

Ethnic Background as a Factor in Temporomandibular Disorder Complaints

Marylee J. van der Meulen, MSc

Psychologist and Assistant Professor
Department of Oral Function
Academic Center for Dentistry
Amsterdam (ACTA) and Center for
Special Dental Care (SBT)
Amsterdam, The Netherlands

Frank Lobbezoo, DDS, PhD

Professor
Department of Oral Function

Irene H.A. Aartman, PhD

Psychologist and Assistant Professor
Department of Social Dentistry and
Behavioral Sciences

Machiel Naeije, PhD

Biophysicist, Professor, and Chair
Department of Oral Function

Academic Center for Dentistry
Amsterdam (ACTA)
Amsterdam, The Netherlands

Correspondence to:

Marylee J. van der Meulen
Department of Oral Function
Academic Center for Dentistry
Amsterdam (ACTA)
Louwesweg 1, 1066 EA Amsterdam,
The Netherlands
Fax: +31 (0)20 5188414
Email: M.vd.Meulen@acta.nl

Aims: To examine the associations between the ethnic backgrounds of temporomandibular disorder (TMD) patients in the Netherlands and the level of TMD pain complaints and psychological/behavioral factors and whether these associations are influenced by socioeconomic factors. **Methods:** A sample of 504 consecutive patients from a TMD clinic completed the Research Diagnostic Criteria for TMD (RDC/TMD) Axis II questionnaire (pain intensity, pain-related disability, somatization, depression, ethnic background, and socioeconomic status), an oral parafunctions questionnaire, and questions related to stress. Ethnic background was classified, following the method of Statistics Netherlands (CBS), using the country of birth from subject and both parents. This resulted in a classification into three subgroups: Native Dutch (ND; 69.6%), Non-Native Western (NNW; 14.8%), and Non-Native Non-Western (NNNW; 15.6%). Statistics used were chi-square, one- and two-way ANOVA, and Kruskal-Wallis tests; for post-hoc interpretation, standardized residual values, Bonferroni, and Mann-Whitney U tests were used. **Results:** No differences in age or gender were found between the three ethnic groups, nor were there any differences in characteristic pain intensity or oral parafunctions. However, TMD patients from the NNNW subgroup had significantly higher scores on psychological factors, namely pain-related disability, disability days, somatization, depression, and stress. These patients had a lower incidence of employment, a lower level of education, and a lower income level than patients from the ND and NNW ethnic backgrounds. Analysis of variance showed no interaction effects between ethnic background and socioeconomic factors in relation to the psychological variables mentioned. **Conclusion:** Ethnic background of TMD patients in the Netherlands is associated with psychological factors, regardless of socioeconomic status, but not with TMD pain complaints or oral parafunctions. J OROFAC PAIN 2009;23: 38–46

Key words: ethnic background, pain, pain-related disability, socioeconomic status, temporomandibular disorders

In 1992, a standardized diagnostic procedure for temporomandibular disorders (TMD) was formulated in the Research Diagnostic Criteria (RDC/TMD).¹ In the RDC/TMD, a dual-axis diagnostic system was introduced. Axis I concerned the physical complaints, while Axis II concerned the psychological and behavioral statuses. According to the authors, one of the issues that RDC/TMD studies would have to address was whether this

standardized examination could be generalized to nations or cultures other than the United States. To enable clear communication and comparisons between researchers, the RDC/TMD examination form was translated into many languages, and 16 official translations are currently available.² In the RDC/TMD, it was also recommended to include data about the demographic backgrounds of patients, such as racial and ethnic backgrounds, identifying different subgroups within each country. To that end, the original English (US)-language RDC/TMD Axis II questionnaire included a question about “the groups best representing your race,” for which five options were available, such as “Eskimo,” “American Indian,” or “Black.” A second question concerned the patient’s “national background or ancestry” (from hereon referred to as “ethnic background”), and included eight possible answers. Examples were: “Puerto Rican,” “Mexican,” or “Other Latin American.” The responses to the questions about racial and ethnic background in the original RDC/TMD questionnaire were appropriate for the population of the US, but not for other countries. Nevertheless, many translators have preferred to maintain the literal translation of the official questionnaire, although some adapted the questions to the local situation.

