

# The oral health status of Special Olympics athletes in Belgium

R. Leroy<sup>1,2</sup>, D. Declerck<sup>2</sup> and L. Marks<sup>1</sup>

<sup>1</sup>Centre of Special Care in Dentistry, Dental School, Ghent University, Belgium; <sup>2</sup>Department of Oral Health Sciences, Katholieke Universiteit Leuven, Belgium

**Objectives:** To describe and evaluate the oral condition and oral treatment needs of the participants of the Special Olympics Special Smiles program organised in Belgium in 2008. **Design:** A cross-sectional study where the data were collected through interviews and clinical examinations. **Participants:** 687 Belgian Special Smiles athletes participated, mean age 33 years. **Results:** More than 70% had at least one missing tooth. Distinct signs of gingivitis and visible caries experience were observed in 44% and 22% of dentate athletes respectively. Dutch-speaking athletes were less likely to present with untreated caries (OR:0.46; 95%CI: 0.31-0.68) or with gingivitis (OR:0.51; 95%CI: 0.37-0.71) compared to their French-speaking colleagues. Signs of past injury were identified in 12% of athletes. Of those athletes with an edentulous mandible, only 53% presented with a removable denture; 73% of athletes missing some maxillary anterior teeth and 30% of those missing all anterior teeth had no prosthetic replacement in the maxilla. Nearly two fifths of athletes were referred for treatment: in 12% of athletes dental treatment was considered urgent. **Conclusion:** The results suggest that there is a tremendous unmet need for dental treatment in the Belgian Special Smiles population, with French-speaking athletes in greatest need. Improvements in data collection should be encouraged for example. more detailed screening methods (e.g. caries screening including enamel lesions, full periodontal examination) and questionnaires (e.g. inclusion of questions related to dietary habits, dental attendance). In this way barriers to optimal oral health (care) in this population could be further explored, attempts made to reduce them and so reduce health inequalities.

**Key words:** oral health, Special Olympics, special smiles, caries experience, gingivitis, prostheses

## Introduction

Data on the oral health of people with intellectual disabilities living in Belgium are rather scarce. More than a decade ago, the oral condition of 626 12-year-old children with intellectual and development disability, living in Flanders (northern Belgium) was described (Gizani *et al.*, 1997; Martens *et al.*, 2000). Almost one third (32%) of the children presented with poor oral hygiene; the level of restorative care was low (i.e. restorative index score: 48.7%). A considerable proportion of the mildly mentally impaired children and learning impaired children did not brush daily (22% and 21% respectively) and were not helped with tooth brushing by their parents or carers (91% and 95% respectively). The authors are not aware of published data on the oral health status of Belgian special needs adults.

Organised annually in many countries worldwide, the Special Olympics is a sports training, fitness and competition program for people with intellectual disabilities to improve their self-esteem and quality of life. The Special Olympics Healthy Athletes® program provides voluntary health screenings free of charge during national and international Special Olympics competitions.

The Special Olympics Special Smiles program offers a unique opportunity for dental practitioners to experience and learn how to work with people with intellectual disabilities. For the athletes it may be an attractive (first) contact with an oral health professional in an unconstrained atmosphere, away from the (possibly frightening) dental office. In addition, athletes and accompanying

family members and care givers are sensitised to the need for daily oral hygiene, healthy diets and regular visits to the dentist. Although the Special Olympics participants cannot be considered representative of all people with intellectual disabilities living in a region or country, the Special Smiles program offers a timely opportunity to collect data on the oral health condition of athletes with intellectual and developmental disabilities (Turner *et al.*, 2008).

The current study was undertaken to describe and evaluate the oral condition and oral treatment needs of the participants of the Special Smiles Program organised in Kortrijk, Belgium, in 2008.

## Material and Methods

The study group was a convenience sample of athletes participating in the Special Olympics held in Kortrijk (Belgium) in May 2008. All athletes were invited to visit the Healthy Athletes hall and participate in the different screenings including the Special Smiles program. Prior to the Special Olympics event, parents (or legal guardians) were informed via a brochure about the Healthy Athletes event and invited to sign an informed consent.

