

# Prevalence of malocclusion and need for orthodontic treatment in Swiss army recruits in the years 1985 and 1996

## Abstract

The prevalence of malocclusion and the need for orthodontic treatment were studied in 421 Swiss army recruits in the year 1996. The results were compared with the findings in a similar study of 757 recruits, done in the year 1985.

The malocclusion prevalence and the need for treatment were evaluated with the Dental Health Component (DHC) and the Aesthetic Component (AC) of the Index for Orthodontic Treatment Need (IOTN). The examination of the 1996 sample was done clinically and of the 1985 sample from dental casts.

The prevalences of increased overjet, contact point displacements (crowding or spacing) and deep bite were significantly lower in the 1996 than in the 1985 sample. The need for orthodontic treatment both according to the DHC and to the AC was significantly lower in 1996 than in 1985.

More than half of the men examined in 1996 had no need for orthodontic treatment according to the DHC, 27 per cent had a moderate need and 14 per cent a clear need for treatment. When judged with the AC no need for treatment was found in 84 per cent, a moderate need in 13 per cent and a clear need in 3 per cent of the men.

When judged with both components of the index 21 per cent of the men were classified as needing treatment i.e., the 14 per cent in need of treatment according to the DHC plus 7 per cent of the men who had a moderate need according to DHC and simultaneously a moderate or clear need according to the AC.

We suggest that the lower need for treatment in 1996 compared with 1985 was due to more men having received orthodontic treatment (44 against 33 per cent) in 1996.

Acta Med Dent Helv 3: 61–67 (1998)

Key words: malocclusion prevalence, need for orthodontic treatment, Swiss recruits

Accepted for publication: 8 January 1998

Address for correspondence:  
Prof. Bengt Ingervall, Klinik für Kieferorthopädie,  
Freiburgstrasse 7, CH-3010 Bern  
Tel. 031 632 25 91, Fax 031 632 98 69

BENGT INGERVALL, ALLEN FIRESTONE,  
RUDOLF HÄSLER and URS THÜR

Klinik für Kieferorthopädie, Universität Bern and Zahnärztlicher Dienst der Armee (ZDA), Bern

## Introduction

In the year 1985 an investigation of the prevalence of malocclusion and the need for orthodontic treatment in a sample of Swiss army recruits was conducted. The sample was selected to represent the male Swiss population of 20 year old individuals. A detailed report of the frequency of malocclusion and of the need for orthodontic treatment was published in 1987 (INGERVALL et al. 1987). It was decided to repeat the study 11 years later in a new sample of the 1996 recruits in order to determine if the prevalence of malocclusions and the need for treatment had changed during the past decade. A lower malocclusion prevalence and need for treatment could be anticipated with an increasing number of active orthodontic care providers.

The original study of the 1985 sample was done with a detailed method of recording of malocclusion on dental casts which, however, was time consuming. The classification of the need for treatment was, however, made with an index with only generalized definitions of criteria but which was still widely used at the time (LINDER-ARONSON 1974). In the meantime, a new system for the classification of the need for orthodontic treatment, the IOTN index, has been developed (BROOK & SHAW 1989). The IOTN index has been thoroughly tested with regard to reliability and validity (EVANS & SHAW 1987, SHAW et al. 1991, HOLMES 1992, LUNN et al. 1993, SO & TANG 1993, BURDEN 1995, RICHMOND et al. 1995a, 1995b, BIRKELAND et al. 1996, JONES et al. 1996, TURBILL et al. 1996) and has gained widespread acceptance. The advantages of the IOTN index are that it is simple to use, has well defined criteria, is validated and also accounts for the aesthetic component of malocclusion which is not considered by a pure malocclusion recording. The IOTN index can be used in a clinical setting, i.e. by direct recording on the patient or on dental casts.

The aim of the present investigation was to evaluate the prevalence of malocclusion and the need for orthodontic treatment in Swiss army recruits with the aid of the IOTN index and to compare the results with the sample examined in 1985.

## Subjects and methods

In the 1996 study 421 men aged 19 to 25 years (median age 20 years) were enrolled. They were selected among the recruits of the military training center in Thun, Switzerland.

The recruits filled out a questionnaire which included questions on where they had attended school and on their level of education. The questionnaire was the basis for the classification of the subjects with regard to level of education, language region and degree of urbanization of their residence. Fifty-six (56.1) per cent of the men had attended school in the German speaking, 42.9 per cent in the French, and 0.5 per cent in the Italian speaking part of Switzerland. One subject had attended school in the Raeto-Romanic speaking part and one subject in a foreign country. Fifty-nine (59.2) per cent of the men had grown up in a town or in a comparable agglomeration (according to the official Swiss classification), 38.4 per cent in the country and 2.4 per cent could not be classified. The distribution of the sample with regard to level of education is given in Table I.

