

# Oral health needs of athletes with intellectual disability in Eastern Europe: Poland, Romania and Slovenia

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**Objectives:** The aims of this study were to evaluate the oral condition and treatment needs of Special Olympics (SO) athletes from Poland, Romania and Slovenia. **Methods:** A cross-sectional study was performed with data collected through standardised oral screening of athletes who participated in the annual SO events held in Poland, Romania and Slovenia, between 2011 and 2012. The data were compiled and transferred to an SPSS data file for analysis using descriptive statistics. **Results:** A total of 3,545 athletes participated in the study. Among the main findings, the prevalence of untreated decay was 41% in Poland and 61% in Slovenia, whilst 70% of the Romanian athletes had signs of gingival disease and only 3.8% presented molar fissure sealants. In addition, 47% of Polish athletes were in need of urgent treatment. **Conclusions:** Analysis of the results obtained following screening showed comparable oral health needs of athletes with intellectual disability among countries. Exploration of the oral health systems of the countries revealed similar significant co-payments and lack of incentive for dentists to treat patients with special needs. The results from Romania, Poland and Slovenia demonstrated the need for a structured system in which a special population is a target for oral-health-related education programmes and system-included preventive, restorative and maintenance interventions.

**Key words:** Oral health, Eastern Europe, disability

## INTRODUCTION

The population with intellectual disabilities is known to be more vulnerable to oral health problems. This topic has been extensively reported, and a systematic review published in 2010 assessed the differences in oral health between general populations and people with intellectual disabilities. Of the 27 studies reported, it was concluded that, on average, people with intellectual disabilities have worse oral hygiene and higher plaque levels, more severe gingivitis, periodontitis and overall worse oral health (1,2).

The oral health status of persons with intellectual disability is influenced not only by individual-level factors or limitations, but also by system-level factors related to their national health-care systems. Unfortunately, health-care systems are recognized as being unequal, usually including few or non-permanent sys-

tematic policies to meet the needs of the entire population (3).

Most Eastern European countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Romania) have health-care systems in transition. Since 1989, insurance-based systems have been introduced in these countries, reducing the public health system. This process of change has been difficult, essentially because of the influence of the Soviet model on the previous systems. As a result, these countries have had to overcome a legacy of centralised and inequitable allocation of resources, in addition to the lack of responsiveness to local needs and poor-quality primary care services. Furthermore, only a small proportion of the gross national product (GNP) was dedicated to health care (4–7).

Large-scale oral health data on persons with intellectual disability in Eastern European countries is scarce, even though this data could be crucial in

evaluating the oral health-care systems. Most oral health diseases are preventable and consequently health-care promotion and preventive measures are fundamental. However, policies must be research-based, allowing each government to be able to identify the health needs in its population (5).

The Special Olympics (SO) is an international sports organisation for children and adults with intellectual disabilities. For the athletes participating in this event, the initiative Healthy Athletes was developed in the USA to help them to improve their general health and fitness. The oral health branch of Healthy Athletes is Special Olympics Special Smiles (SOSS), and its main goal is to collect standardised and region-specific data to improve access to dental care for people with intellectual disabilities. Because of the absence of reliable surveys on the oral health of this population, the SOSS programme is in a unique position to conduct a large number of standardised examinations and interviews, and to promote oral health education (8).

The aim of this study was to evaluate the oral condition and treatment needs of SO athletes from Poland, Romania and Slovenia. In general, this work explored variations in oral health needs and oral health-care systems to inform local policy-makers in an attempt to improve the oral health system in these Eastern European countries.

## METHODS

This paper presents analyses of cross-sectional data collected through interviews and oral examinations of athletes participating in SO events held in Poland in 2012, in Romania in 2011 and in Slovenia in 2012. Participants were recruited from the national games, which were held in different years among the countries included. First of all, the participants were invited during the games to the 'SOSS' site, where they could have their oral cavity screened on a voluntary basis after informed consent was obtained from them and from a parent or guardian. The eligibility criteria considered only athletes with intellectual disability participating in national SO games. In full accordance with the World Medical Association Declaration of Helsinki, the Joint Ethical Committee of the Ghent University Hospital approved this cross-sectional study (2013/816), including the written consent procedure for adults and minors (under 18 years of age).

