Dentistry
PO Box 41
00014 University of Helsinki
Helsinki, Finland
Fax: +358 9 19127509
Email: mauno.kononen@helsinki.fi

Aims: To assess the prevalence of subjective symptoms of pain and/or temporomandibular disorder (TMD) dysfunction and their association with psychosomatic (PS) symptoms in a longitudinal follow-up study of Finnish young adults over an 8-year period. **Methods:** One hundred twenty-eight Finnish young adults (60 men and 68 women) were assessed longitudinally at the ages of 15, 18, and 23 years using routine stomatognathic methods and a standardized questionnaire. **Results:** The prevalence of reported TMD symptoms ranged from 6% to 12% for pain symptoms, from 12% to 28% for dysfunctional symptoms, and from 4% to 7% for a combination of these 2 types of symptoms. The prevalence of PS symptoms, which were constantly present in many of the patients who reported them, ranged from 7% to 11%. A significant correlation ($P < .05$) was found between TMD pain and PS symptoms at the ages of 15 and 18 years. PS symptoms were not significantly correlated to TMD dysfunction symptoms or to experiencing no symptoms at any age. The majority of subjects in all age groups with both TMD and PS symptoms were female, in a ratio of approximately 2 to 1. **Conclusion:** The prevalence of TMD and PS symptoms was low in adolescence and young adulthood, and there was a significant association, although relatively weak, between PS symptoms and reports of either TMD pain or a combination of TMD pain and dysfunction symptoms. *J OROFAC PAIN* 2004;18:126-130

Key words: longitudinal studies, prospective studies, psychosomatic symptoms, temporomandibular disorders

Temporomandibular disorders (TMD) is a collective term for structural and functional disorders associated with the temporomandibular joints, muscles of mastication, or both.¹⁻⁴ These are also known as temporomandibular pain dysfunction disorders. Using various definitions of TMD, epidemiological prevalence studies have shown that up to 50% of the general population may experience symptoms or signs of TMD,⁵⁻¹¹ although only 3% to 7% of the general population are reported to seek treatment.^{4,12,13} Additionally, it has been reported that the majority of those who seek treatment are women between the ages of 25 and 35.^{6,13} The reasons for the apparent discrepancy between the number of people perceiving subjective symptoms or signs and the number of people seeking treatment are still not clear. Additionally, longitudinal studies have indicated that TMD fluctuate over time,^{7,8,11} and no clear conclusion has been reached yet about their natural progression or about exactly what variables contribute to the development of TMD.

Several studies indicate that there is an association between poor general health and chronic musculoskeletal pain disorders such as TMD.^{2,14} People who report problems with their masticatory function, eg, pain or dysfunction in the temporomandibular region, commonly report other somatic or psychological problems.^{14,15} It is also generally understood in the field of pain medicine that certain factors, mainly psychological and psychosocial factors, could be important in determining the patient's tolerance of symptoms, need for treatment, risk of developing chronic disorders, and resolution of symptoms.¹⁴⁻¹⁶ Few studies have examined longitudinally the prospective association between pain disorders such as TMD and other somatic and psychological variables, especially among children and adolescents.

The authors hypothesize that TMD and psychosomatic health are associated. The aim of this study was therefore to assess the prevalence of subjective symptoms of TMD-related pain and/or dysfunction and their association with psychosomatic (PS) symptoms in a longitudinal follow-up study of Finnish adolescents and young adults over an 8-year period.

Materials and Methods

The sample was derived from the study population of a longitudinal investigation of the dental development and oral health of Finnish children initiated at the Department of Pedodontics and Orthodontics, University of Helsinki. The sample consisted of 156 adolescents who were assessed at the ages of 15, 18, and 23 years for type and frequency of TMD and PS symptoms. Other studies concerning the dental development, oral health, and demographic background of the study population have been published previously.^{17,18} This study reports on the 128 adolescents (60 young men and 68 young women; 82%) who participated in all 3 of the examinations. Fourteen young men and 14 young women (18% of the sample) were lost for follow-up.