The Special Smiles program included a brief interview on oral health related topics (brushing frequency, smoking habits and the presence of pain in the oral region), an intraoral examination and an educational component, where the athletes received a one-to-one instruction in proper oral hygiene. Afterwards they were offered a free sample of toothpaste, a tooth brush and oral rinse.

Examinations were performed by 25 dentists, all instructed on the Special Smiles oral screening protocol that has been developed in conjunction with the U.S. Centers for Disease Control and Prevention, Division of Oral Health. In addition, two dental students collected within the frame of their master thesis data on (among others) prosthetic appliances.

Restricted available time and limited cooperation of some athletes have compelled the team to keep data collection simple and to confine most responses to a yes/no format. To conform with the international Special Smiles data collection form, the examination covered following items:

- Presence of untreated decay (defined as a cavity 0.5mm or larger in diameter), separately recorded for anterior teeth, premolars and molars (yes/no)
- Presence of filled teeth (defined as a restoration placed to repair a caries lesion) (yes/no)
- Teeth extracted due to caries, separately recorded for anterior teeth and molars (yes/no) (According to the Special Smiles protocol premolars are not considered here since they are often congenitally missing, especially in this patient group, and often extracted as part of an orthodontic treatment.)
- Presence of sealant(s) (yes/no)
- Injury (fractured (restored as well as non-restored), discoloured or absent anterior teeth) (yes/no)
- Signs of fluorosis, scored on maxillary permanent incisors (yes/no)
- Signs of gingival inflammation in the mandibular anterior region (yes/no)
- Treatment urgency (maintenance/non-urgent/urgent)

In addition, within the frame of their master thesis two dental students collected, among other things, the following data:

- Presence/absence of individual teeth (excluding third molars) for any reason
- Presence of removable or fixed prosthetic appliances, separately recorded for maxilla and mandible

The oral health assessments were performed visually using a mouth mirror and penlight with the athlete seated on an ordinary chair. No radiographs were taken.

Clinical and interview data were recorded on a form and analysed using SAS® v9.2.  $\chi^2$ -tests, univariable and multivariable logistic regression analyses were performed in order to obtain crude and adjusted odds ratios (and 95% confidence intervals) with p-values below 0.05 considered statistically significant.

## Results

Over three days 3,100 athletes competed and 690 of these took part in the Special Smiles program. Data from non-Belgians (2 French and a German) were omitted from the analyses presented here (n=687).

Forty percent of athletes were female; for 8 athletes gender was not recorded and could not be deduced from the first name. The participants' mean age was 33 years (sd 13, range 9-80). Young participants predominated: more than half (52%) were under 35 years old. Some 56 % lived in Flanders (northern, Dutch speaking Bel-

**Table 1.** Oral health related characteristics of Special Smiles participants 2008 (n=687)

	<i>n</i>	<i>%</i>
<i>Interview data</i>		
Brushing frequency*		
Once or more	581	85
2 - 6 times a week	41	6
Once a week	10	1
Less than once a week	6	1
Not sure	17	2
Pain in the oral region		
No	590	86
Yes	86	13
Location of pain**		
Tooth pain	44	6
Other pain	19	3
No data available	23	3
Smoking behaviour		
No	577	84
Yes	71	10
No data available	39	6
<i>Clinical data</i>		
Edentulous		
No	660	96
Yes	27	4
Signs of gingivitis*		
No	363	55
Yes	291	44
Untreated caries*		
No	502	76
Yes	144	22
Location of untreated caries**		
Caries in anterior teeth	34	5
Caries in premolars	54	8
Caries in molars	89	13
Filled teeth*		
No	145	22
Yes	503	76
Sealants present in at least one tooth*		
No	607	92
Yes	41	6
Injury		
No	572	83
Yes	82	12
Treatment urgency		
Maintenance	384	56
Non-urgent	183	27
Urgent	84	12

\* Only dentate athletes considered

\*\* Totals exceed 146 as caries may occur in multiple locations in a single subject

gium,) and 37% in Wallonia (southern, French speaking Belgium,) and 2% in Brussels (capital region); for 32 athletes this information was not available.