The screening procedure consisted of recording demographic data (age, gender and country), followed by oral screening and individual education in oral-hygiene techniques. For the oral screening, a standardised examination protocol was used. This protocol is a public health screening tool developed for the SOSS

by the US Centers for Disease Control and Prevention, with the objective of expanding standardised data collection that may be used to improve access to care for people with special needs. The procedure records the following information: brushing habits; pain inside the mouth; edentulism; untreated decay; filled teeth; missing teeth; sealants; tooth injury; fluorosis; and signs of gingival disease (see the screening form in Ref. 9).

For evaluation of brushing habits, the athlete was asked to state the frequency with which he/she cleans his/her mouth. The presence of oral pain was evaluated using the question: 'Do you have any pain inside your mouth at present?'. If the answer was 'yes', the location of pain was also recorded.

The complete lack of teeth or root remnants was recorded as edentulism, and untreated decay was scored when at least one area of cavitation that would accommodate a 0.5-mm-diameter (or larger) bur was visually detected. Any tooth for which dental-restorative material had been used to restore the function, integrity and morphology as a response to decay was coded as 'filled teeth'. In addition, the code 'missing teeth' was given if one tooth or more was missing at the time of the examination, with the exception of premolars and third molars.

In accordance with the protocol, the presence of signs of dental trauma was considered only for maxillary and mandibular central and lateral incisors in the permanent dentition. This score was attributed when a tooth was absent, fractured or discoloured, indicating loss of vitality. In addition, the presence of sealants was recorded when material placed as a preventive measure covered the pits and fissures of the occlusal surface(s) of first and/or second permanent molars.

Subsequently, fluorosis was recorded when small, diffuse, opaque, white areas and/or brown stains were found over at least 25% of the buccal surface of maxillary anterior teeth (canine to canine). The detection of moderately red free or attached gingival margins or papillae, or those showing significant deviations from normal contour or texture, on three or more teeth within the same area was recorded as a sign of gingival disease.

At the end of the oral inspection, treatment urgency was assessed based upon clinical findings. If there was no complaint of pain, no untreated decay or dental injuries and no signs of gingival disease, the athlete was noted as needing maintenance follow-up. In the absence of pain, presence of decay but not involving the pulp, defective fillings and gingival problems without abscess formation, the athlete was referred for non-urgent treatment. In contrast, when there was oral pain, teeth with possible pulpal involvement, broken or missing fillings with decay, or periodontal abscesses, the participant was referred for urgent

treatment. The procedure was concluded with a personalised oral health care plan taking into account the athlete's capacity for comprehension and response.

Dentists, recruited from university dental schools and dental professional organisations, performed screenings and data collection. All volunteers were previously trained and strictly calibrated according to the SOSS Training Manual for Standardised Oral Health Screening (8). This procedure consists of training sessions, programmed for each day of the event before starting the screenings, in which all volunteers participate after studying the training manual. The training session includes a presentation with case definitions and photographs, then a standardised exercise and a question-and-answer period, in which the standardisation exercise is discussed.

All data collected were entered into an Excel worksheet and transferred to an SPSS data file where descriptive statistics were performed using IBM SPSS Statistics software, version 22.0 (IBM Corp., Armonk, NY, USA). Row-wise deletion was performed for data cleaning.

## RESULTS

A total of 3,545 SO athletes from Poland ( $n = 1,569$ ), Romania ( $n = 1,683$ ) and Slovenia ( $n = 293$ ) participated in this study. The population was mainly adult, and the average age of participants varied according to nationality: 23.2 years (Poland); 22.9 years (Romania); and 27.8 years (Slovenia).

Gender distribution in the Polish group was 30.6% female athletes, 68.9% male athletes and 0.5% described as 'uncertain', which resulted from gaps in the examination forms; in the Romanian participants it was 39.6% female athletes, 60.1% male athletes and 0.3% of uncertain gender; and among the participants from Slovenia it was 36.2% female athletes and 63.8% male athletes.

The distribution of all parameters among the three countries is presented in *Table 1*. Of note, the prevalence of existing oral disease was high, and ranged from 43.4% to 70.4% for gingivitis, 19.1% to 61.8% for untreated decay, and 13.2% to 25.7% for evidence of oral injury.