The sample examined in 1996 was compared to a collection of dental casts obtained from 757 recruits examined in the military training center in Thun in the year 1985. The age range of these subjects was 18 to 24 years (median age 20 years). Sixty-five (65) per cent of these men were from the German and 24 per cent from the French speaking part of Switzerland. Details of the sample, including the distribution according to level of education, have been presented in an earlier report (INGERVALL *et al.* 1987). The need for orthodontic treatment was evaluated with the Dental Health Component (DHC) and Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) as described by BROOK & SHAW (1989) and RICHMOND *et al.* (1994). The DHC follows a hierarchical scale by recording of occlusal traits as follows:

1. Missing teeth (including congenital absence, ectopic and impacted teeth),
2. Overjets (including reverse overjets),
3. Crossbites,
4. Displacement of contact points,
5. Overbites (including open bites).

DHC has five grades from grade 1 "no need for treatment" to grades 4 and 5 "needing treatment". In principle only the worst occlusal feature is recorded. This means that if a feature justifying a classification grade 5 is found there is no need to continue the recording of occlusal features resulting in lower degrees of need of treatment. In this study, however, all occlusal features indicating a need of treatment were recorded even when a fea-

ture with higher need of treatment had already been recorded. This was done in order to get as detailed a record as possible. The recording of the subjects of the 1996 sample was done clinically by four different examiners, all trained and calibrated in the use of the IOTN index. The specially designed Dental Health Component Ruler was used for the examination.

The Aesthetic Component of the index has 10 grades based on a scale of 10 color photographs showing different levels of dental attractiveness (EVANS & SHAW 1987). The dental attractiveness was rated with reference to this scale where grade 1 is the most and grade 10 the least attractive appearance. The recording of the AC was done clinically by the joint classification by two examiners. If the examiners disagreed the decision was made by a third examiner.

The recordings of the DHC and AC in the subjects originally studied in 1985 were made from dental casts by one single examiner who also participated in the clinical examination of the subjects of the 1996 sample. The dental appearance was classified with the AC scale and occlusal traits recorded with the Dental Health Component Ruler. The protocol of the DHC prescribes that when the recording is made on casts the worst scenario should be assumed. This is because information on competence or incompetence of the lips, the relation between the retruded and intercuspal mandibular positions, as well as masticatory and speech difficulties are not available when the recording is made on casts. An increased overjet  $>3.5$  but  $\leq 6$  mm is therefore always recorded as 3a (never as 2a). An anterior or posterior crossbite is always recorded as 4c (never as 3c or 2c). A reverse overjet is always assumed to imply masticatory and speech difficulties (recording 5m instead of 4b, recording 4m instead of 3b).

Differences in frequencies were tested with the  $\chi^2$  test or with Fishers exact test. Differences between distributions were tested with Mann-Whitney's U-test. Interrelations were evaluated by Spearman rank correlation.

## Results

Forty-four (44.2) per cent of the men examined in 1996 and 33 per cent of the men examined in 1985 reported that they had had some form of orthodontic treatment. The prevalence of the different occlusal traits of the DHC of the index is given in Table II. No subject was noted who had the DHC occlusal traits: 5h (extensive hypodontia), 5m (reverse overjet  $>3.5$  mm with masticatory and speech difficulties), 5p (defects of cleft lip and palate), 5s (submerged deciduous teeth), 4b (reverse overjet  $>3.5$  mm without masticatory and speech difficulties).

In the comparison of the prevalences of the occlusal traits between the two samples the fact that the recording of the 1985 sample was made on dental casts and of the 1996 sample clinically must be taken into consideration. Because of the varying classification of increased overjet, reverse overjet and crossbite on casts compared with clinical determinations, the total prevalence of these traits as well as of deep and open bite and of contact point displacements were calculated (Table III). The prevalence of increased overjet, contact point displacements and deep bite were significantly higher in the 1985 than in the 1996 sample while the opposite was true for reverse overjet.

