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Treatment needs and predictive capacity of explanatory variables of oral disease in young athletes with an intellectual disability in Europe and Eurasia

ABSTRACT

Aim *To evaluate the oral condition and treatment needs of young athletes with ID from 53 countries of Europe and Eurasia who participated in the Special Olympics European Games held in Antwerp, October 2014.* ***Methods*** *A cross-sectional study was undertaken with data collected through standardised procedures from consenting athletes under 21 years of age. Oral hygiene habits, reports of oral pain and presence of gingival signs, sealants, untreated caries and missing teeth were recorded. Statistics: Data analysis was performed in SPSS to produce descriptive statistics and explanatory variables for untreated decay, and gingival signs of disease were tested with Multilevel Generalized Linear Mixed Models.* ***Results*** *Five hundred three athletes participated in this study (mean age 17 yrs). Untreated decay was recorded in 33.4% of the participants and 38.7% of them had signs of gingival disease. Absence of untreated decay was associated with lower chances of gingival signs, while absence of sealants was related with higher chances of untreated decay.* ***Conclusions*** *There is consistent evidence of persistent need for increased promotion of oral health, as well as preventive and restorative treatment in young athletes with ID in Europe and Eurasia. Due to the limited predictive capacity of the studied variables for oral disease, further studies including other related factors are needed.*

Keywords *Dental screening; Europe; Intellectual disability; Oral health; Special Olympics; Young athletes.*

Introduction

The oral treatment needs among people with intellectual disabilities have been reported to be high [Trihandini et al., 2013; Leroy et al., 2012; Owens et al., 2006; Leroy and Declerck 2013; Anders and Davis 2010; Fernandez et al., 2015]. Particularly, decay and gingival diseases are considered among the top ten secondary conditions among this population [Newacheck et al., 2000]. Strong evidence also supports that the poor oral hygiene is the main cause of the higher prevalence of severe periodontal disease [Owens et al., 2006; Leroy and Declerck 2013; Anders and Davis 2010]. In comparison to a neuro-typical population, people with intellectual disability have poorer oral hygiene, higher rates of self-inflicted traumatic injuries [Bhat and Nelson, 1989] untreated decay and more extracted teeth than people without a disability [Reid et al., 2003]. On the other hand, the prevalence of decay appears to be similar in both groups [Owens et al., 2006, Anders and Davis 2010, Hennequin et al., 2008].

The prevalence of caries and gingival disease among young people is worrying given the long-term negative impact of tooth decay on speech and nutrition [Dye et al., 2007]. Nevertheless, for clinicians the diagnosis of disease in this special group of population is not always accurate due to patients' difficulties describing pain or other symptoms; some patients may even not be able to cooperate with any assessment [Hennequin et al., 2008].

People with disabilities or their caregivers have to seek dental care but the actual access to care is influenced by many factors like their living conditions or geographic location in relation to the dental services [Guay, 2004]. In the same way, lack of dental health insurance, inadequate dental health insurance or low family income may also be barriers against oral care [Al Agili et al., 2004]. Yet depending on the individual situations, some people with disabilities may experience no barriers, while others may experience multiple barriers [Waldman and Perlman, 2012, Tesini and Fenton, 1994]. Preventive measures and health promotion are effective in prevention of oral diseases, as oral health research has demonstrated [Petersen, 2003]. However, large-scale oral health data regarding persons with intellectual disability is scarce, even though this data could be crucial for evaluation of existing policies.

Healthy Athletes (HA) is an initiative that started in the

United States in 1996, whose main objective is to help athletes with intellectual disability who participate in Special Olympics to improve their health and fitness. The oral health branch of HA 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 special needs. The lack of reliable international surveys on oral health on this population strata makes the SOSS program a unique opportunity to conduct a large number of standardised examinations, interviews and provide education [White and Beltran, 2004].

The aims of this study were firstly to evaluate the oral condition and treatment needs of young athletes who participated in Special Olympics European Games (SOEG) Antwerp 2014 and secondly, to determine the predictive capacity of untreated dental caries and gingival signs of disease.