## DISCUSSION

This study provides a unique set of data that describes the oral health status among athletes with intellectual disabilities from Poland, Romania and Slovenia. The globally used SOSS protocol allows these data to be compared with existing and future data obtained using the same methodology (10–16). This comprehensive and standardised screening procedure identified four notable aspects of oral health

**Table 1** Distribution of oral health parameters

Variable	Poland ( $n = 1,569$ )		Romania ( $n = 1,683$ )		Slovenia ( $n = 293$ )	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Mouth cleaning frequency						
Once or more a day	1,220	77.8	1,237	73.5	280	95.6
2–6 times a week	215	13.7	217	12.9	7	2.4
Once a week	52	3.3	56	3.3	3	1.0
Less than once a week	44	2.8	49	2.9	0	0.0
Not sure	38	2.4	124	7.4	3	1.0
Oral pain	122	7.8	241	14.3	10	3.4
Edentulism	62	0.4	10	0.6	21	0.7
Signs of gingivitis	693	44.2	1,185	70.4	127	43.4
Untreated decay	642	40.9	321	19.1	181	61.8
Filled teeth	1,112	70.9	571	33.9	243	83.0
Missing teeth	828	52.8	646	38.4	139	47.4
Sealants	67	4.3	64	3.8	110	37.7
Injury	403	25.7	256	15.2	39	13.2
Fluorosis	53	3.4	12	0.7	12	0.4
Treatment urgency						
Maintenance	408	26.0	211	12.5	151	51.4
Non-urgent	427	27.2	1,097	65.2	85	29.0
Urgent	734	46.8	375	22.3	57	19.6

in SO athletes from Romania, Slovenia and Poland, which are discussed in more detail below.

First, despite the high frequency of mouth cleaning reported, the prevalence of gingival signs of disease was also pronounced. In particular, 70.4% of Romanian athletes presented signs of gingivitis, higher than data from the USA, Puerto Rico, Venezuela, the UK, Italy and Mexico (10,11,17–19). Even though published data show that gingivitis affects 50–90% of non-disabled adults worldwide (20), this study considered more than three teeth and only anterior mandibular teeth. The high prevalence may be explained by an inadequate brushing technique or motor and coordination impairments. Moreover, athletes with Down syndrome have a higher risk of gingivitis, related to specific subgingival bacterial species and impaired immunological responses (2,21,22).

Second, the prevalence of untreated decay was 40.9% in athletes from Poland and 61.8% in athletes from Slovenia, compared with 19.1% among Romanian athletes. Existing evidence in this regard shows great variability, with values ranging from 19% to 79% in several studies that used the protocol (10,11,17–19). By contrast, in 2004, the US National Institute of Dental and Craniofacial Research showed that in the general population the prevalence of untreated decay was 23% in children and 26% in adults 20–64 years of age.

The third concern was the lack of fissure sealants as a preventive measure in Polish and Romanian athletes, with only 4.3% and 3.8%, respectively. In contrast, among Slovenian athletes this proportion was almost ten times higher, at 37.7%. Even though the sample of

Slovenian athletes was smaller, and significant differences were not evaluated, our results highlight the need for preventive treatment in Poland and Romania.

The prevalence of dental trauma varied from 13.2% to 25.7%. A certain level of trauma was expected because athletes are at major risk of trauma when practising sports, and individual characteristics, such as poor lip closure, slow response to environmental obstacles, slow reflexes or large overjet of maxillary incisors, increase the risk of traumatic oral injuries (23,24,25).

Finally, although reports on present oral pain ranged from 3.4% in Slovenian athletes to 14.3% in Romanian athletes, one in every five Slovenian and Romanian athletes and one in every two Polish athletes were estimated to need urgent treatment [an urgent treatment recommendation was given in the presence of oral pain, possible pulpal involvement or missing fillings with decay, or periodontal abscess formation (8)]. In the case of Poland, these findings reflect a serious need for treatment among SO athletes that should not be overlooked.

The results of this study must be interpreted with caution because some parameters, such as domestic oral hygiene habits and oral pain, could be over- or under-reported because questions were asked of the athletes (16,18). Moreover, a convenience sample was used, which was recruited on-site during the SO events. Therefore, the study results cannot be extrapolated for the entire population with intellectual disabilities because athletes who participate in SO are a relatively younger, better-supported and high-functioning part of this population (17,26).

## Poland

For many years, during the communist regime in Poland, oral health care in the public sector was free of charge; dental practices were owned by the state and only a few private practices existed. This period was also characterised by an uneven geographical distribution of providers (4,27,28).