Based on the highest recording in the individual subject, the distribution of the subjects according to the DHC scale is shown in Table IV. It is obvious that the treatment need of the 1985 sample was higher (grades 4 and 3) than that of the 1996 sample which had a higher prevalence of subjects with little need of

Table I Distribution (in per cent) of subjects according to level of education

Education	Prevalence
Post-secondary (university, gymnasium, advanced technical school)	23.7
Higher professional school	31.7
Apprentice school	39.7
Primary school	0.5
Other	4.3

Table II Prevalence (in per cent) of the different occlusal traits of the Dental Health Component of the IOTN index

DHC number	Sample		Significant difference
	1985	1996	
5 i Impeded eruption	0.4	0.0	
5 a Increased overjet > 9 mm	0.4	1.0	
4 h Less extensive hypodontia	2.4	3.1	
4 a Increased overjet > 6 but ≤ 9 mm	4.6	3.1	
4 m Reverse overjet > 1 but < 3.5 mm with masticatory or speech difficulties	0.7	0.0	
4 c Anterior or posterior crossbite with RCP-ICP difference > 2 mm	25.1	0.2	***
4 l Posterior lingual crossbite	3.8	1.9	
4 d Severe contact point displacements	6.6	5.2	
4 e Extreme lateral or anterior open bites	0.1	0.0	
4 f Increased and complete overbite with gingival or palatal trauma	3.0	1.2	*
4 t Partially erupted, impacted teeth	0.9	0.7	
4 x Supernumerary teeth	0.0	0.2	
3 a Increased overjet > 3.5 but ≤ 6 mm, incomp. lips	24.3	0.2	***
3 b Reverse overjet > 1 but ≤ 3.5 mm	0.0	1.4	**
3 c Anterior or posterior crossbite with > 1 but ≤ 2 mm RCP-ICP difference	0.0	2.1	***
3 d Contact point displacements > 2 but ≤ 4 mm	48.3	28.0	***
3 e Lateral or anterior open bites > 2 but ≤ 4 mm	0.8	0.5	
3 f Deep overbite complete without gingival or palatal trauma	7.1	3.1	**
2 a Increased overjet > 3.5 but ≤ 6 mm	0.0	13.5	***
2 b Reverse overjet > 0 but ≤ 1 mm	0.0	0.7	*
2 c Anterior or posterior crossbite with ≤ 1 mm RCP-ICP difference	0.0	18.3	***
2 d Contact point displacements > 1 but ≤ 2 mm	33.3	47.5	***
2 e Anterior or posterior open bite > 1 but ≤ 2 mm	1.6	1.0	
2 f Increased overbite ≥ 3.5 mm without gingival contact	23.9	20.7	
2 g Pre- or postnormal occlusion (up to half a unit discrepancy) with no other anomalies	97.5	78.9	***
1 Extremely minor malocclusions	0.8	2.9	**

\* 0.01 < p < 0.05, \*\* 0.001 < p < 0.01, \*\*\* p < 0.001

treatment. The difference between the two samples was significant ( $p < 0.001$ ). The mean DHC in the 1985 sample was 3.1, which was significantly ( $p < 0.001$ ) higher than the mean of 2.5 in the 1996 sample. The difference in DHC between men who had or who had not received orthodontic treatment was tested in the 1996 sample. No significant difference was found. The distribution of the DHC grades in men who had or who had not received orthodontic treatment is given in Table V. The relations between the need of treatment according to the DHC (Table IV) and the language of the subjects (German or French) as well as between DHC and home of the subjects (town or country) were studied in the 1996 sample with the  $\chi^2$  test. No significant differences were found. The mean DHC in the individuals with the levels of education "post-secondary", "higher professional school", and "apprentice school" were 2.4, 2.6, and 2.5, respec-

Table III Total prevalence (in per cent) of increased and reverse overjet, crossbite, contact point displacements, deep and open bite

	Sample		Significant difference
	1985	1996	
Increased overjet (sum of 5a, 4a, 3a, 2a)	29.4	17.8	***
Reverse overjet (sum of 4m, 3b, 2b)	0.7	2.1	*
Anterior or posterior crossbite (sum of 4c, 3c, 2c)	25.1	20.7	
Contact point displacements (sum of 4d, 3d, 2d)	88.2	80.7	***
Deep bite (sum of 4f, 3f, 2f)	34.0	25.0	***
Open bite (sum of 4e, 3e, 2e)	2.5	1.4	

\* 0.01 < p < 0.05, \*\*\* p < 0.001

Table IV Prevalence (in per cent) of the different grades of the Dental Health Component of the IOTN

Grade	Sample	
	1985	1996
5 Need treatment	0.8	1.0
4 Need treatment	36.4	13.3
3 Moderate need	37.6	26.9
2 Little need	24.4	57.4
1 No need	0.8	1.5