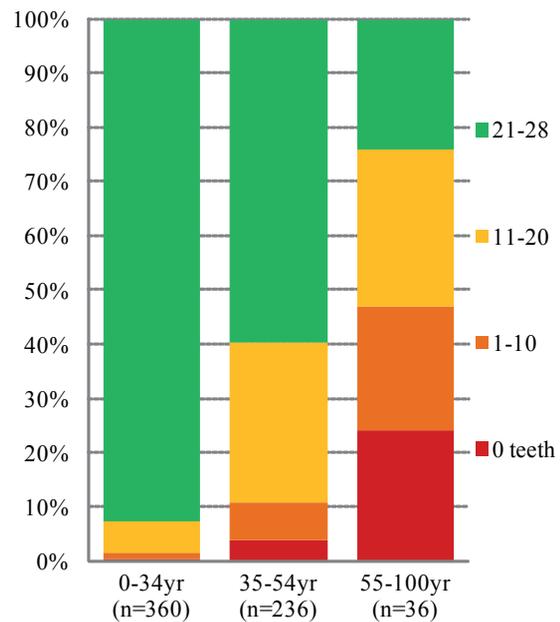
Most participants (85%) answered that they brushed at least once a day, 57 athletes did not brush daily and for 17 athletes it was not possible to elicit their brushing frequency as they could not answer the question themselves and their companion was not their day-to-day personal care giver (Table 1). Some 13% of the athletes complained about pain in the oral cavity on the day of the examination; in most cases pain was located in teeth. Significantly more female athletes experienced pain (OR: 1.94; 95% CI: 1.23-3.06). Neither geographical area nor age was significantly related to the presence of oral pain. One tenth of athletes were smokers; it was not possible to get a reliable answer to this question for 39 athletes.

In Figure 1 the proportion of athletes with no, 1-10, 11-20 and 21-28 teeth according to age group is presented. Considering the proportions with 20 or fewer teeth, these increase with age from 9% in the under 35s to 75% in the over 54s. The number of teeth present was associated with age (OR: 0.90; 95% CI: 0.90-0.92): the older the athlete, the fewer the teeth. Regional (i.e. Dutch- versus French-speaking) differences in the number of teeth were not observed. More than 70% of athletes missed at least one tooth; 27 participants (4%) were completely edentulous. In addition, 12 more athletes had natural teeth only in the mandible and 3 more athletes had natural teeth only in the maxilla. There were no gender differences regarding edentulousness.

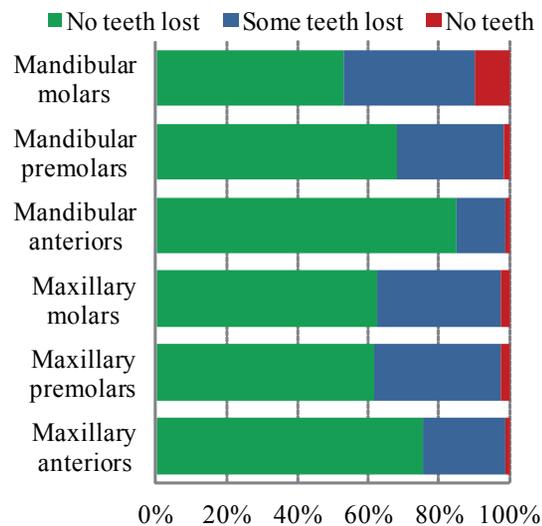
Distinct signs of gingival inflammation were observed in 44% of dentate athletes (Table 1); older athletes had a higher chance for having gingivitis (OR: 1.04; 95% CI: 1.02-1.05). Gingivitis was less prevalent in Dutch speakers compared to French speakers (8% vs. 55%, OR: 0.51; 95% CI: 0.37-0.71).