Methods

Oral health data were collected through interviews and oral examinations of athletes participating in the SOEG 2014 event held in Antwerp, Belgium. The athletes were invited to the "Special Olympics Special Smiles" site where they could have their teeth examined on a voluntary basis. Written consent was obtained from the athlete and a parent or guardian. In full accordance of the World Medical Association Declaration of Helsinki, the Joint Ethical Committee of the Ghent University Hospital approved the study as 2013/816.

The procedure consisted of registration of demographic data (age, gender, date of birth and country), oral health screening, and individual education in oral hygiene techniques. Standardised data collection forms were used to record the following information: pain inside the mouth, edentulism, untreated decay, filled or missing teeth, sealants, tooth injury, fluorosis and signs of gingival disease. The standardised examination protocol, developed for SOSS by the U.S. Centers for Disease Control and Prevention (CDC), Division of Oral Health, has been globally accepted and referred to [White and Beltran, 2004].

For evaluation of brushing habits the athlete was asked how often he/she cleaned his/her mouth? The presence of oral pain was evaluated with the question: do you have any pain inside your mouth at present? In addition, the location of pain was also recorded (Tooth pain or other (intra-oral) pain). Untreated decay was scored in both the primary and permanent dentitions (except third molars) when at least one area of cavitation that would accommodate a 0.5 mm-diameter (or larger) bur was detected. Any dental restorative work done exclusively as a response to decay, was coded as 'filled tooth' and 'missing tooth' was recorded if a tooth was not present at the time of the exam (with the exception of premolars and wisdom teeth). Unerupted teeth, were not counted as missing. For scoring the presence of dental signs of trauma, only maxillary and mandibular central and lateral incisors in the permanent dentition were considered. This score was attributed when a tooth was either absent, fractured or discoloured indicating loss of vitality. 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. Small, diffuse, opaque, paper-white areas and/or presence of brown stains and pitting scattered over at least 25% of the buccal surface of maxillary anterior teeth (canine to canine) were considered signs of fluorosis. Free or attached gingival margins or papillae moderately red or showing significant deviations from normal contour or texture on three or more teeth within the same area, were 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 pain complaint, no untreated decay or dental injuries and no signs of gingival disease the athlete was recorded for maintenance follow-up. In case of 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. When there was pain inside the mouth, teeth with possible pulpal involvement, broken or missing fillings with decay or periodontal abscess formation, the participant was referred for urgent treatment. The procedure was concluded with an individual oral health instruction performed considering the athlete's capacity for comprehension and response.

Dentists recruited from university dental schools and dental professional organisations performed data collection. For the oral screening they were previously trained and calibrated according to the Training Manual for Standardized Oral Health Screening [White and Beltran, 2004]. The materials used for intraoral examination were flashlights, non-latex gloves, disposable masks and disposable mirrors. All data collected were entered into an Excel worksheet. For the data cleaning row-wise deletion method was used, when sex, gender or age was missing the complete screening of this person was excluded.

Statistical analysis

Descriptive statistics were performed on SPSS 22 (SPSS Inc., Chicago, IL, USA) software. The first section of analysis included logistic regression analysis for simple and multiple variables using the JMP software version 11.

The second section consisted in Multilevel Generalized Linear Mixed Models (GLMM) (using the binomial distribution with the logit link function) performed in SPSS 22 software. These models include random effects in addition to fixed effects of regression analysis (Mixed Model) and response variables with non-normal distributions (Generalized Model). Explanatory variables for untreated decay and gingival signs of disease were tested taking into account the random effects of the European Region where the athlete belongs as level 1 and individual variability as level 2. The level of significance

for all tests was set at a p-value < 0.05. Table 1 shows the 53 countries of origin of the athletes' sample and the European Region in which they were grouped.

Statistical models

The analysis of the odds of gingival signs of disease and untreated decay were carried out independently in three steps, in order to explore incrementally the effects of gender, age, untreated decay, oral pain and mouth hygiene frequency as independent variables for gingival signs of disease. Whereas the effects of age, gender, gingival signs of disease, mouth hygiene frequency, oral pain and fissure sealants were explored for untreated decay. First, a Model 1 was created; this was the most basic multi-level model and included only the intercept. In Model 2, gender and age were included as fixed (non-random) effects. Model 3 included the other variables as possible predictors. The best fitting model was selected considering the Akaike Correct and Bayesian scores, based on the -2 log pseudo likelihood algorithms. Thereby, models with smaller information criteria values fit better.