Table V Prevalence (in per cent) of the different grades of the Dental Health Component of the IOTN in the subjects of the 1996 sample who had had orthodontic treatment (Prior Ortho) and who had not had orthodontic treatment (No Ortho)

Grade	Sample	
	Prior Ortho	No Ortho
5 Need treatment	0.6	1.0
4 Need treatment	11.2	15.6
3 Moderate need	25.3	28.9
2 Little need	60.6	53.6
1 No need	2.4	1.0

Table VI Prevalence (in per cent) of the grades of the Aesthetic Component of the IOTN (grade 1 = most attractive, grade 10 = least attractive)

Grade	Sample	
	1985	1996
1 No need	13.8	27.8
2	21.3	26.9
3	24.3	20.4
4	16.0	9.6
5 Moderate need	9.7	8.2
6	7.0	2.2
7	5.0	2.2
8 Need treatment	2.4	1.2
9	0.4	1.7
10	0.1	0.0

Table VII Percentage of subjects with no need, moderate need, and need for treatment according to the Dental Health (DHC) and Aesthetic Components of the IOTN index (numbers for the 1996 sample in italics)

	Need	Aesthetic Component			Total
		No	Moderate	Need	
	No	24.4	0.8	0.0	25.2
		<i>56.1</i>	<i>2.5</i>	<i>0.0</i>	<i>58.6</i>
Dental Health Component	Moderate	30.6	7.0	0.0	37.6
	<i>20.4</i>	<i>5.5</i>	<i>1.2</i>	<i>27.1</i>	
	Need	20.4	13.9	2.9	37.2
		<i>7.7</i>	<i>5.0</i>	<i>1.7</i>	<i>14.4</i>
Total		75.4	21.7	2.9	
		<i>84.2</i>	<i>13.0</i>	<i>2.9</i>	

tively (1996 sample). The difference between the individuals with "post-secondary" and "higher professional school" was significant ( $0.01 < p < 0.05$ ).

The distribution of the subjects with regard to the Aesthetic Component of the index is given in Table VI. The prevalences of the grades 3-8 of the AC were higher in the 1985 than in the 1996 sample while the opposite was true for the grades 1, 2, and 9. The difference between the two distributions was significant ( $p < 0.001$ ). The mean AC grade in the 1985 sample was 3.4 compared with 2.7 in the 1996 sample ( $p < 0.001$ ). In the 1996 sample men who had received orthodontic treatment had a lower AC (mean 2.6) than those who had not had treatment (mean 2.9),  $0.01 < p < 0.05$ . The distribution of the AC grades was not significantly different for subjects from the German or French speaking parts of Switzerland or for subjects who had grown up in a town or in the country ( $\chi^2$  test of 1996 sample). The DHC and AC grades were positively correlated. In the 1985 sample the coefficient of correlation was 0.51 and in the 1996 sample 0.53 ( $p < 0.001$ ). The mean AC in the individuals with the levels of education "post-secondary", "higher professional school", and "apprentice school" were 2.4, 2.9, and 2.6, respectively (1996 sample). The difference in AC between the men with "post-secondary" and those with "higher professional school" was significant ( $0.01 < p < 0.05$ ).

According to the suggestions for application of the Dental Health and Aesthetic Components of the IOTN index (RICHMOND et al. 1994) the grades 1 and 2 of the DHC and the grades 1-4 of the AC can be considered to have no need for treatment.

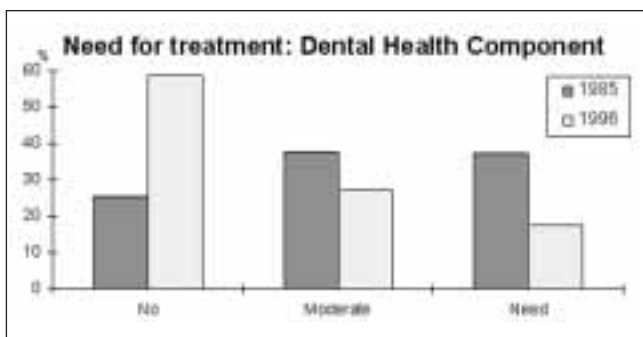


Fig. 1 Distribution of the men of the 1985 and 1996 samples by need for treatment according to DHC (grades 1 and 2=no need, grade 3=moderate need, grades 4 and 5=need for treatment)

Grade 3 of the DHC and grades 5-7 of the AC are considered to imply a moderate/borderline need for treatment and grades 4 and 5 of the DHC and 8-10 of the AC to imply need of treatment. The distribution of the subjects according to this classification is given in Table VII and Figs. 1 and 2.