In 22% of dentate athletes visible cavitated caries lesions were detected with no differences by gender or age group. Visible caries experience was most often observed in molars, followed by the premolars. Regional differences were observed: the prevalence of untreated caries being much lower in Dutch speaking (17%) compared to French speaking athletes (31%) (OR: 0.46; 95% CI: 0.31-0.68) (Table 2). Athletes with 20 or fewer teeth were more likely to have untreated caries, whereas athletes without visible signs of gingivitis (OR: 0.44; 95% CI: 0.30-0.65) and non-smoking athletes (OR: 0.56; 95% CI: 0.32-0.97) were less likely. Also when all evaluated confounders were taken into account in a multivariable logistic regression analysis (Table 2), the geographical area was confirmed as a predictor for untreated caries in these athletes, with Dutch speakers being less likely to present with untreated decay (OR: 0.51; 95% CI: 0.33-0.80). In addition, female athletes (OR: 0.59; 95% CI: 0.37-0.94) and athletes without visible signs of gingivitis (OR: 0.46; 95% CI: 0.29-0.72) were less likely to present with untreated caries.

Of dentate athletes, 76% had restored teeth; with neither regional nor gender differences. As might be expected, older athletes had more filled teeth (OR: 1.05; 95% CI: 1.04-1.07).



**Figure 1.** Proportion of athletes with no, 1-10, 11-20 and 21-28 teeth by age group



**Figure 2.** Proportion of dentate athletes with absent maxillary and mandibular anterior, premolar and molar teeth

Only 6% presented with sealed teeth; most of them (35 out of 41) were under 35 years old. Sealants were more common in Dutch speakers (OR: 5.07; 95% CI: 1.96-13.13).

Signs of past injury were identified in 12% of athletes, with no gender or regional differences observed.

In 12% of cases an appointment with a dentist was considered urgent; referred but non-urgent for 27% and the remaining 56% were indicated for preventive recall visits. Regional differences were evident with Dutch speakers less frequently needing urgent treatment than their French speaking counterparts (9% vs. 13%, OR: 0.58; 95% CI: 0.42-0.79). Older athletes were also more often considered in need of an urgent appointment with the dentist (OR: 1.03; 95% CI: 1.01-1.04). As could be expected, treatment urgency was associated with the

**Table 2.** Crude and adjusted odds ratios and 95% CI for untreated decay in dentate Special Smiles participants, 2008

Variable	Crude odds ratios			Adjusted odds ratios (n=531)		
	OR	95% CI		OR	95% CI	
<i>Demographics</i>						
Age (year) (n=599*)	1.01	1.00	1.03	0.98	0.96	1.01
Gender (n=638*)						
Boys (ref)						
Girls	0.68	0.46	1.01	0.59	0.37	0.94
Geographical area** (n=607*)						
Walloon (French speaking) (ref)						
Flanders (Dutch speaking)	0.46	0.31	0.68	0.51	0.33	0.80
<i>Interview data</i>						
Brushing frequency (n=642*)						
At least daily (ref)						
Not daily	0.63	0.37	1.07	0.75	0.40	1.40
Pain in oral region (n=640*)						
Yes (ref)						
No	0.89	0.52	1.55	1.06	0.52	2.13
Smoking behaviour (n=633*)						
Yes (ref)						
No	0.56	0.32	0.97	0.65	0.34	1.21
<i>Clinical data</i>						
Signs of gingivitis (n=639*)						
Yes (ref)						
No	0.44	0.30	0.65	0.46	0.29	0.72
Filled teeth (n=639*)						
Yes (ref)						
No	0.70	0.44	1.13	0.68	0.38	1.21
Injury (n=642*)						
Yes (ref)						
No	0.80	0.47	1.37	0.97	0.49	1.89
Number of teeth (n=646*)						
21-28 (ref)						
11-20	1.71	1.07	2.71	1.50	0.82	2.73
1-10	2.37	1.05	5.33	2.79	0.99	7.87

\* Number of athletes considered in the univariable analysis;

\*\* Only Flanders and Wallonia were considered due to too few athletes coming from other regions; statistically significant results indicated in bold.

