



# Oral health and oral health behaviour of adolescents with mild or borderline intellectual disabilities compared with a national representative sample of 17-year-olds in the Netherlands

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## Abstract

**Background:** People with intellectual disabilities have worse health outcomes compared to their peers without. However, regarding oral health parameters, recent systematic reviews reported conflicting evidence. The aim was to assess whether adolescents with MBID differ from their peers in oral health and oral health behaviour.

**Methods:** Ninety seven adolescents with MBID participated in this comparative study. Outcomes were compared to data of 17-year-old Dutch adolescents ( $n = 581$ ) from a national epidemiological study on oral health and oral health behaviour.

**Results:** Adolescents with MBID showed worse oral health outcomes and poorer oral hygiene than their peers from the general population. Furthermore, they visit the dentist less regularly, brush less frequently, eat main-dishes less frequently and have higher levels of dental anxiety.

**Conclusion:** Adolescents with MBID have poorer oral health and show worse oral health-promoting behaviours than their peers in the general population. Targeted interventions to reach this vulnerable group are necessary.

## KEYWORDS

adolescents, mild or borderline intellectual disabilities, oral health

## 1 | INTRODUCTION

Differences in health outcomes between people with intellectual disabilities and their peers without intellectual disabilities have been reported quite frequently (Allerton et al., 2011; Elliot et al., 2003; Jansen et al., 2004). Reasons that are suggested for these health inequalities are the fact that people with ID suffer from additional comorbidity (Jansen et al., 2004) as well as the fact that they are more prone to receive less optimal health care by healthcare professionals (Allerton et al., 2011). Like for general health, less favourable oral health outcomes are reported although conflicting evidence also

has been published. (Anders & Davis, 2010; Zhou et al., 2017). A recent systematic review concluded that there was no evidence of a difference in caries levels between people with and without intellectual disability. Also learning disability subgroup analysis revealed no difference, except for people with Down syndrome, where dental caries levels in permanent teeth were lower (Robertson et al., 2019). It should be noted that the group of people with intellectual disabilities hides a huge variation of different kinds of problems (behavioural and health related). Higher caries rates are reported for people with mild ID compared to their peers with severe ID, while highest scores are reported in people with moderate ID (Costa

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et al., 2016). To our knowledge, no further data on oral health and oral health behaviour of the specific subgroup of adolescents and young adults with mild or borderline intellectual disabilities (MBID: an umbrella term for people with mild intellectual disability [MID: IQ 50-70] or borderline intellectual functioning [BIF: IQ 70-85]) are available. Although 'MBID' is not recognized as a variation of people with intellectual disabilities in DSM-V, it is increasingly recognized that people with IQ-values of 50-85 and problems in social adaptability are dependent on disability services to get the individualized support they need. In the Netherlands—as in other countries—the tendency emerges to allocate professional support on the basis of support needs rather than on IQ-scores alone. Having their own household and autonomy, individuals with mild or borderline intellectual disabilities reported to have more severe personal problems and live in a more problematic environment than people with mild ID (Nouwens et al., 2017; Wieland & Zitman, 2016-1; Salvador-Carulle et al., 2013) and can be considered even more vulnerable for not adhering to healthy behaviour.

Oral health is an important factor for general well-being. The two highest prevalent oral diseases, caries (tooth decay) and periodontitis (gum disease), can cause pain, infection, bad aesthetics and bad breath. These consequences may lead to pain and discomfort but also may affect people's appearance and can be considered as risk factors for social exclusion and lower self-esteem. People with MBID are known to be more exposed to several known social determinants of poorer (oral) health like having limited income and resources, living in deprived neighbourhoods more frequently and having reduced community and social participation (Nouwens, et al., 2017-1). This may imply that, compared to their peers without intellectual disability, their oral health is more at risk as well, encountering manifestations of oral diseases more frequently.