Northern Europe	Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Faroe Islands, Sweden, Norway, United Kingdom, Ireland and Isle of Man.
Western Europe	Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Netherlands and Switzerland.
Eastern Europe	Armenia, Azerbaijan, Russia, Ukraine, Belarus, Moldova, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia.
Southern Europe	Andorra, Gibraltar, Portugal, Spain, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Macedonia, Romania, Serbia, Cyprus and Malta.
Eurasia	Turkey, Israel, Kazakhstan, Kyrgyzstan, Georgia, Tajikistan and Turkmenistan

TABLE 1 Countries per European regions.

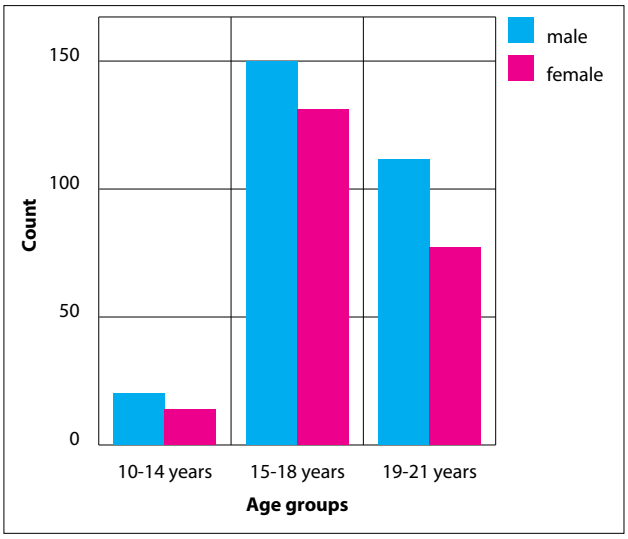


FIG. 1 Gender distribution among different age groups.

Results

Descriptive statistics

A total of 503 athletes with intellectual disability participated to the SOEG Special Smiles program in 2014. The mean age was 17.8 with a SD of 2.16, minimum age of 10 and maximum of 21 years.

Gender distribution showed 222 females (44.1%) and 281 males (55.9%) (Fig. 1). Table 2 presents

Variables		n (n=503)	%
Brushing frequency	Once or more a day	441	87.7
	2 - 6 times a week	39	7.8
	Once a week	0	0
	Less than once a week	11	2.2
	Not sure	11	2.2
	No data	1	2.5
Mouth pain	No	460	90.2
	Tooth pain	29	5.7
	Other pain	8	1.6
	No data	13	2.5
Signs of Gingivitis	No	306	60.8
	Yes	193	38.7
	No data	4	0.8
Untreated decay	No	334	61.3
	Yes	168	33.4
	**anterior decay	39	7.8
	**premolar decay	56	11.1
	**molar decay	149	29.4
	No data	1	0.2
Filled teeth	No	261	51.9
	Yes	240	47.7
	No data	2	0.4
Missing teeth	No	373	74.3
	Yes	127	25.2
	**Missing anterior	17	3.4
	**Missing molar	87	17.3
	No data	3	0.6
Injury	No	445	88.7
	Yes	54	10.7
	**not treated	29	5.7
	No data	3	0.6
Sealants	No	450	89.5
	Yes	50	9.9
	No data	3	0.6
Fluorosis	No	475	94.4
	Yes	27	5.4
	No data	1	0.2
Treatment Urgency	Maintenance	217	43.1
	Non-urgent	214	42.5
	Urgent	71	14.1
	No data	1	0.2

TABLE 2 Demographic characteristics, reported OH habits and clinical findings.

demographical characteristics, reported oral hygiene habits and clinical findings of participants.

Age

Nominal logistic regression was performed with Age as a nominal variable or an ordinal variable (age groups: 10-14; 15-18; 19-21), in both models age was not related to the variables: mouth hygiene frequency, fluorosis, injury, sealants and treatment urgency.