As can be seen from Table VII 14.4 per cent of the subjects of the 1996 sample had a need for treatment according to the DHC versus 37.2 per cent for the 1985 sample. The need for treatment according to the AC was the same for the two samples (2.9 per cent). Of the subjects studied in 1996, more than half had no need for treatment either according to the DHC or the AC while this was true for about one fourth of the individuals examined in 1985. Almost the same relation between the two samples was found for the percentage of subjects who needed treatment according to both the DHC and the AC: 1.7 per cent in 1996, and 2.9 per cent in 1985.

## Discussion

The IOTN used to evaluate treatment needs is originally based on an index of treatment priority used in Sweden (BROOK & SHAW 1989). The IOTN index developed by BROOK and SHAW contains a component to record functional and dental health indications with clear definitions and cut-off points as well as a very important separate component to record aesthetic impairment. While the developers of the IOTN had reservations about the magnitude of health benefits of orthodontic treatment, they state that they tried to establish from the literature cut-off points between grades for each occlusal trait so that these cut-off points would represent a quantifiable threat to the dentition (BROOK & SHAW 1989). The inclusion of a component to record aesthetic impairment reflects the conviction of the developers that the main benefit to the patient of orthodontic treatment may be in improved aesthetics and social-psychological well-being, and on attitudes to dental health (BROOK & SHAW 1989). To the knowledge of the authors of the present study, there has been no prospective study which has shown that treatment needs and treatment goals established by any index of treatment needs has led to long-term increases in dental health compared to matched untreated controls.

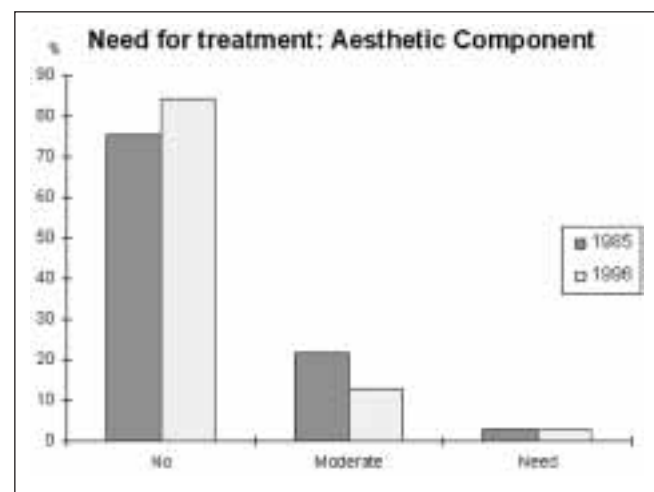


Fig. 2 Distribution of the men of the 1985 and 1996 samples by need for treatment according to AC (grades 1-4=no need, grades 5-7=moderate need, grades 8-10=need for treatment)

The sample of the 1996 examination consisted of 56 per cent German speaking, 43 per cent French speaking and only single recruits from the Italian and Raeto-Romanic speaking parts of Switzerland. Of the total Swiss population of men of comparable age 75, 21, 3, and 0.4 per cent belong to the German, French, Italian, and Raeto-Romanic speaking parts, respectively (Eidgenössische Volkszählung 1990). It is thus clear that the German and Italian speaking parts are underrepresented and the French speaking part overrepresented in the sample. If the less than perfect distribution of the subjects with regard to language region compared to the Swiss population affects the results is unclear. This would be the case if the prevalence of malocclusion and the need for orthodontic treatment varied in different parts of the country. No such signs were, however, detected because there were no differences in these parameters between German or French speaking men or between men who grew up in a town or in the country. The distribution of men with regard to language region in the 1985 sample better reflected that of the general population (INGERVALL et al. 1987). In the 1996 sample more men had a high (post-secondary) level of education than was the case in the 1985 sample. This may be due to the selection of the sample or reflect a general increase in the level of education in the population as documented from 1980 to 1990 (JOYE et al. 1996). The authors recognize that a sample of military recruits excludes most men with handicapping physical and mental disabilities as well as those who decline military service for religious and moral reasons. The question how well this sample of recruits reflects the total Swiss male population of this age remains open. However, the two samples are comparable.