The reform of the health-care system began in 1989, and during the first 10 years there was an increase in the number of dentists in the private sector; dentists were now allowed to combine public practice with private practice. Additionally, a sickness fund was created and the compulsory insurance system was established.

The new oral care system has approximately 25,000 active dentists in a country of 39 million inhabitants. The health-care expenditure is 6% of the GNP, of which 0.18% is spent on oral care, and dentists are paid through fees per item of service (7,27,28).

Services provided are: preventive treatments; diagnostic procedures; curative services; endodontic treat-

ment of all teeth for people younger than 18 years of age and of incisors and canines in adults; treatment of lesions of the mucosa; extractions; basic periodontal treatment; and orthodontic treatment with removable appliances. Procedures that are not covered can be obtained by co-payment, depending on availability at the practice. In addition, optional private oral health insurance is available that complements the national oral health insurance (4,7).

Even though sealants (for children <7 years of age), restorations and basic periodontal treatment are offered by the public health system, our Polish sample does not reflect this, showing a high need for those treatments. Although we acknowledge the influence of many other individual factors on lack of treatment, the system's age limitation for sealants allows dentists to seal only first molars, and only if they erupt early enough, which is not always the case. Another related factor could be the lack of dentists who treat patients with special needs and/or a still-uneven geographical distribution of providers. Furthermore, the fee that a dentist receives for the treatment of non-disabled children or adults is the same as the fee that he/she receives for a patient with an intellectual disability, so there is no incentive for dentists to treat the latter group. Furthermore, there could be a financial barrier when children or adults with an intellectual disability receive no financial aid from the government for co-payment.

## Romania

The main features of the previous Romanian health-care system were universal coverage and free service provided by government financing. There was no private sector and all professionals in the health system were salaried. Since 1989, health care has gradually become decentralised as private health-care units have begun to coexist with state units.

The National Health Insurance Trust (NHIT) is the main source of financing the health-care system. According to Romanian law, health insurance is compulsory for all citizens, but a few categories of individuals, such as children, disabled people and pregnant women, are exempt from insurance contributions and cost sharing (6).

Population estimates from 1 January 2014 revealed 19,781,410 inhabitants. The public expenditure on health as a percentage of the GDP was 4.2% in 2014, of which 0.26% was for oral care, according to the National Ministry of Health.

More than 14,000 active dentists (according to the data of the Analysis of the Situation in Romania Occasion of World Oral Health Day Celebration, 2014) (29) provide oral care through more than 3,500 dental-care units, about 90% of which are located in urban areas. Health insurance covers only a few procedures

performed in dental-care units where the dentists have a contract with the NHIT. It is important to mention that the percentage of dentists working in collaboration with the NHIT has decreased considerably as a consequence of dramatic funding cuts in 2013, when public financing for dentistry was completely suspended. It took about one and a half years to restart (in August 2014) to the same level as it was in 2012. As dentistry is mostly (over 90%) private and very few private dental offices work in collaboration with the NHIT, poor funding can be regarded as one of the main reasons for the poor oral health of people with special needs in Romania. However, other individual factors may play an important role as many disabled persons have a very low financial status, which makes dental treatment in private offices usually unaffordable for them, regardless of their age.

There are few dental procedures listed in the framework contract of the NHIT. Of those, 100% of the costs of dental treatment for children under 18 years of age are supported, and 60% of the costs of acrylic full and partial dentures (only one denture every 10 years), dental extractions and resin-metal crowns. In addition, emergency endodontic treatment, periodontal management of abscesses, or consultations regarding oral and head and neck cancer are free of charge (6).

The Romanian oral health system offers people with special needs free dental care under the same conditions as it does for all the population, but with exemption from insurance contributions. However, some of the limitations for access to dental care are related to dentists as they are paid per clinical procedure and the fees are the same for treating disabled and non-disabled patients. Furthermore, there is a maximum amount of money that the NHIT can repay each dentist every month and no supplementary funds are allocated for working with patients with special needs. Dentists easily reach this limit when treating this population and consequently there is no financial incentive to treat patients with special needs (6,30). Vinereanu *et al.* (30) pointed out that insufficient knowledge of how to approach and treat special-needs patients, together with fear of uncontrollable consequences of the patient's general condition and behaviour, and a poor time/benefit ratio, are the main reasons why Romanian dentists tend to avoid treating patients with special needs.