Gender

Gender was tested with a simple model and with a model with 2 terms interactions. From the analyses it was concluded that gender is not related to the variables mouth hygiene frequency, fluorosis, injury, sealants and treatment urgency.

Gingival signs of disease

Nominal Logistic Regression was used to estimate the probability of choosing one of the response levels as a function of gender, age, oral pain, untreated decay and mouth hygiene habits as explanatory variables. The whole model test had a p value of 0.001, therefore we also rejected the null hypothesis that none of the variables were significant. The model showed that untreated decay was the only significant variable, so the simplified Effect Likelihood-ratio Chi-square test (Table 3) with only this variable was run. According to that test, untreated decay was significant to predict gingival signs of disease (p-value 0.0008).

Untreated decay

The Nominal logistic regression with gender, age, oral pain, gingival signs, fissure sealants and mouth hygiene habits as predictor variables had a p value of 0.046 therefore we conclude that at least one of the variables was significant. The parameter estimates showed that only the variable Mouth pain sensation was significant. A simplified Effect Likelihood-ratio Chi-square test (Table 4) confirmed that mouth pain sensation was significant (p-value 0.007) to predict untreated decay.

GLMM for Gingival Signs of disease

The Model 1 was a null model with binomial distribution and log link function with Gingival Signs of disease as target and no predictors. The intercept estimate of -0.948 is a significant indicator of gingival signs in a European region. It states that the intercept can predict the chances of an athlete having gingival signs. The intercept estimate of -0.948 was a significant indicator, able to predict the chances of having signs of gingivitis:

$e^{-.948} = 0.387$

$p_g = 0.387 = 38.7\%$

where p_g is the probability of having gingival signs.

With no predictors in the model the probability of having gingival signs is 38.7% per European region. The variance of the intercept coefficient is 0.019.

The fixed effects added for Model 2 were age groups and gender. This model used binomial distribution and logit link function. Interaction terms were included to detect any interactions among age and sex and gingival signs of disease. As a result, no interaction effects were identified.

Model 3 with binomial distribution and logit link function, was the best statistical model. It was obtained via incremental addition of the independent variables: untreated decay, age groups and mouth hygiene frequency, with a different intercept for each European Region.

The estimated parameter for absence of untreated decay is −0.67 (Table 5), and indicates that holding all other variables constant, within a European Region the odds of having gingival signs are exp(−0.67) =0.51 times the odds of having gingival signs of disease when untreated decay is present. In other words, absence of untreated decay is associated with lower chances of gingival signs. The variance of the intercept coefficient was 0.036.

GLMM for Untreated decay

The Model 1 was a null model with binomial distribution and log link function, with Untreated decay

Level1	/Level2	Odds Ratio	Prob>Chisq	Lower 95%	Upper 95%
Untreated decay	No untreated decay	0.523	0.0008*	0.357	0.764
No untreated decay	Untreated decay	1.912	0.0008*	1.309	2.798

TABLE 3 Odds Ratios for Gingival signs of disease.

Level1	/Level2	Odds Ratio	Prob>Chisq	Lower 95%	Upper 95%
Tooth pain	No pain	0.337	0.005*	0.153	0.718
Other pain	No pain	3.339	0.196	0.586	62.724
Other pain	Tooth pain	9.917	0.015*	1.490	198.238
No pain	Tooth pain	2.969	0.005*	1.392	6.526
No pain	Other pain	0.299	0.196	0.016	1.705
Tooth pain	Other pain	0.101	0.015*	0.005	0.671

TABLE 4 Odds for Untreated decay.