Caries and periodontitis are among the most prevalent diseases worldwide, despite the fact that they can be largely prevented by adapting to a relatively simple but strict oral hygiene regime of brushing the teeth using fluoridated tooth paste twice a day and limiting the daily intake of consumptions containing fermentable carbohydrates (like sugars). Furthermore, visits to an oral health professional on a regular basis are recommended from the eruption of the first tooth (Peres et al., 2019). All children depend on their parents or caregivers for adhering to these components of oral health-promoting behaviour. During childhood and adolescence, people are considered to develop the needed skills and abilities to brush their own teeth and to learn to adapt to other healthy behaviours in adulthood. In this transition to adulthood, people become more and more autonomous and take responsibility for their own oral health. For young people with mild or borderline intellectual disabilities, this transition to adulthood can be specifically difficult as by definition they have more problems with autonomy and taking responsibility for their own health (Nouwens et al., 2017-2). Moreover, it may be more difficult for them to perform a complex sequential task as effective tooth-brushing and to oversee the consequences if they refrain from doing so. Consequently, they may be considered more at risk for poor oral health outcomes than their peers in the general population. Since no specific data on oral health outcomes and oral health behaviour of

adolescents with mild or borderline intellectual disabilities are available, a sub-survey of a national epidemiological survey on this matter (Schuller et al., 2018) has been performed. The aim of this study was to assess whether Dutch adolescents (16-18 years) with mild or borderline intellectual disabilities differ from their peers in the general population in oral health and oral health behaviour.

## 2 | METHODS

### 2.1 | Ethical approval

This study was judged by the Central Committee on Research Involving Human Subjects (CCMO) not to fall under the provisions of the Medical Research Involving Human Subjects Act. It was furthermore decided that the study met all requirements of the Personal Data Protection Act (Approval No. m1556571).

### 2.2 | Power calculation

It was calculated that a minimum of 90 participants with mild or borderline intellectual disabilities was necessary to be able to detect a clinically relevant difference in caries experience of 40% DMFS or more with the 17-year-olds from the general population with an alpha of 0.05 and a power of 80%.

### 2.3 | Recruitment

#### 2.3.1 | National epidemiologic survey

The national survey was conducted in four geographically spread medium-sized cities in the Netherlands (Alphen aan den Rijn, Gouda, 's-Hertogenbosch and Breda). A stratified sample of 3412 17-year-olds was drawn from the databases of all health insurance companies in the Netherlands. It was calculated that a minimum of 525 participants should be included to detect a clinically relevant difference of 25% in mean caries experience from earlier estimates (2011) at an alpha of 0.05 and a beta of 0.80. Inclusion was ceased when the required number of participants was reached. The adolescents were recruited by means of an information letter and an informed consent form. A total 562 17-year-olds participated in the clinical examination and filled out the questionnaire. 171 Individuals refused to participate but were willing to fill out a non-response questionnaire. Reasons for non-participation were in 84% of the cases that they were 'not interested' or 'lack of time'.

#### 2.3.2 | Sub-survey of people with mild or borderline intellectual disabilities

Participants were recruited from two schools for special education and one sheltered living accommodation for people with intellectual disabilities, in geographically spread areas of the Netherlands

(Ermelo, Zwolle, Monster). Eligibility criteria were (a) mild or borderline intellectual disability confirmed by school of institute and (b) aged 16-18 years old. Eligibility concerning age and level of intellectual disability was determined by the school or institution. Eligible individuals were informed by their teacher or care giver about the aim of the study and what would be expected from them if they decided to participate. Informed consent was given prior to the oral examination. Of the total of 141 eligible people, a total of 97 participants were included in this sub-study. Provided reasons for non-participation were 'afraid for the dentist' ( $n = 22$ ), 'not interested' ( $n = 21$ ). One eligible participant had severe behavioural problems on the day of the clinical assessment and therefore did not show up.

Although the two subgroups of adolescents with mild or borderline intellectual disabilities (those living at home with one or both parents and those living institutionalized or in sheltered living) may be too small ( $n = 97$ ) to allow proper statistical analyses, we considered it interesting enough to explore for possible differences in oral health outcomes between these two groups.

## 2.4 | Data collection

All participants were invited for a dental check-up in a mobile research facility, temporarily located on the premises of their school or for the national survey in their city of residence. Participants filled out a questionnaire and underwent a clinical examination.

## 2.5 | Questionnaire

The questionnaire comprised questions about sociodemographic status, living conditions (institutionalized, non-institutionalized (stratified in self-autonomous / at home with their parents), quality of life, oral health behaviour, dietary behaviour and dental anxiety.

Generic health-related quality of life was measured using the adapted version of the Dutch Child Health Utility 9-Dimensions (CHU9D-NL) (Rogers et al., 2019) and corresponding value set (Rowen et al., 2018). Dental anxiety was scored using the Dental Anxiety Scale (Corah, 1969).

