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Association between cynical hostility and temporomandibular pain mediated through somatization and depression: an 11-year follow-up study on Finnish adults

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ABSTRACT

Background: Hostility is believed to have an adverse effect on physical health through mediating psychosocial factors.

Objectives: This study aimed to investigate the association of hostility with temporomandibular (TMD) pain. Another aim was to investigate if the association is mediated through increases in depressiveness and somatization in an 11-year follow-up on Finnish adults, based on the Health 2000 and 2011 Surveys (BRIF8901).

Material and methods: The sample comprised subjects who underwent clinical TMD pain examination (pain on palpation of the masticatory muscles and temporomandibular joints) in 2000 and 2011 and responded to questions on TMD pain symptoms in 2011. Hostility was measured using the Cynical Distrust Scale, somatization was measured using the Symptom Checklist-90, and depressiveness using Beck's Depression Inventory-21. Four subgroups were formed based on the presence of TMD pain: no pain, pain in 2000 only, pain in 2011 only, and pain in 2000 and 2011. Analyses included chi-square test cross-sectionally, and multinomial logistic regression longitudinally with the level of hostility in 2000 as the predictor. Mediation analysis was performed using Hayes' Process v3.5.

Results: Those with higher hostility showed a higher prevalence of TMD pain. Longitudinally, the association of hostility with TMD pain in 2000 only, and with TMD pain in both years, was mediated either by somatization only or by depressiveness that was mediated by somatization. In those with TMD pain in 2011 only, the association was mediated by depressiveness that was mediated by somatization.

Conclusion: Hostility increased the risk of TMD pain through increases in depressiveness and somatization.

Introduction

Hostility can be defined as a personality trait characterized by cynical ideation, mistrust, and an antagonistic interpersonal approach [1,2]. In the growing interest in the health adversities of hostility, several theories have been developed attempting to explain how hostility could affect health. This includes heightened physiological reactivity to the interpersonal and cognitive load of hostility (psychophysiological), erosion of social support as a result of antagonism and its taxing effect on mental health (psychosocial vulnerability), engaging in unhealthy habits such as smoking, excessive alcohol consumption and lack of exercise (behavioral), the interaction between the social adversity of hostility and the characteristic heightened physiological reactivity (transactional), and finally the genetic link between hostility and its ensued health complications (constitutional) [2]. What the aforementioned theories seem to have in common is the presence of a mediating factor through which hostility may cast its adverse effect on health.

A hostile personality trait has been linked to an increased symptoms load, including musculoskeletal symptoms and headache, and this effect appears to be moderated by socio-economic status [3]. Furthermore, hostility was found to increase pain severity [4] which was believed to be mediated through low social support and consequential poor mental health [5]. Nevertheless, in those suffering from chronic pain, hostility was found to increase muscle tension at the site of pain, which was suggested as a possible reason for perpetuating chronic pain [6]. Fillingim et al. reported that those with chronic temporomandibular disorder (TMD) pain had a higher level of hostility compared to healthy controls, as well as higher levels of somatization and depressive symptoms [7]. Another clinical study observed that TMD patients with bruxism had higher levels of hostility, showing that the level of hostility increased with higher depressiveness levels [8].

Interestingly, in a study comparing different subsets of TMD pain, masticatory muscle pain was found particularly associated with high levels of hostility compared to temporomandibular joint pain, but those TMD pain subsets did not differ significantly by somatization and depression levels [9]. Viewing the literature, there seems to be a scarcity of longitudinal population-based studies investigating the association of cynical hostility with TMD pain, whereas the association of other psychological factors such as depression and somatization is well documented [10–14]. Furthermore, in the few studies investigating hostility and TMD pain, somatization and depression seem to be other common risk factors for TMD pain. In a population-based study of Finnish adults, depressive symptoms increased the risk of TMD pain [15]. Based on the theories explaining the association of hostility with health adversities, and studies on TMD pain, the hypothesis would be that cynical hostility increases the risk of TMD pain through increases in somatization and depression.