Some studies have been done on the association between racial or ethnic backgrounds of TMD patients and their RDC/TMD Axis I and II scores. For example, one study focused on comparing patients from different countries with each other.³ Although few differences were found, the authors encouraged further study “...to explore how differences in culture, ethnicity, and related variations in health care provision are possible factors influencing the differential expression of TMD in patients around the world.” In other studies, differences in, eg, pain-related disability, were found between groups with different racial^{4,5} or ethnic⁶ backgrounds. Unfortunately, the results were not controlled for possible socioeconomic differences between the groups, which might have influenced or even determined the outcome, according to the authors.

The purpose of the present study was to examine the associations between the ethnic backgrounds of TMD patients in the Netherlands and the level of TMD pain complaints and psychological/behavioral factors, and whether these associations were influenced by socioeconomic factors such as being employed, level of income, and level of education.

Materials and Methods

A sample of 504 consecutive patients who were referred by their dentist to the specialized TMD clinic of the Academic Center for Dentistry Amsterdam (ACTA) participated in the study. Upon entering the clinic for the first time, they completed the Dutch version of the RDC/TMD Axis II questionnaire,⁷ an oral parafunctions questionnaire,⁸ and a stress questionnaire. All patients in the sample signed a statement of informed consent, agreeing with the anonymous use of their questionnaire data for research purposes. To examine possible differences in TMD pain, along with psychological and behavioral factors between patients with different ethnic backgrounds, the below-mentioned variables from the questionnaires were used.

Ethnic Background

In the culturally adapted Dutch version of the RDC/TMD Axis II questionnaire,⁷ ethnic background is established following the method of Statistics Netherlands (CBS), an organization that collects and publishes population data for research purposes and policy making. According to this method, ethnic background is determined by the country of birth of the subject, and that of his or her mother or father, leading to the country with which the subject has a factual affiliation. This procedure results in a classification in three different ethnic groups that will also be used in the present study:

1. Native Dutch (ND): both parents were born in the Netherlands, regardless of the country of birth of the subject. All the other subjects are called Non-Natives (groups 2 and 3).
2. Non-Native Western (NNW): the subject or at least one of the parents was born in Europe (excluding Turkey), North America, Oceania, Indonesia, or Japan (for socioeconomic and cultural reasons, people from Indonesia [many of whom were born in the former Dutch East Indies] and Japan are included).
3. Non-Native Non-Western (NNNW): includes all other subjects; the subject or at least one parent was born in Turkey, Africa, Latin America, or Asia (Indonesia and Japan excluded).

Pain Intensity and Pain-Related Disability

The RDC/TMD Axis II questionnaire consists of questions related to the subjective experience of pain, in terms of both the intensity of the pain experience and the disability in daily functioning, caused by the TMD pain.⁹ This leads to a classification of patients into five pain subgroups, termed the graded chronic pain (GCP) scale. The scale is based on the characteristic pain intensity (CPI) score, which may range from 0 to 100, the disability score (0 to 100), and disability days (0 to 180).¹ Since both the GCP classification and the separate pain intensity and pain disability variables are relevant for this study, all three were used to compare scores between the ethnic groups.

Somatization and Depression

The RDC/TMD questionnaire also includes two scales of the Dutch version of the Symptom Checklist-90 (SCL-90).¹⁰ The somatization scale consists of 12 questions that refer to physical complaints the patient was distressed by during the past week, with today included. Responses range from not at all (1), a little (2), somewhat (3), and rather much (4), to always (5). The total score of the 12 items is used. The depression scale of the SCL-90 consists of 16 questions. These are formulated and rated the same way as the questions within the somatization scale.