When participants were not (fully) able to read or understand the text in the questionnaire, a trained interviewer was able to help them doing so.

## 2.6 | Clinical measurement

The oral examination consisted of a registration of dental plaque, caries experience, periodontal health and dental erosion. The oral examination was conducted with halogen light, compressed air, a dental mirror, a blunt probe and a periodontal probe.

Caries experience was defined as having caries lesions into dentin and/or any subsequent treatment (i.e. restoration or extraction).

To estimate the level of caries experience, the total score of the decayed (D), missing (M) and filled (F) surfaces of permanent teeth (DMFS index) was used. Caries-free dentitions were defined as DMFS = 0. In addition to the DMF-index, the International Caries Detection and Assessment System (ICDAS) score was used for lesions that were restricted to the enamel (Ismail et al., 2007).

Level of oral hygiene was measured using the simplified oral hygiene index (Greene & Vermillion, 1964), periodontal treatment need was measured by the Dutch Periodontal Screenings Index (DPSI: van der Velden, 2009), and tooth wear was measured by the Dutch Tooth Wear Screenings Index (DTWSI: Wetselaar et al., 2009).

For the national study, examinations were performed by six calibrated dentists. Three of them conducted the examinations in the population of people with mild or borderline intellectual disabilities. To assess the quality of the clinical examinations, inter-examiner agreement on caries experience was calculated for 125 participants. Intraclass correlations between the examiners and mean outcomes of each examiner were calculated. The intraclass correlation coefficients were for DS (decayed surfaces) 0.93, for FS (filled surfaces) 0.96 and for DMFS (decayed, missing and filled surfaces) 0.95. Differences between the two examiners in mean caries experience were clinically negligible (i.e. at 0.1 DMFS).

## 2.7 | Data analysis

Non-parametric data were analysed using chi-square tests, Mann-Whitney U tests and Kruskal-Wallis tests. Independent samples t tests were performed to analyse parametric data.

All analyses were performed using SPSS (Version 25.0. Armonk, NY: IBM Corp.).

## 3 | RESULTS

A total of 72 participants of the group of people with mild or borderline intellectual disabilities indicated they needed assistance filling out the questionnaire in one or another way (74%). In the national study, 10 participants indicated they needed assistance filling out the questionnaire in one or another way (<2%).

Descriptive statistics of both samples are presented in Table 1. Compared to their peers from the general population, participants with mild or borderline intellectual disabilities were slightly older (mean difference of 0.2 years) and were more often male and from a non-indigenous Dutch background. More than half of them indicated to live institutionalized or in shelter on their own, while 99% of their peers lived with one or both of their parents. Furthermore, more than 70% of the group of people with mild or borderline intellectual disabilities had no work or after school job and almost 50% was not following any education, in the national sample, this was 29% and 9% respectively. The adolescents with mild or borderline intellectual disabilities reported to smoke more often and to have higher levels of dental anxiety than their peers without mild or borderline

**TABLE 1** Descriptives of study samples and differences between adolescents with mild or borderline intellectual disabilities and the general population

	Mild or borderline intellectual disabilities N = 97		General population N = 562		t	p
Age (Mean, SD)	17.26 (0.82)		17.01 (0.29)		3.49	<.01
	N	%	N	%	$\chi^2$	p
<b>Sex</b>						
Male	63	65	236	42	18.6	<.001
Female	34	35	326	58		
<b>Ethnicity</b>						
Indigenous Dutch	85	88	523	93	51.3	<.001
Other	12	12	39	7		
					Z	p
<b>Currently following education</b>						
Yes	53	52	511	91	9.88	<.001
No	46	48	51	9		
<b>Living situation</b>						
At parents' house	39	40	558	>99	18.00	<.001
Resident in institution	54	56	2	<1		
On my own	4	4	2	<1		
<b>Paid work / after school job</b>						
No	71	73	163	29	8.45	<.001
<8 h/week	9	9	236	42		
9-24 h/week	14	14	146	26		
25 h or more	4	4	17	3		
<b>Smoking</b>						
Every day	20	21	23	4	8.32	<.001
Sometimes	21	22	39	7		
Never	56	57	500	89		
<b>Dental anxiety</b>						
Not afraid	64	67	432	77	2.61	<.01
A little afraid	18	18	107	19		
Quite afraid	11	11	17	3		
Very afraid	4	4	6	1		
<b>Self-reported oral health</b>						
Inadequate (1-5)	8	8	6	1	1.63	<.05
Adequate (6-7)	31	32	62	11		
More than adequate (8-10)	60	60	494	88		
					t	p
Utility (0-1) (Mean, SD)	0.89 (0.18)		0.88 (0.13)		0.59	.56

Note: Z: score of Mann-Whitney Test.

intellectual disabilities. No difference in generic health-related utility between the two groups was found.