Aims

One aim of the study was to investigate the association of cynical hostility with temporomandibular pain in a population-based study. Another aim was to investigate the longitudinal effect of cynical hostility on the prognosis of temporomandibular pain over 11 years. The final aim was to investigate whether the potential adversities of cynical hostility on temporomandibular pain were mediated by somatization and depressive symptoms.

Material and methods

The data for the study were based on the comprehensive, nationally representative Health 2000 and Health 2011 Surveys, carried out by the Finnish Institute for Health and Welfare (THL) [16,17]. The main sampling frame in the Health 2000 comprised 8,028 adults aged 30 years or over, living in mainland Finland, of whom 6,986 (87%) were interviewed in their home or in an institution, and 79% participated in health examinations, including oral health [18]. The two-stage stratified cluster sample was representative of the Finnish population aged 30 years or over, allowing for good generalizability of the results. Persons aged 80 years and over were oversampled by doubling the sampling fraction [16].

All participants included in the Health 2000 Survey were invited to participate in the Health 2011 Survey, which, in addition, included a new sample of young adults aged between 18 and 28 years old [17]. Of those invited, 6,740 participated in at least one part of the survey [17]. Clinical oral examinations were carried out in the same manner as in the Health 2000 Survey; however, due to limited resources, they only covered subjects who were living in Southern (Hospital Districts of Helsinki and Uusimaa) and Northern (Hospital Districts of Kainuu, Keski-Pohjanmaa, Pohjois-Pohjanmaa, Lappi, Länsi-Pohja, Pohjois-Savo, and Vaasa) Finland, with a 41% participation rate [19].

For this study, those who participated in the clinical oral examination and TMD signs assessment in the Health 2000 survey ($n = 6,309$; men $= 2,860$ and women $= 3,449$), or in the Health 2011 survey ($n = 1,524$; men $= 681$ and women $= 843$), were included for cross-sectional investigations. Additionally, those who participated in the clinical oral examination and TMD assessment in both the Health 2000 and the Health 2011 surveys ($n = 1,210$) were selected for longitudinal investigation [20]. The final longitudinal sample comprised 1,087 participants (men $= 488$, women $= 599$) after excluding cases with missing information.

Assessment of TMD signs and symptoms

In the Health 2000 survey, a standardized clinical oral examination was performed by five calibrated and experienced dentists, who assessed the signs of TMD [18]. The examiners were trained prior to the examinations by experienced specialists in order to increase the reproducibility of the clinical examination. The assessment of TMD signs included the recording of maximum mouth opening, auscultation of temporomandibular joint (TMJ) noises, and palpation of the TMJs and two masticatory muscles (MM), namely, the temporalis anterior and masseter superficialis. TMJ tenderness to palpation was assessed by applying a force of about 0.5 kg over the immovable condyle, and MM tenderness was assessed with a force of about 1 kg. Attempts were made to standardize the palpation force by exerting the forces on a measuring scale (using a letter-weighing scale) between the examinations. TMJ and MM pain on palpation was recorded if the subjects reported pain when asked, or if they showed a protective reflex. Except for the maximum inter-incisal distance, all the findings were recorded separately for both sides. The percentage agreement between examiners and the referent examiner was 92% (Kappa value, 0.26; 95% CI, 0.19–0.34) for pain on palpation in TMJs and 95% (Kappa value, 0.47; 95% CI, 0.41–0.53) for pain on palpation in masticatory muscles.

In the Health 2011 survey, the oral health examinations were performed by four calibrated and experienced dentists, similarly to the Health 2000 Survey [17]. In addition to the assessment of TMD signs, TMD symptoms were investigated in the follow-up using the following questions, which have been shown to be valid for screening TMD pain [21].

1. Do you have pain in your temples, face, temporomandibular joint, or jaws once a week or more?
2. Do you have pain when you open your mouth wide or chew once a week or more?