Stress

A series of seven questions address the amount of stress experienced by the patient. They are formulated as follows: "How much stress have you experienced during the past 6 months as a result of: worries at home or in the family, worries at work or school, financial worries, worries about social or personal relationships, worries about health, worries about other causes than the above, and overall amount of stress experienced during the past month?" These questions can all be answered on a 5-point scale, ranging from none (0), a little bit (1), somewhat (2), and rather much (3), to very much (4). The total stress score is the mean of these seven items.

Oral Parafunctions

In the oral parafunctions questionnaire, the frequency at which the subject reportedly engages in 12 different oral parafunctions is collected. These can be rated on a 5-point scale, ranging from never

(0), sometimes (1), regularly (2), and often (3), to always (4). The 12 oral parafunctions form three scales with related parafunctions.⁸ The BRUX scale includes bruxism: nocturnal and diurnal clenching or grinding. The BITE scale includes biting activities: biting on nails, pens, or chewing gum. The SOFT scale includes soft tissue activities: biting on lips, vacuum sucking with the tongue, playing and pushing with the tongue, and playing with a removable or full denture. Mean scores on each of these scales can range from 0 to 4.

Socioeconomic Factors

To examine whether differences found in psychological and behavioral factors could be attributed to differences in socioeconomic levels, demographic data were collected with three questions from the RDC/TMD questionnaire, which were adapted to the situation in the Netherlands. One question concerns having (or not having) employment: "Over the past 2 weeks, have you worked for at least 12 hours per week, unpaid (voluntary) work included?" The answer can be "no" or "yes." The other two questions concern the level of education that the patient has completed and the gross level of family income over the past 12 months. Following the methods of the CBS, three different levels of education can be selected (examples from the Dutch educational system are offered, varying from low to middle to high). In addition, five different levels of income can be selected: level 1, € 0 to € 12.499; level 2, € 12.500 to € 24.999; level 3, € 25.000 to € 39.999; level 4, € 40.000 to € 74.999; and level 5, € 75.000 or more.

Data Analysis

To compare the prevalence of the three different ethnic patient groups with the prevalence of these groups in the Netherlands as a whole (CBS data), and to compare gender, GCP classification, and socioeconomic variables between the ethnic groups, chi-square tests were used. For post-hoc interpretation of the cross tables, the standardized residual values were used (values higher than |2| indicate cells that deviate significantly). Analysis of variance (ANOVA), with post-hoc Bonferroni tests, was used to assess differences in age, pain intensity and pain-related disability, somatization, depression, and stress between the ethnic groups. Kruskal-Wallis tests, with post-hoc Mann-Whitney *U* tests, were used to compare the number of disability days and the frequency of oral

Table 1 Comparison of Demographic Data in Each Ethnic Group: Percentages of Subjects, Women, and Mean Age \pm Standard Deviation (10 Missing)

	ND	NNW	NNNW	Total (n = 494)	P
Subjects (%)	69.6	14.8	15.6	100	
Female (%)	75.9	75.3	66.2	74.3	.211
Age (yr)	40.6 \pm 14.6	43.3 \pm 14.8	38.8 \pm 14.2	40.7 \pm 14.6	.161

Table 2 Comparison of RDC/TMD Axis II Data in Each Ethnic Group: Percentages of Patients in GCP Subgroups (56 Missing); Mean Scores \pm Standard Deviation of Characteristic Pain Intensity (CPI) (0–100), Pain-Related Disability Score (0–100), and Disability Days (0–180)

	ND	NNW	NNNW	Total	P
GCP subgroups					.120
0	24.2	21.7	20.3	23.2	
I	24.8	27.5	18.8	24.3	
II	34.8	27.5	26.1	32.4	
III	10.0	14.5	20.3	12.3	
IV	6.2	8.8	14.5	7.8	
Pain and disability					
CPI	55.6 \pm 22.6	54.7 \pm 23.2	56.9 \pm 22.0	55.5 \pm 22.5	.862
Disability score	29.7 \pm 26.9	34.5 \pm 29.9	46.8 \pm 29.3	33.2 \pm 28.3	< .001*
Disability days	7.7 \pm 25.3	10.8 \pm 29.7	17.6 \pm 34.4	9.8 \pm 27.8	< .001*