The authors acknowledge that one of the limits of the present investigation is that one of the samples was examined clinically and the other by way of dental casts. Some occlusal traits were directly influenced by the different rules for the two methods of recording. When recording the items "increased or reverse overjet" and "crossbite" from casts, negative complicating factors are assumed to be present and the next higher grade is assigned. This automatically increases the need for treatment. Therefore in Table II the prevalence of the items 4c and 3a are high for the 1985 sample but low for the 1996 sample while the opposite is true for the items 2a and 2c. To enable a comparison of the prevalence of these occlusal traits, all types of increased or reverse overjet and of crossbite were summarized (Table III). For other types of malocclusion there are no biases prescribed by different rules for the two types of recording but bias could possibly occur. Thus, the recording (measurement) of contact point displacements could possibly be made more accurately on dental casts than clinically. Possibly, more displacements can be detected on casts than clinically. Likewise, the inspection of the occlusion of the posterior teeth could possibly be made more accurately on casts than in the mouth. The extremely high (almost 100 per cent) prevalence of item 2g (pre- or postnormal occlusion) in the 1985 sample may be a consequence of this. Item 2g is recorded if the antero-posterior interdigitation of the posterior teeth (from the canine to the last molar) is not perfect, which obviously is very rare. Fortunately, item 2g is validated low, i.e. 2g is classified as no need for treatment.

While some occlusal traits may be better recorded on casts than clinically the opposite is true for increased or reverse overjet and crossbite. This may also be the case for deep bite because gingival or palatal trauma may be better detected clinically than on casts. A special problem is the recording of hypodontia. In cases of missing teeth the subject was asked for the reason and could

as a rule explain the absence as orthodontic extraction or congenital absence.

While differences in the protocols for the two methods of recording the DHC might be presumed to lead to different results, in one study of this issue the differences were shown to be minor and insignificant (BUCHANAN et al. 1994). The vast majority of cases received the same grade of need for treatment with the two methods (BUCHANAN et al. 1994).

One advantage of the IOTN index is its Aesthetic Component (AC). The rating of the AC implies a degree of subjectivity. All examiners were, however, trained and calibrated in the use of the IOTN index. Furthermore, the clinical part of the study (1996 sample) was done by two examiners, who had to agree. Where the two examiners did not agree, a third examiner forced a decision by choosing one of the two proposed grades. In the two samples studied the AC grade was assigned clinically in 1996 and from dental casts in 1985. Clinical rating and rating from casts have both been found to have a high, and similar, reproducibility (HOWELLS & SHAW 1985, WOOLASS & SHAW 1987). The agreement between AC rating of the same subjects from dental casts and clinically has been shown to be substantial and without bias (BUCHANAN et al. 1994). The higher mean AC of the 1985 sample is therefore not likely to be due to methodological differences. In the present study, the differences in AC scores mirrors the differences in the DHC scores. In the 1996 sample 14.3 per cent of the men needed treatment (grades 5 and 4) versus 37.2 per cent in the 1985 sample. The large difference in prevalence of need for treatment may be partly due to methodological factors but is certainly to a major extent a reflection of differences in the prevalence of malocclusion between the two groups. This is supported by the total larger frequencies of increased overjet, deep bite and crossbite (Table III) for the 1985 sample. The total prevalence of these traits is not affected by the differing methods. In support of an actual lower need for orthodontic treatment in the 1996 than in the 1985 sample is the fact that the Aesthetic Component was lower in the 1996 than in the 1985 sample. The reason for the lower prevalence of malocclusion and need for treatment in the 1996 sample may be the higher frequency of orthodontic treatment, 44 per cent in the 1996 sample compared with 33 per cent in the 1985 sample. A recent publication comparing the results of representative surveys of Swiss dentists documented a more than two-fold increase between two surveys conducted in 1984 and 1994 in the number of individuals demanding orthodontic treatment (GARAZI et al. 1996). In this same time period the investigators also report that there has been a similar increase in the number of individuals beginning orthodontic treatment both in terms of absolute numbers and as a percentage of the population. These trends are reflected in the results of the present investigation where both the number of recruits reporting that they had received orthodontic therapy was higher and the number of recruits with a clear need for treatment lower in 1996 than in 1985. The fact that in the 1996 group there was no difference in the distribution of the DHC between men who had and who had not received orthodontic treatment is not astonishing. We interpret this to indicate that orthodontic treatment had improved the occlusion of the men who needed and received treatment to a standard comparable with that in men who had neither required nor received treatment.