In the Health 2000 survey and similarly in the Health 2011 survey, the subject was considered TMJ-pain positive in the presence of pain on palpation on either side of the TMJs, and negative in the absence of pain on both sides. The corresponding criteria were set for MM pain, meaning that those having pain in any of the four MMs on either side were set as MM-pain positive. Accordingly, those exhibiting either TMJ or MM pain on palpation were referred to as being clinical TMD-pain positive. Reported TMD pain was based on a positive answer to either of the TMD pain

symptom questions that were asked in the Health 2011 survey. Finally, those who attended both surveys (Health 2000 and Health 2011) were categorized into four TMD pain subgroups, based on the presence of clinical pain at baseline (in 2000) and clinical or reported pain in the follow-up (in 2011) as follows: 1. no TMD pain in either year, 2. TMD pain at baseline only, 3. TMD pain in the follow-up only, and 4. TMD pain at baseline and in the follow-up [10,11].

Exposure

Hostility was assessed in both surveys using the cynical distrust scale [22], which was a modified version derived from the Cook-Medley Hostility Scale [23]. The cynical distrust scale comprised eight statements to which the participant was required to choose on a scale from 1 to 4 how correct the statement was in their opinion, with 1 being *fully correct* and 4 being *fully incorrect*. The lower the score, the higher the level of cynical hostility. The sum of the scores ranges between 8 and 32, which was then reversed so that the lower the score, the lower the cynical hostility level, then categorized into five score ranges based on the quintiles, as in a previous study by Suominen-Taipale et al. [24] on the Health 2000 participants, as follows: 8–18, 19–21, 22–23, 24–25, 26–32. The first quintile (8–18) refers to the lowest level of cynical hostility and the fifth quintile (26–32) refers to the highest level of cynical hostility. The same approach was used to define the categories in 2011 and to determine the lowest and the highest quintiles of the test scores in the sample. Quintiles were as follows: 8–20 (lowest), 21–23, 24–25, 26–28, and 29–32 (highest).

Mediators

Somatization, or 'unexplained physical symptoms,' and depressive symptoms were chosen here as possible routes of transmission from hostility to TMD pain. Data on somatization and depressive symptoms were collected based on the Health 2000 survey. The level of somatization was used based on the somatization subscale of the Symptom Checklist-90 (SCL-90-SOM) [25]. The somatization subscale contained 12 symptom questions, each of which had a rating from 0 (not at all) to 4 (extremely). Scores were then calculated and the average score for each participant was obtained. Based on the average score of the SCL-90-SOM, the participant's somatization symptom levels were divided into quartiles and categorized as follows: up to the 50th percentile (low level of somatization), between the 50th and the 75th percentiles (moderate level of somatization), and above the 75th percentile (high level of somatization). The level of depressive symptoms was measured using Beck's Depression Inventory 21 (BDI-21) [26]. Each question contained 4 answers rating the severity of current depressive symptoms, ranging from 0 to 4. A sum score was formed, and BDI-21 was used as a continuous variable [27].

Confounders

Age, gender, educational level, and general health status were used as potential confounders. The educational level in both years included three categories: basic, intermediate, and higher education. The basic education category included those with no formal vocational training or senior secondary education. Intermediate education included those who had completed vocational training or passed the matriculation examination, and higher education included those with degrees or diplomas from higher vocational institutions, polytechnics, and universities. Self-reported general health status included four categories: good, rather good, moderate, rather poor, and poor. This was further trichotomized into good and rather good, moderate, rather poor and poor.

Statistical analysis

Pearson's Chi-Square and Fisher's exact test were used to assess the association of percentiles of cynical hostility and somatization levels with clinical TMD pain in 2000 and 2011 and reported TMD pain in 2011. Depressive symptoms were not included here, as their association with TMD pain was tested in a previous report [15].