*Post-Hoc Bonferroni: NNNW > ND and NNW.

parafunctions between the ethnic groups. To examine possible interaction effects between ethnic background and socioeconomic factors on psychological variables, a two-way ANOVA was used. For all analyses, SPSS 14.0 (SPSS Inc, 2005) was used. Probability levels of $P < .05$ were considered statistically significant.

Results

Ethnic Background

In the sample, two-thirds of the 494 TMD patients who answered the question on ethnicity (10 responses missing) were Native Dutch (ND); the Non-Natives were equally divided over the Western (NNW) and Non-Western (NNNW) groups (see Table 1). No significant differences were found between the three groups in male-female ratio ($\chi^2 = 3.11$, $df = 2$, $P = .211$), or in mean age ($F_{2,491} = 1.83$, $P = .161$). Compared to the population of Amsterdam, where most of the TMD patients in this study resided, Natives were overrepresented, while NNNW were underrepresented ($\chi^2 = 98.61$, $df = 2$, $P < .001$).

Pain Intensity and Pain-Related Disability

The distribution of patients into the five GCP subgroups is shown in Table 2. Differences in percentages of patients in GCP subgroups did not reach statistical significance ($\chi^2 = 19.80$, $df = 8$, $P = .120$). It was also examined whether differences between ethnic groups could be found when examining the elements of the GCP (characteristic pain intensity, pain-related disability, and disability days) separately (see Table 2). The results of these analyses showed no differences in CPI scores between the groups ($F_{2,348} = 0.15$, $P = .862$), but did show significant differences in pain-related disability scores ($F_{2,348} = 8.73$, $P < .001$) and disability days (Kruskal-Wallis) ($\chi^2 = 21.20$, $df = 2$, $P < .001$). Post-hoc Bonferroni and Mann-Whitney U tests showed that these differences were found between the NNNW group compared to the ND and NNW groups: NNNW scored higher than ND and NNW.

Psychological Factors and Oral Parafunctions

The total scores of the three groups on the SCL-90 somatization and depression scale, as well as

Table 3 Psychological and Behavioral Factors for Each Subgroup: Mean Scores ± Standard Deviation of SCL-90 Somatization (12–60); Depression (16–80); Stress (0–4); Oral Parafunctions (BRUX, BITE, SOFT) (0–4)

	ND	NNW	NNNW	Total	P
Psychological factors					
Somatization	19.9 ± 7.8	19.2 ± 7.1	23.7 ± 9.6	20.4 ± 8.1	.001*
Depression	23.9 ± 10.4	25.1 ± 11.7	30.4 ± 14.1	25.1 ± 11.5	< .001*
Stress	0.9 ± 0.7	1.0 ± 0.9	1.4 ± 1.1	1.0 ± 0.8	< .001*
Oral parafunctions					
BRUX score	1.2 ± 0.9	1.2 ± 0.9	1.1 ± 1.01	1.1 ± 0.9	.595
BITE score	0.6 ± 0.7	0.5 ± 0.6	0.6 ± 0.6	0.6 ± 0.6	.686
SOFT score	0.5 ± 0.6	0.4 ± 0.5	0.6 ± 0.9	0.5 ± 0.7	.235

*Post-Hoc Bonferroni: NNNW > ND and NNW.