In the 1996 sample almost 60 per cent of the men were classified as having no need for treatment according to the Dental Health Component (grades 1 and 2) and only 14 per cent as

needing treatment (grades 5 and 4) with about one fourth of the men with a borderline (moderate) need for treatment (grade 3). About 40 per cent of the men of the 1996 sample (grades 5, 4, and 3) would thus benefit from treatment when judged with the Dental Health Component. From an aesthetic point of view the prevalence of men in the 1996 sample that would benefit from treatment (grades 5–10 of the AC) was about 15 per cent. Only very few men were judged to have a clear need for treatment according to both components of the IOTN.

It has been suggested that for the group of individuals with a moderate need for treatment according to the DHC scale (grade 3) the grading according to the Aesthetic Component could be decisive (LUNN et al. 1993). About 7 per cent of the men in the 1996 sample were classified as grade 3 of the DHC with a simultaneous moderate or clear need for treatment according to the AC. If this 7 per cent is added to the 14 per cent who had a need for treatment (grades 5 and 4) according to the DHC the total, about 20 per cent, would constitute a group where orthodontic treatment would clearly be beneficial. In Switzerland, adults make up a large proportion of the number of persons seeking an initial orthodontic consultation (GARAZI et al. 1996). This is a reflection of both a general increase in orthodontic awareness among the adult Swiss population and a reflection of the residual need for treatment. This pool of unmet need must be considered when evaluating orthodontic manpower requirements in Switzerland.

The malocclusions found in the men were such that they could have been treated in the mixed or young permanent dentitions. If the need for treatment also means a demand for treatment will be the subject of a forthcoming publication on the men's own views on their dentitions.

## Zusammenfassung

An 421 Rekruten der Schweizer Armee wurden 1996 das Vorkommen von Malokklusionen und der kieferorthopädische Behandlungsbedarf studiert. Die Resultate wurden mit einer ähnlichen Studie von 1985 mit 757 Rekruten verglichen.

Das Vorkommen von Malokklusionen und der kieferorthopädische Behandlungsbedarf wurden mit dem «Dental Health Component» (DHC) und dem «Aesthetic Component» (AC) des «Index for Orthodontic Treatment Need» (IOTN) beurteilt. Die Untersuchung von 1996 wurde klinisch an Rekruten und die von 1985 an Gipsmodellen durchgeführt.

Das Vorkommen von vergrössertem Overjet, gebrochenen Kontaktpunkten (Eng- oder Weitstand) und Tiefbiss waren 1996 signifikant kleiner als 1985. Der kieferorthopädische Behandlungsbedarf gemäss DHC und AC war 1996 signifikant geringer als 1985. Mehr als die Hälfte der Männer, die 1996 untersucht wurden, hatten gemäss DHC keinen, 27% einen mässigen und 14% einen eindeutigen Behandlungsbedarf. Mit dem AC beurteilt, hatten 84% keinen, 13% einen mässigen und 3% einen eindeutigen Behandlungsbedarf.

Einundzwanzig Prozent der Männer zeigten einen eindeutigen Behandlungsbedarf, beurteilt nach beiden Komponenten (DHC und AC) des IOTN. Dieser Wert berechnet sich aus den 14% mit eindeutigem Behandlungsbedarf gemäss DHC, plus 7% mit mässigem Behandlungsbedarf nach dem DHC und gleichzeitig mässigem oder eindeutigem Bedarf nach dem AC.

Man kann annehmen, dass der geringere Behandlungsbedarf für 1996 darauf zurückzuführen ist, dass mehr Männer eine kieferorthopädische Behandlung bekommen hatten als 1985 (44% gegenüber 33%).

## Résumé

La prévalence de malocclusion et la nécessité d'entreprendre un traitement orthodontique ont fait l'objet d'une étude réalisée en 1996 auprès de 421 recrues de l'armée suisse. Les résultats ont été comparés à ceux obtenus dans le cadre d'une étude similaire, menée en 1985 auprès de 757 recrues.

La prévalence de malocclusion et la nécessité d'un traitement ont été évaluées à l'aide du «Dental Health Component» (DHC) et de l'«Aesthetic Component (AC) of the Index for Orthodontic Treatment Need (IOTN)». Un examen clinique a été effectué auprès de l'échantillon 1996, alors que l'échantillon 1985 a été étudié sur la base de moulages orthodontiques.

Les prévalences de l'overjet excessif, de la perte de points de contacts (encombrement ou diastèmes) et de la supraclusion se sont avérées inférieures en 1996 à celles constatées en 1985 et cela, à un niveau significatif.

Plus de la moitié des sujets examinés en 1996 n'avaient pas besoin de traitement orthodontique selon le «DHC»; 27% d'entre eux en avaient un besoin modéré et 14% présentaient un besoin élevé. Sur la base de critères esthétiques («AC»), 84% n'avaient pas besoin de traitement, 13% présentaient un besoin modéré et 3% un besoin élevé.