In those who attended the survey in both years, multinomial logistic regression was used to assess the association of cynical hostility level at baseline with TMD pain subgroups (no TMD pain in either year as the reference category), first unadjusted, and then adjusting in turn for baseline levels of education, somatization by SCL-90-SOM, and depressive symptoms by BDI-21, controlling for age and gender. The same was done to assess the association of the level of somatization at baseline, based on the SCL90-SOM, with TMD pain subgroup outcome, additionally adjusting for self-reported health status at baseline.

Serial mediation model

Serial mediation analysis was conducted using Hayes [28] *Process v3.5* to investigate the paths through which cynical hostility at baseline was associated with TMD pain subgroup outcome, while BDI-21 and SCL-90-SOM at baseline were set as possible mediators. For statistical reasons, TMD pain outcome was arranged into three binomial variables. The first category in each variable was no pain in either year, and the second category was one of the following: pain at baseline only, pain in the follow-up only, and pain in both years. The category 'no pain in either year' was set as the reference in all three variables during the analysis. The model had one direct effect path from cynical hostility to the TMD pain outcome independent of the mediators, and three indirect paths from cynical hostility to the outcome of TMD pain, as follows: 1. through BDI-21 score, meaning depressive symptoms at baseline, 2. through SCL-90-SOM score, meaning somatization at baseline, 3. first through BDI-21 then through SCL-90-SOM. The model was controlled for age, gender, and educational level.

Results

Cross-sectional findings

Results from the Health 2000 survey can be seen in Table 1. Clinical TMD pain was significantly associated with high levels of cynical hostility and somatization among men and women. The Health 2011 survey (Table 2), reported TMD pain was significantly associated with high levels of cynical hostility among women.

Longitudinal findings (multinomial logistic regression)

The results for those who attended both the Health 2000 and the Health 2011 surveys can be seen in Tables 3 and 4. Based on unadjusted and adjusted analyses, a higher cynical hostility level at baseline did not significantly predict TMD pain at baseline only, nor TMD pain in the follow-up only. A higher cynical hostility level at baseline significantly predicted TMD pain in both years when unadjusted (OR = 1.1, 95% CI 1.0–1.2), and also after adjusting for age (OR = 1.1, 95% CI 1.0–1.2), and further adjusting for gender (OR = 1.1, 95% CI 1.0–1.2) (Table 3). When adjusted for either educational level, somatization, or depressive symptoms at baseline, while controlling for age and gender, the cynical hostility level was not significant in predicting TMD pain in both years. A higher somatization level at baseline was significantly predictive for TMD pain in all subgroups, unadjusted and when adjusting for age, gender, educational level, or when alternately adjusted for baseline depressive symptoms or general health status, while controlling for age, gender, and education (Table 4).

Serial mediation analysis

The direct effect of cynical hostility on the TMD pain subgroup outcome was not significant. Cynical hostility had a significant indirect (mediated) effect on the outcome of TMD pain at baseline only, through somatization level, and a significant indirect (mediated) effect on the outcome through depressive symptoms, which was mediated by somatization. The same indirect paths were significant in the case of TMD pain in both years. For the outcome of TMD pain at the follow-up only, cynical hostility had a significant indirect effect on the outcome through depressive symptoms and then through somatization (Table 5).

Discussion

This study explored the association between hostility and experiencing TMD pain and the possible pathways through which hostility might increase the risk of such pain. The present study showed that somatization symptoms, which are

Table 1. Weighted prevalence (%) of clinical temporomandibular pain (TMD pain) in the Health 2000 survey among men and women by cynical hostility distrust and somatization level categories.

	Clinical[a] TMD pain					
	Men			Women		
	N	%	p^b	N	%	p^b
All	2,860	8.9		3,449	21.2	
Cynical distrust hostility score			<.001			<.001
1st quintile (lowest)	391	5.9		760	17.3	
2nd quintile	405	6.9		532	17.0	
3rd quintile	483	7.3		549	18.7	
4th quintile	646	7.2		619	18.8	
5th quintile (highest)	747	12.1		670	28.1	
Somatization level (SCL-90-SOM)			<.001			<.001
Low (≤50th percentile)	1,568	4.8		1,523	10.4	
Moderate (>50th — ≤70th percentiles)	588	11.0		786	17.7	
High (>70th percentile)	535	18.7		942	39.4	

[a]Having pain on palpation in either masticatory muscles (temporalis or masseter) or temporomandibular joints.
[b]Chi-Square value.