When comparing Romania with Poland and Slovenia, Romanian athletes presented a surprisingly lower prevalence of untreated, clinically detected decay. As there is no water or salt fluoridation in Romania (except for a few very limited geographical areas), this could be related to variations in diet among the different countries, especially in the consumption of refined carbohydrates. However, this relationship needs to be studied further.

On the other hand, the prevalence of gingival signs of disease was far higher in Romanian SO athletes than in SO athletes from Poland and Slovenia (70% *vs.* 43–44%, respectively), indicating poorer oral hygiene and therefore a great need for adapted oral health-education programmes targeted towards both athletes and caregivers.

All the above indicates that, in Romania, the changes to the medical system in the last years have not solved the problems. There is no question about the importance of both preventive and restorative treatments for oral health. Therefore, the currently limited access of special-needs people to certain dental-care services represents an important concern for both the present and the future.

### Slovenia

Slovenia has a population of 2.06 million. Since 1991, when the country became an independent state, the public health-care network has been supplemented with private practices and clinics. At present, payments for compulsory health insurance are mandatory; this insurance aims to provide financial cover for a wide range of health-care services for all citizens, on the principles of social justice and solidarity, and is paid by all employees according to how much they earn. In addition, it is possible to purchase optional private health insurance, to supplement the compulsory insurance, to cover the costs of co-payments and extra costs required for certain treatments. In Slovenia, health expenditure is 8.30% of the GNP (31).

Oral health care in Slovenia is almost 60% private. Among private practices, 80% have contracts with the national insurance (31). When a patient is receiving dental care from a dentist who has a contract with the Health Insurance Institute, the patient is obliged to remain with that particular dentist for at least 1 year, even if the dentist cannot provide the patient with all the necessary treatment (e.g. because of a long waiting list). The National Health Insurance Institute covers oral preventive and treatment procedures for persons under 19 years of age. For adults, there are some co-payments, in different proportions, for many dental procedures. Dentists working independently are free to establish their own fees (7,31).

The group of Slovenian SO athletes was small, and their mean age was higher than in the group of SO athletes from Poland and Romania. A high prevalence of untreated tooth decay and gingival inflammation were observed; this probably reflects partly a lack of implementation of relevant preventive measures and partly some weaknesses within the health-care system (e.g. long waiting times for dental visits). Furthermore, the group of athletes with an intellectual disability is one of the underserved dental patient

groups, with a higher prevalence of dental diseases and more difficult accessing dental care compared with other populations (32). Many practitioners have limited experience in providing care for patients with special needs and/or are reluctant to provide services to patients with an intellectual disability for a variety of reasons, including financial (33). Some of these facts could also be reflected in the high proportion of Slovenian athletes with decayed teeth, gingivitis and urgent treatment needs.

On the other hand, the proportion of Slovenian athletes with sealed and filled teeth is high. In Slovenia, the proportion of 12-year-old children with sealed teeth is as high as 89% (34). Therefore, it is not surprising that almost 40% of the Slovenian SOSS athletes had at least one sealed permanent molar. This shows that despite some shortcomings in the organisation of dental services, dentists in Slovenia are aware of the importance of providing dental care for patients with an intellectual disability. Nevertheless, the challenge remains the need to ensure effective oral health care for this sector of the population.

### Eastern Europe

The oral health care of people with disabilities may face several barriers. Access to dental care is defined as the ability to obtain or make use of dental care (35). However, because of lack of preparation, time, facilities or appropriate protocols in the event of complications, not all dentists treat persons with disabilities. People with disabilities have to seek dental care but the actual access to care is affected by many factors, such as the lack of dental health insurance, inadequate dental health insurance, living conditions and geographical location in relation to dental services, and financial and educational status (36,37). Moreover, there are other barriers to treatment, including the importance that people give to oral health, and dental apathy or ignorance, whilst fear or anxiety may also affect interest in receiving treatment. All in all, in order to improve the oral health status of the population with intellectual disabilities, individual countries should identify the relevant barriers and, if possible, address them.

In the context of growing recognition of their governments' responsibility in respecting the full and equal enjoyment of all human rights for its entire population, in 2007, Poland, Romania and Slovenia signed the United Nations Convention on the Rights of Persons with Disabilities (CRPD) and later the convention ratification. Under the Convention, every state must ensure that persons with disabilities have equal access to the same range, quality and standard of free or affordable health care and programmes as provided to 'healthy' persons (38).