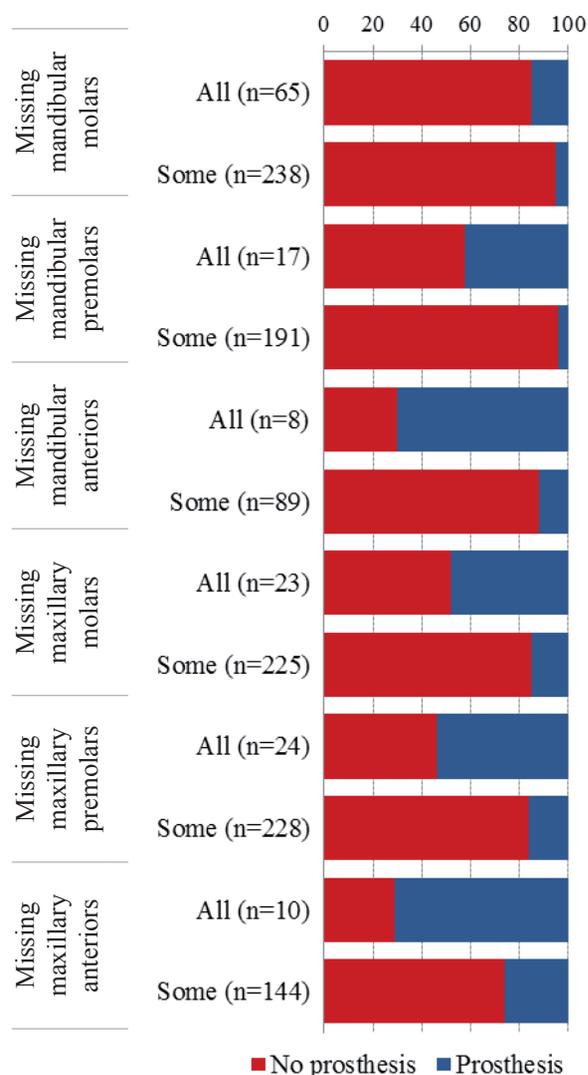
presence of oral pain ( $p < 0.001$ ) though not all athletes reporting pain received an urgent referral to the dentist.

In Figure 2, the absence of different tooth types is further analysed. In the group of athletes with a dentate maxilla, 76% still had all their anterior teeth, 61% had all premolars and 62% had all molars. In the group of athletes with a dentate mandible, the situation is better for anterior and premolar teeth: 85% still had all anterior teeth and 68% had all premolars. Only half (53%) still had all molars (wisdom teeth excluded).

Just 13% of all athletes presented with a prosthesis in the maxilla, two thirds of which were removable. Of the 39 athletes with an edentulous maxilla, 25 presented with a removable denture, 7 presented without any prosthesis and for 7 more athletes no data could be collected. Some 6% of all athletes had a prosthesis in the mandible,

84% of which were removable. In the 30 athletes with an edentulous mandible, 16 presented with a removable denture, 6 with no prosthesis and for 8 athletes no data could be collected.

Due to time constraints, it was not recorded which missing teeth were replaced by a prosthesis and which were not. Still it could be deduced from the data that 73% of athletes missing some maxillary anterior teeth and 30% of athletes missing all anterior teeth had no prosthesis at all in the maxilla. The respective proportions for missing some and all maxillary premolars and molars are presented in Figure 3.



**Figure 3.** Percentage of partially edentate athletes with(out) replaced missing teeth

### Discussion

The presented data are derived from a convenience sample and as a result, one should be cautious in generalising the results. The participants of Special Olympic games cannot be considered representative for all people with intellectual disabilities living in a region or country, as they are more likely to be younger, healthier, have less severe disability, and be better supported and integrated in society (Reid *et al.*, 2003).