Table 4 Socioeconomic Factors in Percentages for Each Subgroup: Responses to the Question Having Had Work (Yes/No) (13 Missing:), Levels of Education (Low, Middle, High) (22 Missing), and Levels of Income (in Euros per Year) (114 Missing)

	ND	NNW	NNNW	Total	P
Having work					
"no"	35.2	36.1	69.3	40.5	< .001
Education level					
Low	27.7	27.1	52.1	31.3	< .001*
Middle	36.9	35.7	32.9	36.1	
High	35.4	37.1	15.1	32.6	
Income level					
1	20.0	13.8	22.8	19.5	.004†
2	19.3	20.7	42.1	22.8	
3	27.3	29.3	21.1	26.7	
4	24.0	24.1	8.8	21.8	
5	9.5	12.1	5.3	9.2	

*Standardized residuals: Percentage low education NNNW > ND and NNW; Percentage high education NNNW < ND and NNW.

†Standardized residuals: Percentage income level 2 NNNW > ND and NNW; Percentage income level 4 NNNW < ND and NNW.

answers to the stress question, were compared (see Table 3). Significant differences were found between the three groups in somatization ($F_{2,485} = 7.50$, $P = .001$), depression ($F_{2,481} = 10.17$, $P < .001$), and stress ($F_{2,464} = 8.09$, $P < .001$). Post-hoc Bonferroni tests showed that the NNNW subgroup had higher somatization, depression, and stress scores than the ND and NNW groups.

To examine possible differences between the three groups in the frequency of oral parafunctions, their mean scores on the BRUX, BITE, and SOFT scales were compared using Kruskal-Wallis tests. No significant differences were found ($\chi^2 = 1.04$, 0.75 , and 2.90 ; $df = 2$; $P = .595$, $.686$, and $.235$, respectively).

Socioeconomic Factors

The percentages of patients responding "no" to the question "Over the past 2 weeks, have you worked for at least 12 hours per week, unpaid (voluntary) work included?" are shown in Table 4. Differences between the three groups of patients were significant ($\chi^2 = 30.49$; $df = 2$; $P < .001$). NNNW patients scored "no" more often than patients from ND and NNW groups (standardized residual values were 3.9 and -3.2 , respectively).

The percentages of patients for each level of education are also found in Table 4. Significant differences were found between the groups ($\chi^2 = 20.22$; $df = 4$; $P < .001$). NNNW patients had more often a lower education (standardized

residual = 3.2) and less often a higher education (standardized residual = -2.6) than patients in the other two groups. In addition, Table 4 shows data on level of income (N = 390). Significant differences were found between the groups ($\chi^2 = 19.80$; $df = 8$; $P = .004$). NNNW patients had more level 2 incomes (Standardized residual = 3.0) and fewer level 4 incomes than the other two groups. (See Discussion for the high percentage of missing values for this variable.)

To test whether socioeconomic factors were interacting with ethnic background, two-way univariate analyses of variance were used, with one of the three socioeconomic factors and ethnic background as independent variables, and disability, somatization, depression, and stress as dependent variables. Because 64% of the patients filled in 0 disability days, the number of patients in each cell would be too small for an analysis of variance with this variable, and this analysis was therefore not included. While the socioeconomic variables showed some significant relationships with the four dependent variables (data not shown), more important for the aim of this study was that in all three series of analyses, the independent variables “having work,” “level of education,” and “level of income” had no interaction with the independent variable “ethnic background.” Because the number of patients in the two highest income categories was very low, the analyses were repeated after combining these into one high-income level. The results were the same. In the analyses with the independent variable “level of income,” the *P* value of the main effect between ethnic background and the dependent variables increased just above the significance threshold for “somatization” ($P = .099$) and “stress” ($P = .076$).

Discussion

In the GCP classification, two aspects of pain, collected with three different questions, are combined, leading to a classification with five subgroups. In the GCP classification, pain-related disability is connected with pain intensity in such a way that specific information about both these variables is hidden. Since both the GCP classification and its separate factors were relevant to the present study, all of them were examined. After comparing analyses using the original RDC/TMD GCP classification with the analyses using two elements of the GCP classification separately, differences in pain-related disability between ethnic groups could only be established with the latter

method. It may therefore be useful in future TMD studies to examine both GCP and pain intensity and disability separately.