The subjects were asked whether they frequently suffered from pain in the temporomandibular region, jaw tiredness, difficulty in mandibular opening, or temporomandibular joint noises. These standardized questions were taken from a study by Nilner and Lassing.¹⁹

The subjects who experienced symptoms were categorized as either experiencing TMD pain, experiencing TMD dysfunction, or experiencing both TMD pain and dysfunction. PS symptoms were

assessed using a self-report questionnaire developed by Rimpelä et al.²⁰ The questionnaire was validated with 4,705 Finnish adolescents. The psychometric properties of the questionnaire, including the details of the validity and reliability testing and the scoring of the 17 PS symptoms, have been reported by Rimpelä et al.²⁰ The questionnaire was used to assess the prevalence of the following PS symptoms within the preceding 6 months: irritability, loss of appetite, dizziness, anxiety, sleep disturbance, loss of energy, irritable bowel, stomach problems, tiredness, heart palpitations, hand tremor, nausea, sleep disturbance, heartburn, sweatiness, head pain, and breathing problems. Subjects were asked to rate the occurrence of these symptoms on a 4-point scale, where 1 = never, 2 = occasionally, 3 = often, and 4 = constantly. For this study only scores of 3 or 4 were considered to indicate that subjects suffered from PS symptoms. A total symptom score according to Rimpelä et al.²⁰ was also recorded. All data in this study are based on subjective reports of perceived symptoms, not actual diagnosed disorders. The results regarding clinical stomatognathic examinations were reported earlier.^{11,21,22}

Statistical Analysis

The chi-square test was used to analyze categorical variables, and the Wilcoxon matched pairs signed-rank test was used to analyze ordinal nonparametric variables. The correlations are based on Pearson's product moment correlation coefficient (r). The levels of statistical significance used were (***) $P < .001$, (**) $P < .01$, (*) $P < .05$, and $P > .05$ (insignificant).

Results

Longitudinal Prevalence of TMD Symptoms

Of the 128 subjects, 16 (12%) experienced TMD pain symptoms at the age of 15 years, 12 (9%) at 18 years, and 7 (6%) at 23 years. Fifteen (12%) experienced TMD dysfunction at the age of 15 years, 28 (22%) at 18 years, and 36 (28%) at 23 years. Five (4%) experienced both TMD pain and dysfunction at 15 years, 8 (6%) at 18 years, and 9 (7%) at 23 years. There was no significant difference in prevalence of TMD symptoms between male and female subjects at any of the 3 ages ($P > .05$).

Figure 1 shows the distribution of subjects according to age. There was a significant increase in TMD dysfunction from the ages of 15 to 18 years ($P < .05$) and from 18 to 23 years ($P < .05$).

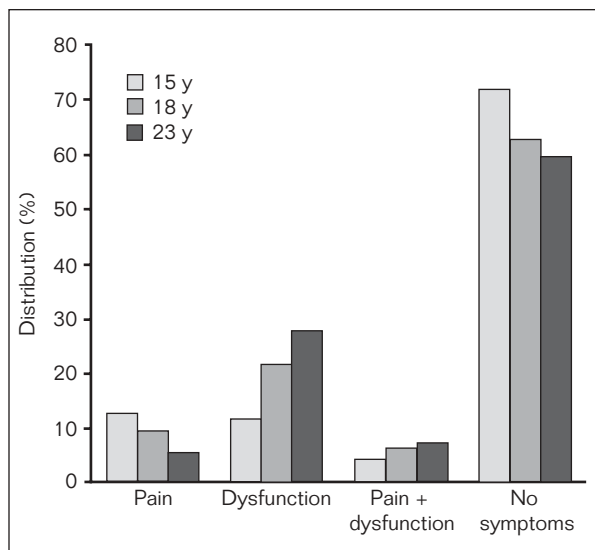


Fig 1 Distribution of subjects with TMD pain, TMD dysfunction, and both TMD pain and dysfunction and of symptom-free subjects, at the ages of 15, 18, and 23 years (n = 128).

Table 1 No. of Psychosomatic (PS) Symptoms Reported by the Subjects (n = 128) at Ages 15, 18, and 23 Years

No. of PS symptoms	15 y n (%)	18 y n (%)	23 y n (%)
1	23 (18)	30 (23)	18 (14)
2	15 (12)	5 (4)	9 (7)
3	11 (9)	6 (5)	5 (4)
> 3	3 (2)	9 (7)	4 (3)
Total	52 (41)	50 (39)	36 (28)
Male	23 (18)	22 (17)	12 (9)
Female	29 (23)	28 (22)	24 (19)

There was no significant difference in the prevalences of the other 2 categories of pain between the different age cohorts ($P > .05$). The majority of subjects had no symptoms of TMD pain or dysfunction at any of the 3 ages examined.