Model Term	Coeflicient	Std.Error	t	Sig.	95% Confidence Interval	
					Lower	Upper
Intercept	0.001	0.667	0.001	.999	-1.309	1.311
Untreated Decay=0	-0.668	0.203	·3.295	**.001**	-1.066	-0.270
Untreated Decay-1	0*					
Age Groups=1	-0.016	0.392	-0.040	.968	-0.786	0.754
Age Groups=2	-0.244	0.202	-1.210	.227	-0.640	0.152
Age Groups=3	0*					
Mouth Hygiene=0	0.125	0.650	0.193	.847	-1.152	1.402
Mouth Hygiene=1	0.055	0.725	0.076	.940	-1.370	1.480
Mouth Hygiene=2	0.383	0.910	0.421	.674	-1.405	2.171
Mouth Hygiene=5	0*					

Probabilily distribution: Binomial
Link function: Logit
*This coefficienl is set to zero because it is redundant.

TABLE 5 Fixed coefficients for gingival signs of disease.

as target and no predictors. The intercept estimate of -1.162 is a significant indicator of gingival signs in a region. It states that the intercept can predict the chances of an athlete having untreated decay. The intercept estimate of -1.162 was a significant indicator, able to predict the chances of having untreated decay:

$e^{-1.162} = 0.312$

$p_u = 0.312 = 31.2\%$

where p_u is the probability of having untreated decay.

With no predictors in the model the probability of having untreated decay is 31.2% per European Region. The variance of the intercept coefficient is 0.179.

The fixed effects for Model 2 were age and sex. This model used binomial distribution and logit link function. Interaction terms were also included to detect any interactions among age groups and sex and untreated decay. No interaction effects were identified, and therefore, these terms were omitted from the analyses.

Model 3 with binomial distribution and logit link function, was the best statistical model. It was obtained by an incremental addition of the independent variables: fissure sealants, mouth pain sensation and mouth hygiene frequency, with a different intercept for each European Region. The estimated parameter for absence of fissure sealants was 0.922 (Table 6), and indicates that holding all other variables constant, within a European Region the odds of having untreated decay are exp(0.922)=2.51 times the odds of having untreated decay when at least a molar is sealed. The variance of the intercept coefficient was 0.346.

Discussion

A convenience sample of 503 screenings was used, recruited on-site during the Special Olympics European Games event. The primary dataset included 511 screenings and 8 data points were deleted with the data cleaning procedure.

The globally used standardised SOSS protocol enables comparisons between the obtained results with all existent and future data of studies performed with the same methodology as the protocol is widely accepted and referred to in the literature [Leroy et al., 2012; Hanke-Herrero et al., 2013; Dellavia et al., 2009; Bissar et al., 2010; Duarte Ferreira et al., 2011; Pezzementi

Model Term	Coeflicient	Std.Error	t	Sig.	95% Confidence Interval	
					Lower	Upper
Intercept	-1.992	1.364	-1.461	.145	-4.672	0.688
Mouth Pain=0	1.129	1.089	1.037	.300	-1.011	3.270
Mouth Pain=1	2.211	1.156	1.913	.056	-0.061	4.482
Mouth Pain=2	0*					
Sealants=0	0.922	0.449	2.054	**.041**	0.040	1.804
Sealants=1	0*					
Mouth Hygiene=0	-0.844	0.690	-1.224	.222	-2.199	0.511
Mouth Hygiene=1	-0.565	0.770	0.734	.463	-2.078	0.948
Mouth Hygiene=2	-0.064	0.963	0.067	.947	-1.957	1.828
Mouth Hygiene=5	0*					

Probabilily distribution: Multinominal
Link function: Generalized Logit
*This coefficienl is set to zero because it is redundant.

TABLE 6 Fixed coefficients for untreated decay.

and Fisher, 2005; Fernandez et al., 2012]. However, the study results cannot be extrapolated for the general population with intellectual disability, because study participants were athletes, who participated in Special Olympics events and were a young, better supported and high-functioning subgroup of this population [Trihandini et al., 2013; Reid et al., 2003].