Reid and coworkers suggested that data from the Special Olympics could represent the “best case scenario” of oral health among people with intellectual disabilities (Reid *et al.*, 2003), suggesting that the more severe the disability is the worse the expected oral health status (e.g. oral hygiene, care index). On the other hand, it was noted that adults with learning disabilities living in the community were significantly less likely to have a dentist and to use community dental services than their residential counterparts; they were more likely to attend only when having trouble (Stanfield *et al.*, 2003; Tiller *et al.*, 2001). The more self-reliant the individual the more difficult it seems

to enforce sound (oral) health behaviour and to organise regular dental visits. Unfortunately, within the frame of the Special Smiles Program no data were collected on residential status nor on the use of dental services, so no further analyses on these aspects could be performed.

Another limitation of this study was that data on brushing frequency, presence of oral pain and smoking behaviour were collected through self-report from athletes with varying degrees of mental capacities. The athletes were accompanied by volunteers who may not have been their daily caretakers, so these companions may have been unaware of the real situation and were unable to correct faulty answers. Hence, it is possible that the athletes have under or over reported these behaviours and the presence of pain, for example to please the examiner or because they may have misunderstood the question posed by the examiner. This may have resulted in misclassification and hence bias of the reported results. This may also explain why not all athletes reporting pain in the oral cavity received an urgent referral to the dentist. So far, the validity and reliability of the Special Smiles examination methods have not been determined.

The clinical screening revealed that 44% of dentate athletes presented with distinct signs of gingival inflammation. This prevalence is comparable to data collected during the Special Olympics held in 40 sites in the United States in 2001 (Reid *et al.*, 2003), but is lower than the data reported from the Special Olympics held in Puerto Rico in 2004 (60%) (Lopez del Valle *et al.*, 2007), in New Jersey in 1996 (60%) (Feldman *et al.*, 1997), and in the UK in 2005 (63%) (Turner *et al.*, 2008).

Untreated caries was present in 22% of screened athletes. This is probably an underestimate as only lesions with a diameter of 0.5 mm were scored, teeth were not dried nor polished before the examination and no bitewing radiographs were taken. The real prevalence of caries experience and need for restorative treatment may be much higher. In other reports on Special Olympics athletes, the prevalence of untreated caries ranged between 19% and 45% (Feldman *et al.*, 1997; Lopez del Valle *et al.*, 2007; Reid *et al.*, 2003; Turner *et al.*, 2008). It is regrettable that there are no data on caries prevalence in the general Belgian population with which to compare these results.

Nearly two fifth of athletes were given the advice to see the dentist for treatment; in 12% of athletes dental treatment was considered urgent. As caries was only scored positive for lesions with a diameter of 0.5mm, and periodontal breakdown, soft tissue lesions, erosive lesions, enamel disorders, orthodontic and prosthetic treatment needs were even not considered, it can be concluded that the reported need for a dental appointment is underestimated.

The inclusion of data on the presence and absence of both individual teeth and prosthetic appliances added value to the dataset. It is striking that so many absent teeth are not replaced by prostheses. Unfortunately, no data were gathered about the number of prostheses left at home, but it can be argued that if prostheses are well fitting, the athletes would prefer to attend the games with teeth rather than without. Based on these preliminary findings it can be concluded that the unmet prosthetic treatment need in this population is huge.

The results of this study suggest that there is a tremendous need for dental treatment in the Belgian Special Smiles population, with French speaking athletes in highest need. Further research has to elucidate why athletes coming from the French speaking section of the country were in worse oral health. It can be recommended that in further research projects in this special needs populations more detailed screening methods are employed (e.g. caries screening including enamel lesions, full periodontal examination). Data collection could also be improved by using a more detailed questionnaire (e.g. also inclusion of questions related to dietary habits, dental attendance) that is completed in the presence of one of the individual's daily caretakers. In this way barriers to optimal oral health (care) in this population could be further explored, attempts made to reduce them and so reduce health inequalities.

### Acknowledgements

The authors thank the staff of the Special Olympics Healthy Athletes program, the 3 participating Belgian dental schools (UGent, K.U.Leuven and UCLouvain), all 25 dentist examiners, 2 dental students (C. Noreille and E. Josson) and the many volunteers who made the screening event possible. Thanks to GABA Benelux and WTB (Dutch-speaking task force for Special Care Dentistry) for financial support of the Special Smiles Program in Belgium.

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