Longitudinal Prevalence of PS Symptoms

Table 1 shows the number of PS symptoms reported by the subjects at each age. The most frequently reported PS symptoms at the ages of 15 and 18 were anxiety, irritability, fatigue, loss of energy, headache, and sleep disturbance. At the age of 23, subjects also reported stomach and breathing problems in addition to these symptoms. The overall prevalence of often or constantly present PS symptoms was 41% at 15 years, 39% at 18 years, and 28% at 23 years, but only a few subjects reported more than 2 of the 17 possible symptoms (11% at 15 years, 12% at 18 years, and 7% at 23 years). There was no significant difference in the number of reported PS symptoms at each age ($P > .05$).

Correlation Between TMD and PS Symptoms

Table 2 shows the distribution of subjects who reported both PS and TMD symptoms. There was a significant correlation between PS symptoms and TMD pain at the age of 15 ($r = 0.255$, $P < .01$) and at the age of 18 ($r = 0.248$, $P < .01$), but not at the age of 23 ($P > .05$). Similarly, there was a significant correlation between PS symptoms and TMD pain and dysfunction at the age of 15 ($r = 0.185$, $P < .05$) and at the age of 18 ($r = 0.261$, $P < .01$), but not at the age of 23 ($P > .05$). No significant association was found between TMD

Table 2 Distribution of Subjects (n = 128) with PS Symptoms in Each TMD Symptom-Related Group at Ages 15, 18, and 23 Years

	15 y			18 y			23 y		
	n [†]	Total [‡]	%	n [†]	Total [‡]	%	n [†]	Total [‡]	%
Pain	12	16	75**	6	12	50**	3	7	43
Dysfunction	6	15	40	10	28	36	12	36	33
Pain + dysfunction	4	5	80*	7	8	88**	5	9	56
Any TMD symptom	22	36	61	23	48	48	20	52	38
Male	7	14	50	8	20	40	7	21	33
Female	15	22	68	15	28	54	13	31	42
No TMD symptoms	30	92	33	27	80	34	16	76	21
Male	16	46	35	14	40	35	5	39	13
Female	14	46	30	13	40	33	11	37	30

[†]No. of patients in a TMD symptom-related group suffering from PS symptoms.

[‡]No. of patients in the TMD symptom-related group.

* $P < .05$.

** $P < .01$.

dysfunction and PS symptoms ($P > .05$) or between PS symptoms and lack of TMD symptoms ($P > .05$). The majority of subjects with both TMD and PS symptoms were female, in a ratio of approximately 2 to 1 in all 3 age groups (Table 2).

Discussion

Few studies have assessed longitudinally the association between TMD and somatic or psychological symptoms. In agreement with previous studies,²³⁻²⁶ this study found the subjective reports of TMD pain symptoms and PS complaints to be correlated, although the associations were weak. The strongest coefficient was 0.2555, which accounts for about 7% of the total variance. No similar association was found between either dysfunctional symptoms or lack of TMD symptoms and PS complaints.

This study concurs with previous studies that found a relatively low prevalence of TMD pain and dysfunction in adolescents and young adults.⁵⁻¹¹ The majority of subjects with both TMD and PS symptoms were female. Additionally, the majority of subjects reporting PS symptoms at all ages were female. Most prevalence studies have shown that those in need of or seeking treatment for TMD are predominantly female and between the ages of 25 and 35.^{6,10,13} Various reasons for the predominance of 25- to 35-year-old women among TMD patients have been proposed, including hormonal factors, increased trauma, a generally high amount of health-seeking behavior, and the psychosocial functioning of this cohort.^{4,13,26,27} Overall, however, the results of studies in younger age groups, including the present study, indicate that the majority of subjects cope well with their TMD pain and dysfunction symptoms in adolescence.^{5-9,22}