Table 2 shows data on oral health-related behaviour. No differences in self-reported brushing frequency were found between the groups. 79% of the adolescents with mild or borderline intellectual

disabilities versus 88% of their peers from the general population reported to eat main meals (almost) every day. Although the number of between-meal snacks per day did not differ between the groups, the time of day for eating snacks did: adolescents with mild or borderline intellectual disabilities indicated to snack more at night and

TABLE 2 Oral health behaviour

	Mild or borderline intellectual disabilities n = 97	General population n = 562	Z	p
Brushing frequency %				
Not every day	4	4	1.73	.08
Once a day	22	21		
Twice a day or more	75	76		
Interdental cleaning %				
Never	53	42	1.86	.06
A few times a month	21	33		
A few times a week	20	19		
Every day	6	6		
Dental visits %				
Twice a year	44	83	8.35	<.001
Once a year	33	11		
Less than once a year	8	4		
I don't now	13	2		
Never	3	<1		
Eating regular meals %				
Every day	75	74	4.64	<.001
Almost every day	4	14		
2-4 times a week	9	8		
1-3 times a week	7	3		
Never	5	1		
Between-meal snacks daily				
	Mean (sd)	Mean (sd)	Z	p
Morning	0.65 (0.93)	0.63 (0.76)	0.45	.66
Afternoon	1.09 (0.91)	1.74 (1.12)	1.92	.05
Evening	1.33 (1.34)	1.36 (1.03)	0.83	.41
Night	1.21 (3.08)	0.17 (0.53)	5.88	<.001
Total	4.29 (7.49)	3.89 (2.38)	1.74	.08

Note: Z: score of Mann-Whitney Test.

their peers without mild or borderline intellectual disabilities more in the afternoon. Adolescents with mild or borderline intellectual disabilities reported to visit the dentist less frequently than their peers from the general population.

Differences in clinical outcomes are presented in Table 3. The main indicator of the level of oral hygiene (OHI-s) was statistically significantly poorer in the group of people with mild or borderline intellectual disabilities ( $p < .001$ ), meaning that a larger part of the tooth surfaces was covered with dental plaque. Caries experience was higher among adolescents with mild or borderline intellectual disabilities with more tooth surfaces decayed, filled or extracted than their peers, being statistically significant for extracted teeth ( $p = .05$ ) and for the total sum score of DMFS ( $p = .03$ ). Adolescents with mild or borderline intellectual disabilities also had slightly more microcavitated caries (i.e. possibly future cavities) in the enamel (ICDAS 3:  $p < .001$ ).

No statistically significant differences between the two groups were found for periodontal health. Considering the differences in

tooth wear, a statistically significant difference was found between the two groups. However, this was mainly due to the fact that two individuals with mild or borderline intellectual functioning were diagnosed with tooth wear with loss of height. Without these two cases, no statistical significant difference remained.

Because the two groups had a different composition considering sex and smoking, a multiple linear regression analysis was performed to control for these factors. When mean DMFS was predicted, it was found that only belonging to the MBID group was a significant predictor (Beta  $-.148$ ,  $p < .001$ ). Sex (beta  $.066$ ,  $p .09$ ) and smoking (beta  $.036$ ,  $p .36$ ) were not significant predictors. The overall model fit was  $R^2 = .023$ .