Table 2. Weighted prevalence (%) of clinical and reported temporomandibular pain (TMD pain) in the Health 2011 survey among men and women by cynical hostility distrust categories.

	Clinical[a] TMD pain						Reported[b] TMD pain					
	Men			Women			Men			Women		
	N	%	p^c	N	%	p^c	N	%	p^c	N	%	p^c
All	681	4.3		843	10.6		681	8.2		843	12.7	
Cynical distrust hostility level			.362			.210			.478			<.001
1st quintile (lowest)	93	2.4		138	8.0		93	4.8		138	7.1	
2nd quintile	127	2.6		211	6.9		127	11.2		211	7.5	
3rd quintile	107	7.0		156	13.8		107	8.0		156	6.9	
4th quintile	156	2.2		144	8.4		156	7.2		144	18.3	
5th quintile (highest)	147	3.5		135	12.7		147	6.3		135	22.0	

[a]Having pain on palpation in either masticatory muscles (temporalis or masseter) or temporomandibular joints.
[b]Positive answer to either of the TMD pain symptoms questions.
[c]Chi-Square value.

Table 3. Multinomial logistic regression association of cynical hostility score at baseline with temporomandibular pain outcome, compared to no pain in either year, represented in odds ratio (OR) and 95% confidence intervals (95% CI).

Cynical hostility score (continuous)	TMD pain at baseline only	TMD pain in the follow-up only	TMD pain at baseline and in the follow-up
		OR (95%CI)	
Unadjusted	1.0 (1.0–1.1)	1.0 (1.0–1.1)	**1.1 (1.0–1.2)**
Adjusted for age	1.0 (1.0–1.1)	1.0 (1.0–1.1)	**1.1 (1.0–1.2)**
Adjusted for gender and age	1.1 (1.0–1.1)	1.0 (1.0–1.1)	**1.1 (1.0–1.2)**
Adjusted for educational level at baseline (age and gender controlled)	1.0 (1. 0–1.1)	1.0 (1.0–1.1)	1.1 (1.0–1. 1)
Adjusted for depressive symptoms* (age and gender controlled)	1.0 (1.0–1.1)	1.0 (0.9–1.0)	1.1 (1.0–1.1)
Adjusted for somatization** (age and gender controlled)	1.0 (1.0–1. 1)	1.0 (0.9–1.0)	1.0 (1.0–1.1)

*Based on Beck's Depression Inventory 21 score at baseline.
**Based on Symptom Checklist 90 somatization subscale at baseline.
Significant associations in **bold.**

Table 4. Multinomial logistic regression association of somatization score at baseline with temporomandibular pain outcome, compared to no pain in either year, represented in odds ratio (OR) and 95% confidence intervals (95% CI).

Somatization level (SCL-90-SOM) (continuous)	TMD pain at baseline only	TMD pain in the follow-up only	TMD pain at baseline and in the follow-up
		OR (95%CI)	
Unadjusted	**3.8 (2.5–5.7)**	**2.8 (2.0–4.0)**	**7.1 (4.5–11.2)**
Adjusted for age	**3.7 (2.4–5.7)**	**3.0 (2.1–4.4)**	**7.6 (4.7–12.4)**
Adjusted for gender and age controlled	**3.4 (2.2–5.2)**	**2.9 (2.0–4.2)**	**7.3 (4.4–11.9)**
Adjusted for educational level at baseline (age and gender controlled)	**3.2 (2.0–5.1)**	**3.0 (2.0–4.4)**	**6.0 (3. 6–10.0)**
Adjusted for depressive symptoms* (age, gender, and education controlled)	**2.7 (1.6–4.5)**	**2.5 (1.6–3.9)**	**5.2 (2.9–9.5)**
Adjusted for health status (age, gender, and education controlled)	**2.4 (1.4–4.1)**	**2.9 (1.9–4.7)**	**4.3 (2.3–7.9)**

*Based on Beck's Depression Inventory 21 score at baseline.
Significant associations in **bold**.