Several studies of general pain constructs, as well as TMD, have indicated an association between psychosomatic and/or psychosocial aspects.^{14-16,24-26} There is now general support from many studies that biomedical, psychological, and psychosocial variables are all important in the assessment of pain disorders, including TMD.^{2,15,26,28,29} The findings of this study concur with this and with the biopsychosocial model of health and disease to some degree.^{14,15,28-30} Pain problems may be associated with psychosomatic factors and general well-being, at least in some subjects. It is not possible to say, however, how these parameters relate to each other, ie, whether PS symptoms predispose the patient to initiate or maintain TMD pain. In future studies it would be of interest to assess whether TMD prob-

lems are associated with other pain conditions, to determine the correlation between PS and clinical variables and their clinical significance, and to evaluate the prospective treatment need.

In this study, subjects who reported TMD dysfunction had only a weak association with PS symptoms and closely resembled those subjects with no symptoms. It could be hypothesized that these patients can tolerate changes in their mandibular function without treatment.^{11,15,16,31} It has been reported also that both pain symptoms and dysfunctional symptoms may fluctuate over time.^{5-10,14,15,22} A study by Könönen et al²² showed that joint clicking, a common dysfunctional symptom with a reported prevalence of up to 50% in some epidemiological studies,^{6,13} may be adaptive in nature. These findings further support the exercise of caution in even conservative management of these symptoms in adolescence, a physically and psychologically sensitive phase of development.²² It is premature to elucidate, however, how functional disturbances that require treatment are correlated to the development of TMD. Further prospective studies in this field are required to elucidate this relationship.

Conclusions

In conclusion, this longitudinal study indicated an association between PS symptoms and TMD pain and between PS symptoms and a combination of TMD pain and dysfunction symptoms. No similar correlation was found between TMD dysfunction and PS complaints or between the lack of TMD symptoms and PS complaints. Although the findings support an association between pain symptoms and psychological factors, this association was weak. Some subjects who report TMD pain may also have PS symptoms that should be given consideration in the assessment of these subjects. No conclusion can be made, however, about the role of PS symptoms in predisposing patients to, initiating, or maintaining the development of TMD or the prospective treatment need.

The percentage of adolescent subjects reporting either TMD pain symptoms or PS symptoms was low. This finding supports earlier studies that reported that the prevalence of people with TMD symptoms and signs in the general population is higher than the prevalence of people in need of treatment for TMD. Furthermore, this finding supports conservative management of TMD symptoms during adolescence.