The most worrying findings were the high prevalence of gingival signs, missing teeth, untreated decay and urgent treatment recommendations in these young people. A 38.7% of the athletes had signs of gingival disease, even though most of them (87.7%) cleaned their mouth once or more a day. This incongruence has several possible explanations: first, oral cleaning frequency was self-reported and could have been influenced by previous knowledge of the ideal brushing frequency. Furthermore, an inadequate technique, due to lack of dexterity in brushing the teeth, could explain the high prevalence of gingival signs as effectiveness in plaque removal, was not measured [Waldman and Perlman, 2012]. Besides the used technique, athletes with Down Syndrome were expected to have higher prevalence of gingivitis, related to a higher level of specific sub-gingival bacterial species and impaired immunologic responses [Owens et al., 2006; Khocht et al., 2010; Sakellari et al., 2005]. The results obtained on gingival signs of disease agree with those from other studies based on data from special Olympics from Germany 2010 (46.9% of athletes between 12- 17 years old), United States 2001 (40.1%), Puerto Rico 2013 (42%), and lower than UK 2005 (63%), New Jersey 1996 (60%), Italy 2009 (60%) and Mexico 2013 (52%) [Reid et al., 2003; Hanke-Herrero et al., 2013; Turner et al., 2008; Dellavia et al., 2009; Bissar et al., 2010].

One third of the young athletes presented with untreated decay, only considering lesions with a diameter of 0.5 mm. The situation looks disturbing considering that the actual prevalence may be higher with radiography support for its detection, in addition to the fact that 25% of these athletes under 21 years old have already lost a tooth. The evidence regarding prevalence of untreated decay shows great variability, with figures between 19% and 79% in several studies that used the same standardised protocol.

The low prevalence of fissure sealants (9.9%) evidences a persistent need for preventive treatment. Similar results were found 20 years ago, in an American review released by the Third National Health and Nutrition Examination Survey (NHANES III) in 1996, even though during the last two decades preventive measures like application of sealants, salt fluoridation or fluoride varnish/gel application have been introduced in most European countries. This American review stated that 18.5% of 12-17 years old children had at least one sealed tooth and this prevalence decrease dramatically to 5% on 18-24 years old young adults [Selwitz et al., 1996].

Subjects with intellectual disability may present some individual features like poor lip closure, slow response to environmental obstacles, oral pathologic reflexes or large over-jet of maxillary incisors. These features are directly related with self-inflicted traumatic injuries [Fernandez et al., 2015; Bhat and Nelson, 1989; Paszynska, 2004] that, in addition to potential dental injuries associated with the sports activities the athletes engage in, may explain a prevalence of dental injury of 10.7% .

A recommendation of urgent treatment was given to 14.5% of the athletes; this finding is in agreement with results obtained in Italy and the U.S. [Reid et al., 2003; Fernandez et al., 2012] and much lower than in the other countries [Hanke-Herrero et al., 2013; Pezzementi and Fisher, 2005]. Furthermore, half of the athletes were in need of non-urgent treatment and in other words the total need of treatment was up to 57% of the screened population.

From the first section of statistical analysis, no gender or age significant relation was found with mouth hygiene frequency, fluorosis, dental injury, sealants and treatment urgency. This could be explained by the uniformity of gender distribution (Fig. 1) and the sample's small age variability as only athletes between 10 and 21 years old were included in the study.

Absence of gingival signs of disease was strongly related with absence of untreated decay. As shown in Table 3, an athlete is 1.9 times more likely to not have gingival signs of disease if he has no untreated decay rather than an athlete with untreated decay. This relation evidences that most of the affected individuals have not only decay or gingival disease, but both oral diseases. On the other hand, mouth-cleaning frequency was not significantly related to the presence of signs of gingival disease, although there is chance of misclassification of the frequency of mouth cleaning because it was a self reported parameter as explained before. Moreover, the question 'How often do you clean your mouth?' was asked rather than, 'How often do you brush your teeth?' because the idea, according to the protocol, is to assess the frequency of oral hygiene effort without consideration given to the specific devices used or the effectiveness of the technique [White and Beltran, 2004]. Correspondingly, the first analysis of explanatory variables for untreated decay found mouth pain, and more specifically tooth pain, as the only variable significantly related to untreated decay. As follows, an athlete is 2.9 times more likely to not have untreated decay if he has no mouth pain rather tooth pain.