All patients completed a Dutch questionnaire. This raises the question of whether a problem with language, which patients from Non-Native ethnic backgrounds could have had, was responsible for the study's outcomes. This might have been the case, however, if differences had been found in all the questions, and not just in those related to psychological aspects. The three patient groups showed no differences in their responses to questions relating to pain intensity and oral parafunctions, implying that the results found could not be attributed to a misunderstanding of the questions.

With two-way ANOVA, it was shown that there was no interaction effect between ethnic background and socioeconomic factors. In two out of 12 analyses, the significance value of the main effect between ethnic background and the two dependent variables was raised slightly above the .05 level. This may be due to the number of missing values with the variable “level of income” ($n = 114$), which raises the question whether these missing data might have introduced some bias. However, for the other two socioeconomic variables “having work” and “level of education,” the significance of the main effect of ethnic background was not raised. The same result was found for “level of income” and two of the four dependent variables, “disability” and “depression.” Therefore, the possibility of a different outcome if the incomes of all 494 patients were known, is likely to be negligible.

The outcome that ethnic background did not interact with the socioeconomic factors in relation to psychological variables does not mean that the socioeconomic factors themselves are unrelated to psychological factors. As mentioned in the Results section, some of them were significantly associated with some of the dependent variables. It means that not having employment, or having a low level of income and education, is also related to higher depression, somatization, disability, and stress scores. This study shows that, in addition, being a NNNW patient results in having a separate risk factor above and unrelated to socioeconomic factors.

From a research point of view, it is necessary to look critically at the formulation of questions and categories used to collect data about racial and ethnic background. The definitions of race and ethnicity have been the subject of discussion.¹¹ According to Edwards et al,¹² race refers to a combination of ancestry and physical characteristics, while ethnicity refers to behavior and culture as

well as biological and physical characteristics, thus showing that the distinction between race and ethnicity is far from clear. Especially, the use of classifications on the basis of racial background has been subject of disagreement. Although racial characteristics used to be seen mostly as based on biological and hereditary attributes, the concept “race” is now judged to be mainly a social construct. For some, this has been an argument to stop routinely collecting data about race in health research, pointing out the dangers of discrimination and stereotyping¹³; for others, hereditary factors in the onset of certain diseases committed them to continue the search for these racially based factors.¹⁴ Roberts, an expert on legal issues,¹⁵ suggested: “Thus, the legal regulation of biomedical research should discourage or prohibit the use of ‘race’ as a genetic or biological category, but encourage or require the use of ‘race’ as a socio-political category to understand and investigate ways to eliminate disparities in health status, access to health care, and medical treatment.” These arguments point to the necessity to be careful, especially with the use of terms like racial background, to discriminate between different TMD patient populations, and support the preference of the Dutch translators to omit this question in the Dutch RDC/TMD version. However, although the definition of ethnicity seems to be less ambiguous, as it is mostly related to groups of people from the same area, sharing the same language, habits, religion, and often physical characteristics, critics of ethnicity research have commented upon the use of ill-defined groups from which no meaningful conclusions can be drawn.¹⁶ According to Bhopal,¹⁷ the ethnic classifications used are often created for censuses and used for administrative purposes, and are not designed or validated for research purposes. He states that researchers should pay attention to the validity and interpretation of the categories or classifications that were developed for other objectives. A review of 268 articles that used the keywords “race” and “ethnicity” examined to what extent the studies included a definition of these terms and, more importantly, if inclusion and exclusion criteria for racial or ethnic groups were formulated.¹⁸ This criterion was met in only 28% of the articles. It can be concluded that the use of ethnic background in TMD studies is not without risks.