References

1. Suvinen TI. Psychophysiological Aspects of Temporomandibular Pain and Dysfunction [PhD thesis]. Melbourne, Australia: University of Melbourne, 1992.
2. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders. Review, criteria, examinations and specifications, critique. *J Craniomandib Disord* 1992;6:301-355.
3. Okeson JP (ed). *Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management*. Chicago: Quintessence, 1996.
4. McNeill C. Management of temporomandibular disorders: Concepts and controversies. *J Prosthet Dent* 1997;77:10-22.
5. Nilner M. Prevalence of functional disturbances and diseases of the stomatognathic system in 15-18 year olds. *Swed Dent J* 1981;5:189-197.
6. Carlsson GE. Epidemiological studies of signs and symptoms of temporomandibular joint-pain-dysfunction. A literature review. *Aust Prosthodont Soc Bull* 1984;14:7-12.
7. Magnusson T, Egermark-Eriksson I, Carlsson GE. Five-year longitudinal study of signs and symptoms of mandibular dysfunction in adolescents. *J Craniomandibular Pract* 1986;4:338-344.
8. Wänman A, Agerberg G. Mandibular dysfunction in adolescents. I. Prevalence of symptoms. *Acta Odontol Scand* 1986;44:47-54.
9. Heikinheimo K, Salmi K, Myllärniemi S, Kirveskari P. Symptoms of craniomandibular disorder in a sample of Finnish adolescents at the ages of 12 and 15 years. *Eur J Orthod* 1989;11:325-331.
10. Dworkin SF, Huggins KH, LeResche L, et al. Epidemiology of signs and symptoms in temporomandibular disorders: Clinical signs in cases and controls. *J Am Dent Assoc* 1990;120:273-281.
11. Könönen M, Nyström M. A longitudinal study of craniomandibular disorders in Finnish adolescents. *J Orofac Pain* 1993;7:329-336.
12. de Kanter RJ, Truin GJ, Burgersdijk RC, et al. Prevalence in the Dutch adult population and meta-analysis of signs and symptoms of temporomandibular disorder. *J Dent Res* 1993;72:1509-1518.
13. Carlsson GE, LeResche L. Epidemiology of temporomandibular disorders. In: Sessle BJ, Bryant PS, Dionne RA (eds). *Progress in Pain Research and Management*. Vol 4: Temporomandibular disorders and related pain conditions. Seattle, WA: IASP Press, 1995:211-226.
14. Dworkin SF, Suvinen TI. Orofacial pain/temporomandibular disorders. Review of the scientific literature on biobehavioral aspects of temporomandibular disorders. Behavioral, cognitive and emotional factors related to etiology, assessment, diagnosis and management. In: *Proceedings of the World Workshop on Oral Medicine III*, 2-5 Aug 1998, Chicago, IL.
15. Suvinen T, Reade PC. Temporomandibular disorders: A critical review of the nature of pain and its assessment. *J Orofac Pain* 1995;9:317-339.
16. Dahlsröm L. Psychometrics in temporomandibular disorders. An overview. *Acta Odontol Scand* 1993;51:339-352.
17. Nyström M. Development of the deciduous dentition in a series of Finnish children. *Proc Finn Dent Soc* 1982;78 (4 suppl):1-48.
18. Alaluusua S, Kleemola-Kujala E, Grönroos L, Evälahti M. Salivary caries-related tests as predictors of future caries increment in teenagers. A three-year longitudinal study. *Oral Microbiol Immunol* 1990;5:77-81.
19. Nilner M, Lassing S-Å. Prevalence of functional disturbances and diseases of the stomatognathic system in 7-14 year olds. *Swed Dent J* 1981;5:173-187.
20. Rimpelä M, Rimpelä A, Pasanen M. Perceived symptoms among 12-18 year-old Finns [in Finnish with English summary]. *J Soc Med* 1982;19:219-233.
21. Könönen M, Nyström M, Kleemola-Kujala E, et al. Signs and symptoms of craniomandibular disorders in a series of Finnish children. *Acta Odontol Scand* 1987;45:109-114.
22. Könönen M, Waltimo A, Nyström M. Does clicking in adolescence lead to painful temporomandibular joint locking? *Lancet* 1996;347:1080-1081.
23. Kleinknecht R, Mahoney E, Alexander L. Psychosocial and demographic correlates of temporomandibular disorders and related symptoms: An assessment of community and clinical findings. *Pain* 1987;29:313-324.
24. De Leeuw JRJ, Steenks MH, Ros WJ, Lobbezoo-Scholte AM, Bosman F, Winnubst JA. Multidimensional evaluation of craniomandibular dysfunction. I: Symptoms and correlates. *J Oral Rehabil* 1994;21:501-514.
25. Suvinen T, Reade PC, Sunden B, Gerschman JA, Koukounas E. Temporomandibular disorders: Part I. A comparison of symptom profiles in Australian and Finnish patients. *J Orofac Pain* 1997;11:58-66.
26. Suvinen T, Reade PC, Sunden B, Gerschman JA, Koukounas E. Temporomandibular disorders: Part II. A comparison of psychologic profiles in Australian and Finnish patients. *J Orofac Pain* 1997;11:147-157.
27. Reade PC. An approach to the management of temporomandibular joint pain-dysfunction syndrome. *J Prosthet Dent* 1984;51:91-96.
28. Dworkin SF. Psychosocial issues. In: Lavigne G, Sessle BJ, Dubner R (eds). *Orofacial Pain: From Basic Science to Clinical Management*. Chicago: Quintessence, 2001: 115-188.
29. Dworkin SF, Von Korff M, LeResche L. Epidemiologic studies of chronic pain: A dynamic ecologic perspective. *Ann Behav Med* 1992;14:3-11.
30. Rugh JD. Psychological components of pain. *Dent Clin North Am* 1987;31:579-594.
31. Turner JA, Clancy S. Strategies for coping with chronic low back pain: Relationship to pain and disability. *Pain* 1986;24:355-364.