Eastern European countries have made major progress in their systems of oral health care, depending on the selected strategy, by giving priority to some aspects and sacrificing others. The level of oral health care is limited by a shortage of finances and other resources.

The report of the GNP spent on oral health care reflects the importance given to oral health care and the funding policies of every government. The percentage of the GNP spent on oral health care by the Eastern European countries of the present study is 0.18% in Poland, 0.01% in Romania (2014 data) and 0.62% in Slovenia. In the European Union (EU) and European Economic Area (EEA) in 1996, the percentage of the GNP spent on oral health care ranged from 0.3% in Greece and Ireland to 0.9% in Sweden. Hence only in Slovenia did the percentage of GNP spent on oral health care match that of EU and EEA countries (5,8). However, these values should be interpreted with caution because the GNP varies from one country to another.

Indeed, almost all the athletes evaluated here were raised under changing political systems (mean age of athletes <22 years). Consequently, future studies will be able to determine if changes in the oral health-care systems have improved oral health for persons with disabilities.

### CONCLUSION

In general, oral problems of SO athletes from Poland, Romania and Slovenia are very similar. The athletes encountered several limitations in accessing dental care and the assessment revealed some general conclusions. Significant co-payments and lack of incentive for dentists to treat patients with special needs were common for the three countries.

The results of the oral screenings from Romania, Poland and Slovenia expose the need for a structured system in which special populations are a target for oral-health-related education programmes and system-included preventive, restorative and maintenance care.

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### Conflict of interest

None declared.