How do these arguments relate to the present study? The classification of ethnic background by the Dutch CBS, used in the Dutch translation of the RDC/TMD questionnaire,⁷ has in fact been criticized for creating seemingly clear, but

extremely large categories, and for its hidden political and discriminatory implications.¹⁹ However, the use of the official Dutch CBS system for classifying people according to their ethnic background also has certain advantages. For example, it led to clear inclusion and exclusion criteria in this study, which made comparison with other Dutch data possible. In this way, it could be estimated that, since the TMD center is situated in Amsterdam, and most of the TMD patients in this study lived in or around Amsterdam, the NNNW patients were under-represented compared to the ND and NNW patients. The results of this study are comparable to a Dutch study that proved that patterns of health care consumption were determined by ethnic background.²⁰ This subject is of crucial importance. Presuming that the prevalence of TMD symptoms is the same for people with different ethnic backgrounds, the different uses of health care in specialized TMD clinics needs to be studied further. Having access to health care institutions is seen as an important issue in health care studies about ethnic differences.²¹ Although the ethnic background classification used in this study can be criticized, and should certainly be improved, it has led to some important and consistent results.

The finding that patients with different ethnic backgrounds do not differ in TMD pain complaints, but do differ on psychological factors, is comparable to previous studies. In one study, female African-American TMD patients scored higher on depression and somatization than Caucasian TMD patients.⁴ In another study, this was the case for Israeli-Arabic TMD patients compared to Israeli-Jewish TMD patients.⁶ In both studies, no differences in TMD pain were found. While in these studies two racial or ethnic subgroups were selected beforehand, in the present study no prior selection of ethnic background was made. All TMD patients with all possible ethnic backgrounds participated. Even though the TMD patient groups used in the different studies were not comparable, the findings are for a large part similar. While in other studies the question of whether or not the results could be attributed to socioeconomic factors was left unanswered, in our study, it was established that they were not. Ethnic background in itself, as measured by the RDC/TMD questionnaire, is related to disability, somatization, depression, and stress.

How to interpret these study results? The finding that NNW patients do not differ from ND patients, but that both score lower on psychological factors

than NNNW patients, may suggest that it is not having an ethnic background different from that of ND patients, but rather having a background from a country with a culture farther removed from the Dutch and other Western cultures that is associated with higher scores on psychological factors. Problems with adaptation to Dutch culture may be a probable explanation for these differences. Since the factors disability, depression, and somatization have been shown to be related to poor treatment results, an important question is whether ethnic background, in a similar way, may also be a separate factor related to poor treatment results. This subject needs further study. According to Hilton,²² a reason to continue doing studies on the role of ethnic background is that they may at least lead to a positive effect on patient care, may help staff awareness, and stimulate discussions about health care needs.

The arguments described in the previous sections necessitate the improvement of research on this topic, and of the questions leading to the classification of ethnic backgrounds. For developing a more meaningful classification, consider asking patients to name the country or countries that they feel most related to, instead of basing ethnic background on country of birth alone. For further study, which would lead to better interpretable conclusions, larger numbers of patients should be used. This would enable studying in more detail TMD patients from countries that are represented in the Netherlands in relatively large numbers, such as people from Morocco, Turkey, Surinam, and the Dutch Antilles, of which the CBS also has more detailed information. In the present study, the numbers of each of these ethnic groups were too small for separate analysis. It would also be useful to look critically at the formulation of the socioeconomic questions. Although three different socioeconomic questions were used and each yielded the same result, the formulation of some of these questions should perhaps be reconsidered. For example, when local illustrations are given for levels of education, these may be hard to understand for a person who has had his or her education in another country. The questions about level of income and having work seem less prone to misunderstanding. However, with the latter question, most of the missing values (114) were noted, showing an unwillingness by some of the patients to reveal their incomes.

Conclusions

TMD patients in the Netherlands, who have different ethnic backgrounds according to questions used in the Dutch RDC/TMD Axis II questionnaire, do not differ in the intensity of TMD pain complaints, nor in TMD-related behavior, such as frequency of oral parafunctions that they engage in. Rather, ethnic background is associated with psychological variables. TMD patients from countries farther removed from the Dutch and Western countries have more signs of depression, somatization, stress, and pain-related disability, independent of having employment, level of education, and level of income.