Table 5. Serial mediation model depicting the direct effect of cynical hostility (HOS) at baseline on temporomandibular pain outcome (TMD pain) in 95% confidence intervals (CI), and the indirect effect through the score of Beck's Depression Inventory 21 (BDI-21) at baseline, the indirect effect through the level of somatization (SOM) at baseline, and the serial indirect effect through BDI-21 then through SOM in bootstrap confidence intervals (CI), all while controlling for gender, age, and educational level.

	Direct HOS—>TMD pain		Indirect HOS—>BDI-21—>TMD pain	Indirect HOS—>SOM—>TMD pain	Indirect HOS—>BDI-21—>SOM—>TMD pain
	Effect (95% CI)	p-value	Effect (Bootstrap CI)	Effect (Bootstrap CI)	Effect (Bootstrap CI)
TMD pain at baseline only	−0.0099 (−0.0810, 0.0613)	.7862	0.0159 (−0.0008, 0.0346)	**0.0078 (0.0008, 0.0175)**	**0.0153 (0.0071, 0.0252)**
TMD pain in the follow-up only	−0.0198 (−0.0752, 0.0356)	.4839	0.0090 (−0.0068, 0.0242)	0.0046 (−0.0024, 0.0126)	**0.0121 (0.0060, 0.0197)**
TMD pain in both baseline and the follow-up	−0.0289 (−0.1149, 0.0571)	.5102	0.0134 (−0.0119, 0.0393)	**0.0155 (0.0034, 0.0305)**	**0.0250 (0.0148, 0.0392)**

Significant effects denoted in **bold**.

associated strongly with TMD pain and with depressiveness, mediated the effect of cynical hostility on TMD pain. Longitudinally, a high level of hostility significantly increased the risk of exhibiting TMD pain in both years, but this became insignificant when controlling for educational level, depressiveness, or somatization. Somatization, on the other hand, was highly predictive of TMD pain in all the subgroups, even after controlling for possible confounders. The serial mediation model revealed that the effect of hostility on the outcome of TMD pain was totally mediated by depressiveness and somatization. Different routes for mediation were found for TMD pain outcomes. In those with TMD pain only at baseline and TMD in both years, the effect of

hostility was either through somatization or through depressiveness, which then goes through (mediated by) somatization. In those with TMD pain only in the follow-up, the effect of hostility was mediated by depressiveness, which was mediated by somatization.

Several longitudinal studies have found hostility to be associated with depressive symptoms, and especially its somatic aspect [29–32]. Those results support the findings of the present study. Furthermore, it has been established that depression, somatization, and chronic pain (e.g. TMD pain) are often comorbid conditions and can affect the prognosis of one another [33], for which the present study demonstrated a serial pathway from hostility that goes through

depressiveness and somatization towards exhibiting TMD pain. This serial pathway could be explained by breaking down some of the commonalities between hostility, depression, and somatization. Hostility puts the individual under constant conflict with the surrounding environment, leading to heightened stress levels [2], when prolonged, could possibly result in dysregulation in the hypothalamus-pituitary-adrenal (HPA) axis, contributing to depressive and somatic symptoms through various neurogenic inflammatory reactions [34]. Prolonged periods of stress in vulnerable individuals have been found to disturb the chemical balance of the stress system both centrally and peripherally, which may result in a depressive mood, somatic symptoms, and hyperalgesia, among other symptoms and conditions, including obesity and type-2 diabetes [35]. Another explanation for the pathway from hostility to TMD pain is that the erosion of the social support system due to interpersonal conflicts from hostility could make an individual more prone to depressiveness and the subsequent somatic symptoms development [2,5,36]. These changes may lead to TMD pain through central sensitization, which is a phenomenon that has been observed among chronic TMD pain sufferers [37].