## REFERENCES

1. Anders PL, Davis EL. Oral health of patients with intellectual disabilities: a systematic review. *Spec Care Dentist* 2010 30: 110–117.
2. Owens PL, Kerker BD, Zigler E *et al.* Vision and oral health needs of individuals with intellectual disability. *Ment Retard Dev Disabil Res Rev.* 2006 12: 28–40.
3. Hilton IV, Lester AM. Oral health disparities and the workforce: a framework to guide innovation. *J Public Health Dent* 2010 70: S15–23.
4. Widström E, Eaton KA, Borutta A *et al.* Oral healthcare in transition in Eastern Europe. *Br Dent J* 2001 190: 580–584.
5. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003 31: 3–24.
6. Vladescu C, Scintee G, Olsavsky V *et al.* Romania: Health System Review. *Health Systems in Transition*, Vol. 10. Copenhagen: World Health Organization, 2008. p. 1–172.
7. Widström E, Eaton KA. Oral health care systems in the extended European Union. *Oral Health Prev Dent* 2004 2: 155–195.
8. White JA, Beltran ED, Perlman S. *Training Manual for Standardized Oral Health Screening Training Manual for Standardized Oral Health Screening*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1998.
9. Special Smiles Healthy Athletes Screening Form. Available from: <http://media.specialolympics.org/soi/files/healthy-athletes/2014-Special-Smiles-HAS-Form.pdf>. Accessed 25 August 2015.
10. Hanke-Herrero R, López Del Valle LM, Sánchez C *et al.* Latin-American Special Olympics athletes: evaluation of oral health status, 2010. *Spec Care Dentist* 2013 33: 209–212.
11. Dellavia C, Allievi C, Pallavera A *et al.* Oral health conditions in Italian Special Olympics athletes. *Spec Care Dentist* 2009 29: 69–74.
12. Fernandez JB, Lim LJ, Dougherty N *et al.* Oral health findings in athletes with intellectual disabilities at the NYC Special Olympics. *Spec Care Dentist* 2012 32: 205–209.
13. Pezzementi ML, Fisher MA. Oral health status of people with intellectual disabilities in the southeastern United States. *J Am Dent Assoc* 2005 136: 903–912.
14. Duarte Ferreira M, Guare R, Prokopowitsch I *et al.* Prevalence of dental trauma in individuals with special needs. *Dent Traumatol* 2011 27: 113–116.
15. Bissar A-R, Kaschke I, Schulte AG. Oral health in 12- to 17-year-old athletes participating in the German Special Olympics. *Int J Paediatr Dent* 2010 20: 451–457.
16. Leroy R, Declerck D, Marks L. The oral health status of special olympics athletes in Belgium. *Community Dent Health* 2012 29: 1–6.
17. Reid BC, Chenette R, Macek MD. Special Olympics: the oral health status of U.S. athletes compared with international athletes. *Spec Care Dentist* 2003 23: 230–233.
18. Turner S, Sweeney M, Kennedy C *et al.* The oral health of people with intellectual disability participating in the UK Special Olympics. *J Intellect Disabil Res* 2008 52: 29–36.
19. Feldman CA, Giniger M, Sanders M *et al.* Special Olympics, special smiles: assessing the feasibility of epidemiologic data collection. *J Am Dent Assoc* 1997 128: 1687–1696.
20. Albandar JM, Rams TE. Global epidemiology of periodontal diseases. *Periodontol* 2000 29: 7–10.
21. Khocht A, Janal M, Turner B. Periodontal health in Down syndrome: contributions of mental disability, personal and professional dental care. *Spec Care Dentist* 2010 30: 118–123.
22. Sakellari D, Arapostathis KN, Konstantinidis A. Periodontal conditions and subgingival microflora in Down syndrome patients. A case-control study. *J Clin Periodontol* 2005 32: 684–690.
23. Paszynska E. Implications of intellectual and developmental disabilities; oral health status and retention of sealants in intellectually disabled patients – 2 years clinical program. In: Tan U, editor. *Latest Findings in Intellectual and Developmental Disabilities Research*. Rijeka, Croatia: InTech; 2004. p. 369–392. doi: 10.5772/1236.
24. Bhat M, Nelson KB. Developmental enamel defects in primary teeth in children with cerebral palsy, mental retardation, or hearing defects: a review. *Adv Dent Res* 1989 3: 132–42.
25. Fernandez C, Kaschke I, Perlman S *et al.* A multicenter study on dental trauma in permanent incisors among Special Olympics athletes in Europe and Eurasia. *Clin Oral Investig* 2015; doi: 10.1007/s00784-015-1403-x.
26. Trihandini I, Wiradidjaja Adiwoso A, Erri Astoeti T *et al.* Oral health condition and treatment needs among young athletes with intellectual disabilities in Indonesia. *Int J Paediatr Dent* 2013 23: 408–414.
27. Chawla M, Berman P, Kawiorska D. Financing health services in Poland: new evidence on private expenditures. *Health Econ* 1998 7: 337–346.
28. Kuszewski K, Gericke C. *Poland: Health Systems in Transition*, Vol. 7. Copenhagen: World Health Organization; 2004. p. 1–130.
29. Analysis of the Situation in Romania Occasion of World Oral Health Day Celebration. Colegiului Medicilor Dentisti din România (CMDR) [Internet]. Galati, Romania, 2014. Available from: [http://www.dspbv.ro/sectii/promovare/evenimentel/2014/Sanatate orala/Analiza de situatie sanatate orala.pdf](http://www.dspbv.ro/sectii/promovare/evenimentel/2014/Sanatate%20orala/Analiza%20de%20situatie%20sanatate%20orala.pdf). Accessed 25 August 2015.
30. Vinereanu A, Luca R, Amariei C *et al.* Oral health of special needs patients in Romania – from individual to community concern. *Oral Health Dent Manag* 2008 2: 11–14.
31. Albrecht T, Turk E, Toth M *et al.* *Slovenia: Health System Review. Health Systems in Transition*, Vol. 11. Copenhagen: World Health Organization; 2009. p. 1–168.
32. Mabry C, Mosca N. Interprofessional educational partnerships in school health for children with special oral health needs. *J Dent Educ* 2006 70: 844–850.
33. Waldman HB, Perlman SP. Dental care for individuals with developmental disabilities is expensive, but needed. *J Calif Dent Assoc* 2002 30: 427–432.
34. Vrbič V. Dental health of 12-year-old children in Slovenia, 1987–2008. *Zobozdrav Vestn* 2008 63: 169–171.
35. Guay AH. Access to dental care: the triad of essential factors in access-to-care programs. *J Am Dent Assoc* 2004 135: 779–785.
36. Oliver CH, Nunn JH. The accessibility of dental treatment to adults with physical disabilities in northeast England. *Spec Care Dentist* 1996 16: 204–209.
37. Finger ST, Jedrychowski JR. Parents' perception of access to dental care for children with handicapping conditions. *Spec Care Dentist* 1989 9: 195–199.
38. Bartlett P. The United Nations convention on the rights of persons with disabilities and mental health law. *Mod Law Rev* 2012 150: 752–778.

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