References

1. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *Cranio* 1992;6:301–355.
2. International RDC/TMD Consortium website. Available at: www.rdc-tmdinternational.org/translations/frmtranslations.htm.
3. Yap AUJ, Dworkin SF, Chua EK, List Th, Tan, KBC, Tan HH. Prevalence of temporomandibular disorder subtypes, psychologic distress, and psychological dysfunction in Asian patients. *J Orofac Pain* 2003;17:21–29.
4. Plesh O, Sinisi SE, Crawford PB, Gansky SA. Diagnoses based on the Research Diagnostic Criteria for Temporomandibular Disorders in a biracial population of young women. *J Orofac Pain* 2005;19:65–76.
5. Widmalm SE, Christiansen RL, Gunn SM. Race and gender as TMD risk factors in children. *Cranio* 1995; 13:163–166.
6. Reiter S, Eli I, Gavish A, Winocur E. Ethnic differences in temporomandibular disorders between Jewish and Arab populations in Israel according to RDC/TMD evaluation. *J Orofac Pain* 2006;20:36–43.
7. Lobbezoo F, van Selms MK, John MT, Huggins K, Ohrbach R, Visscher CM, van der Zaag J, van der Meulen MJ, Naeije M, Dworkin SF. Use of the Research Diagnostic Criteria for Temporomandibular Disorders for multinational research: translation efforts and reliability assessment in The Netherlands. *J Orofac Pain* 2005;19:301–308.
8. Meulen MJ van der, Lobbezoo F, Aartman IHA, Naeije M. Self-reported oral parafunctions and pain intensity in temporomandibular disorder patients. *J Orofac Pain* 2006;20:31–36.
9. Von Korff M, Ormel J, Keefe FJ, Dworkin SF. Grading the severity of chronic pain. *Pain* 1992;50:133–149.
10. Arrindell WA, Ettema JHM. Symptom checklist SCL-90: Handleiding bij een Multi-dimensionele Psychopathologie-indicator. Lisse: Swets Test Publishers, 1986.
11. Bhopal R, Donaldson L. White, European, Western, Caucasian, or what? Inappropriate labelling in research on race, ethnicity, and health. *Am J Public Health* 1998; 88:1303–1307.

12. Edwards ChL, Fillingim RB, Keefe F. Race, ethnicity and pain. *Pain* 2001;94:133–137.
13. Sheldon, TA., Parker H. Race and ethnicity in health research. *J Public Health Med* 1992;14:104–110.
14. LaVeist ThA. On the study of race, racism, and health: A shift from description to explanation. *Int J Health Serv* 2000;30:217–219.
15. Roberts DE. Legal constraints on the use of race in biomedical research: toward a social justice framework. *J Law Med Ethics* 2006: 526–535.
16. Kaplan, JB, Bennett, T. Use of race and ethnicity in biomedical publications. *JAMA* 2003;289:2709–2716.
17. Bhopal R. Race and ethnicity: Responsible use from epidemiological and public health perspective. *J Law Med Ethics* 2006;39:500–507.
18. Shanawani H, Dame L, Schwartz DA, Cook-Deegan, R. Non-reporting and inconsistent reporting of race and ethnicity in articles that claim associations among genotype, outcome, and race or ethnicity. *J Med Ethics* 2007;32: 724–728.
19. Groenendijk K. Allochtonen of burgers: definitiemacht in debat en wetgeving over immigranten. In: Duyvendak JW et al. *Macht en Verantwoordelijkheid. Essays voor Kees Schuyt*. Amsterdam: Amsterdam University Press, 2007:101–112.
20. Stronks K, Ravelli ACJ, Reijneveld SA. Immigrants in the Netherlands: Equal access for equal needs? *J Epidemiol Community Health* 2001;55:701–707.
21. Sue S, Dhindsa MK. Ethnic and racial health disparities research: Issues and problems. *Health Educ & Behav* 2006;33:459–469.
22. Hilton C. For debate: Collecting ethnic group data for inpatients: is it useful? *Br Med J* 1996;313:923–925.