Studies have demonstrated a relationship between stress, depression, and somatization and the onset or the persistence of TMD pain [7,10–15,37], which makes the pathway found in the current study plausible. For instance, those who suffer from chronic TMD pain show higher levels of hostility, stress, depression, and somatization compared to healthy controls [7]. Furthermore, the risk of first-onset TMD was found to be increased by stress, negative affect, and somatization [10]. These previous studies support the present results.

In a case-control study, participants with TMD pain reported higher levels of somatosensory amplification (amplified response to normal bodily sensations) and affect (emotions) inhibition [38]. Somatization was found to increase the risk of chronic TMD pain in a one-year follow-up in Finnish non-patients, but depression was not as significant [11], which was similar to the findings of the current study. According to a clinical study on TMD patients, especially those diagnosed with painful TMD exhibited a higher prevalence of moderate to severe somatization and depressive symptoms, which were highly correlated [39]. A similar study comparing TMJ pain to MM pain found no difference in somatization and depression levels, but hostility was significantly elevated in those with MM pain [9]. Furthermore, a population study in Brazil found that those who were diagnosed with TMD pain showed significantly high levels of somatization and depression [40]. Somatization seems to be particularly higher in those with chronic TMD pain [7,41].

This study is in line with the transactional model [2], in which hostility increases the risk for TMD pain experience through depressiveness (psychosocial) and then through somatization (psychophysiological). Furthermore, in the present study, level of education was used as an indicator of socioeconomic status, and it seemed to weaken the association of cynical hostility with TMD in both years. This result is supported by a previous study showing that the link between hostile personality and pain symptoms is moderated by socioeconomic status [3]. Although the effect of hostility may be modest in this study sample, this could be understandable due to the complexity and multifactorial nature of TMD pain pathophysiology. Furthermore, the sample comprised individuals without particularly high levels of hostility, which might have attenuated the statistical effect, along with the fact that the number of those exhibiting TMD pain in the follow-up was low, due to a lower participation rate.

Strength and limitations

This study demonstrated statistically a path for the effect of hostility on exhibiting temporomandibular pain using a large population-based sample in a longitudinal setting. Furthermore, temporomandibular pain was based on clinical signs that were recorded by experienced examiners rather than relying on self-report alone. Additionally, information on symptoms experience was collected in the follow-up using questions that showed validity for screening TMD pain. Furthermore, information about hostility, somatization, and depressive symptoms was collected using commonly used and validated questionnaires. However, one of the limitations of the study was that pain was based on a palpation examination of the masticatory muscles and the temporomandibular joint, and the Research Diagnostic Criteria for TMD (RCD/TMD) were not implemented, which was due to the large sample size. Furthermore, questions about symptoms of temporomandibular pain were only obtained in the follow-up (the Health 2011 survey), which did not allow for a comparison between the baseline and the follow-up, and additionally, information about somatization was not obtained in the follow-up, which did not allow for exploration of the pathway analysis between hostility and temporomandibular pain in the follow-up, through depressiveness and somatization in the follow-up.

Conclusion

In vulnerable individuals, hostility may increase the risk of temporomandibular pain. This risk can be mediated by increased depressiveness, which, in turn, is mediated by increased somatization. Increased somatization might play a major role in the risk of temporomandibular pain in individuals with higher hostility, whether they suffer from depressive symptoms or not, given the fact that the mediation pathway through somatization alone was more significant than through depressiveness alone, and the fact that depressiveness was always mediated by somatization. Finally, the present study showed that psychosocial factors are important risk factors for TMD pain, and therefore psychological screening for TMD pain patients should be recommended to identify those at risk of chronicity and for drawing a multidisciplinary treatment plan for those suffering from underlying psychosomatic comorbid conditions.

Disclosure statement

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