Sur la base des deux indices combinés («DHC» et «AC»), 21% des sujets ont été considérés comme nécessitant un traitement; parmi eux, 14% l'ont été sur la base du «DHC» seul et 7%, sur la base du «DHC» et celle du «AC».

On peut penser que la baisse du nombre de cas nécessitant un traitement, constatée entre 1996 et 1985, est due au fait qu'un plus grand nombre de sujets a suivi un traitement orthodontique durant cette période (44% contre 33%).

## References

- BIRKELAND K, BÖE O E, WISTH P J: Orthodontic concern among 11-year-old children and their parents compared with orthodontic treatment need assessed by Index of Orthodontic Treatment Need. *Am J Orthod Dentofacial Orthop* 110: 197–205 (1996)
- BROOK P H, SHAW W C: The development of an index of orthodontic treatment priority. *Eur J Orthod* 11: 309–320 (1989)
- BUCHANAN J B, DOWNING A, STIRRUPS D R: A comparison of the index of orthodontic treatment need applied clinically and to diagnostic records. *Br J Orthod* 21: 185–188 (1994)
- BURDEN D J: The ranking of dental aesthetics. *Br J Orthod* 22: 259–261 (1995)
- EVANS R, SHAW W: Preliminary evaluation of an illustrated scale for rating dental attractiveness. *Eur J Orthod* 9: 314–318 (1987)
- GARAZI F, LANG R, JOHO J-P: Enquête sur les besoins orthodontiques en Suisse pour la période 1994–2004. *Acta Med Dent Helv* 1: 105–111 (1996)
- HOLMES A: The prevalence of orthodontic treatment need. *Br J Orthod* 19: 177–182 (1992)
- HOWELLS D J, SHAW W C: The validity and reliability of ratings of dental and facial attractiveness for epidemiologic use. *Am J Orthod* 88: 402–408 (1985)
- INGERVALL B, GEBAUER U, THÜRER U, BÜRGIN W: Malokklusionen bei Schweizer Rekruten im Jahre 1985. *Schweiz Monatsschr Zahnmed* 97: 1366–1373 (1987)
- JONES C M, WOODS K, O'BRIEN K, WINARD C, TAYLOR G O: Index of Orthodontic Treatment Need, its use in a dental epidemiology survey calibration exercise. *Community Dent Health* 13: 208–210 (1996)

- JOYE D, SCHULER M, MEIER U: Sozialstruktur der Schweiz. Bundesamt für Statistik, Bern (1996)
- LINDER-ARONSON S: Orthodontics in the Swedish public dental health service. *Trans Eur Orthod Soc* 50: 233–240 (1974)
- LUNN H, RICHMOND S, MITROPOULOS C: The use of the index of orthodontic treatment need (IOTN) as a public health tool: a pilot study. *Community Dent Health* 10: 111–121 (1993)
- RICHMOND S, O'BRIEN K, BUCHANAN J, BURDEN D: An introduction to occlusal indices. Ortho-Care, Bradford, England (1994)
- RICHMOND S, BUCHANAN J B, BURDEN D J, O'BRIEN K D D, ANDREWS M, ROBERTS C T, TURBILL E A: Calibration of dentists in the use of occlusal indices. *Community Dent Oral Epidemiol* 23: 173–176 (1995a)
- RICHMOND S, SHAW W C, O'BRIEN K D, BUCHANAN I B, STEPHENS C D, ANDREWS M, ROBERTS C T: The relationship between the index of orthodontic treatment need and consensus opinion of a panel of 74 dentists. *Br Dent J* 178: 370–374 (1995b)
- SHAW W C, RICHMOND S, O'BRIEN K D, BROK P, STEPHENS C D: Quality control in orthodontics: Indices of treatment need and treatment standards. *Br Dent J* 170: 107–112 (1991)
- SO L LY, TANG L K: A comparative study using the Occlusal Index and the Index of Orthodontic Treatment Need. *Angle Orthod* 63: 57–64 (1993)
- TURBILL E A, RICHMOND S, WRIGHT J L: Assessment of General Dental Services orthodontic standards: the Dental Practice Board's gradings compared to PAR and IOTN. *Br J Orthod* 23: 211–220 (1996)
- WOOLASS K F, SHAW W C: Validity and reproducibility of rating dental attractiveness from study casts. *Br J Orthod* 14: 187–190 (1987)