As far as the dataset is concerned a correlation between subjects from the same European Regions is expected due to national health care systems and insurance possibilities. In the GLMM it was possible to perform hierarchical designs by adding 'European region' (Fig. 2, 3) as a cluster variable with expected correlations with the other variables and the model estimates its random effect, as well as the random effect of the individual variability of the athletes. For

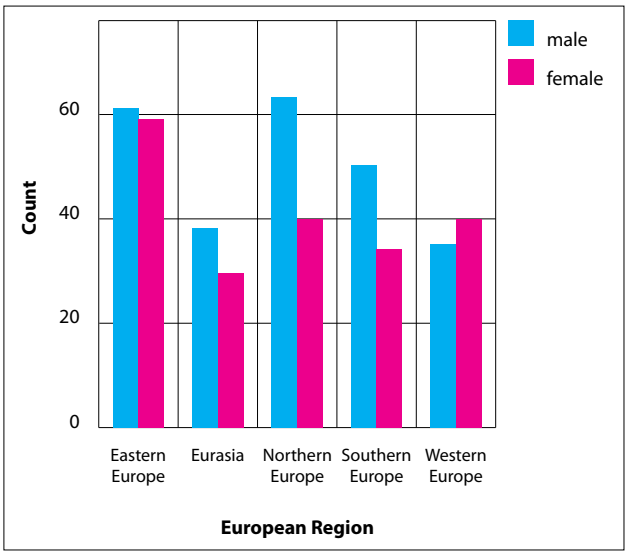


FIG. 2 Athlete's distribution per European Region.

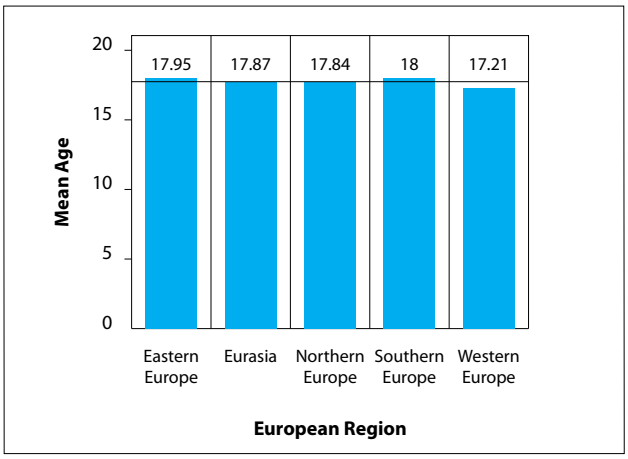


FIG. 3 Mean age of athletes from different European Regions.

binomial data, ignoring the clustered nature of the data leads to biased parameters estimates of fixed effects. Unobserved heterogeneity at the cluster level becomes a confounder that is omitted because it cannot be measured Therefore, differences between clusters are considered in terms of the random or unobserved cluster-specific effects [Casals et al., 2014; Skondral and Rabe-Hesketh., 2003].

From the GLMM analysis a considerable variation in the presence of gingival signs of disease and untreated decay that could not be explained by variables was assessed. This was expected because both are multifactorial diseases and many other involved factors (i.e. diet, smoking habits, socioeconomic status) that were not included in the screening and consequently not controlled in the model.

The general probability of having gingival signs was not affected by European region variability but most of the variance occurred at individual level. Most of the variance in presence of untreated decay occurred at the individual level and only 2% occurred at European region level. The low variability may be explained by a similarity of the barriers faced by an intellectually disabled population in accessing oral care. Nevertheless, European health managers must consider regional variables in health policies planning, in order to seek equity and reduce social inequalities. Particularly, the findings from this study identified that European Regions are an important focus for interventions to promote preventive measures in oral health such as fissure sealants, in addition to the current focus of interventions directed primarily at country and individual level factors.

Conclusions

The consistency of the results supports the persistent need of oral treatment among half of the young intellectually disabled athletes, even though the sample is not representative of the whole population with intellectual disabilities. The predictive capacity of the studied variables for oral disease was limited and further studies including other related factors are needed.

Decay and gingival disease are preventable diseases, especially on this young population. Therefore, promotion of health and education on oral hygiene techniques are needed, as well as preventive and restorative care in Europe and Eurasia.

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Conflicts of Interest

Authors report no conflicts of interest.

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