Table 4 presents outcomes of the sub-analyses between the subgroups of adolescents with mild or borderline intellectual disabilities living at home and those living institutionalized / sheltered. Despite the modesty of the groups ( $n = 47$  living with one or both of the parents and  $n = 50$  institutionalized or in shelter),

TABLE 3 Oral health outcomes

	Mild or borderline intellectual disabilities n = 97	General population n = 562	t	p
Oral hygiene				
OHI-s (0-3)	1.28 (1.11)	0.69 (1.08)	4.83	<.001
Caries experience into dentin				
Decayed surfaces (DS)	1.38 (2.43)	1.06 (1.74)	1.27	.21
Extracted surfaces (MS)	0.35 (1.35)	0.07 (0.64)	1.98	.05
Filled surfaces (FS)	2.71 (4.69)	1.81 (3.45)	1.81	.07
Decayed, Missing and Filled surfaces (DMFS)	4.44 (6.28)	2.94 (4.22)	2.28	.03
Caries experience into enamel				
ICDAS 2 (enamel surfaces decalcificated)	5.98 (5.80)	6.70 (6.18)	1.13	.26
ICDAS 3 (enamel surfaces microcavitated)	1.61 (1.87)	0.76 (1.27)	4.30	<.001
	%	%	$\chi^2$	p
Periodontal health				
Healthy	6	4	2.53	.64
Bleeding on probing	50	57		
Bleeding and calculus	37	32		
Bleeding and pocket depth 3-5 mm	7	7		
Tooth wear				
No visible signs / wear in enamel	69	63	13.5	.001
Wear into dentin	29	37		
Wear into dentin with loss of height	2	0		

Abbreviations: ICDAS, International Caries Detection and Assessment System; OHI-s, Simplified oral hygiene index (0-3).

statistically significant differences were found for the number of microcavitated caries lesions in enamel ( $p = .05$ ), smoking habits ( $p < .001$ ) and health-related quality of life ( $p < .001$ ); all with less favourable outcomes for institutionalized / in shelter living adolescents.

Because the two different groups have a different composition considering sex and smoking (possible predicting factor for oral health-related diseases), a multiple linear regression analysis was performed to control for these factors. When mean DMFS was predicted, it was found that only having MBID was a significant predictor (Beta  $-.148$ ,  $p < .001$ ).

## 4 | DISCUSSION

As far as we are aware of, this is the first study to compare oral health and oral health-related behaviour of adolescents with mild or borderline intellectual disabilities with adolescents of a national representative sample. Our results suggest that adolescents with mild or borderline intellectual disabilities in the Netherlands have a poorer oral health, higher levels of dental anxiety and show less favourable oral health-promoting behaviour than their peers in the general population. Adolescents with mild or borderline intellectual disabilities who lived institutionalized or sheltered had worse outcomes concerning smoking habits, their quality of life and more

microcavities in their teeth compared to those who lived at home with their parents.

Interpreting the results, one should take into account the following issues: firstly, this study did not compare oral health outcomes of adolescents with mild or borderline intellectual disabilities and those without mild or borderline intellectual disabilities, but with a reference population of the general public, including also individuals with MBID. It was impossible to sample a representative sample of the population without MBID since MBID is often not diagnosed. The most recent figures on prevalences of mild or borderline intellectual disability in the Netherlands showed a rough estimation of 0.44% of the population diagnosed with mild intellectual disability (IQ 50-70) and 13.17% with borderline intellectual functioning (IQ: 70-85) Woittiez et al., 2014). Since this is a fair share of the population, differences in oral health and oral health behaviour may have shown larger differences between the groups with and without mild or borderline intellectual disabilities than it did in the current study.

Secondly, the recruitment procedure of the two groups has been executed not in exactly the same way. While the recruitment of the national epidemiologic study could follow all requirements for proper stratification of the eligible participants, adolescents with mild or borderline intellectual disabilities were recruited in participating schools for people with mild or borderline intellectual disabilities and can best be considered a convenience sample.

**TABLE 4** Oral health and oral health behaviour of people with mild or borderline intellectual disabilities by living situation

	Living with parents (n = 47)	Living institutionalized or in shelter (n = 50)	t	p
<b>Oral hygiene</b>				
OHI-s (0-3)	1.26 (0.91)	1.35 (1.35)	0.65	.52
<b>Caries experience into dentin</b>				
Decayed surfaces (DS)	0.98 (2.16)	1.82 (2.65)	1.85	.07
Extracted surfaces (MS)	0.21 (1.12)	0.49 (1.57)	1.08	.29
Filled surfaces (FS)	2.40 (5.20)	3.02 (4.41)	0.58	.57
Decayed, Missing and Filled surfaces (DMFS)	3.60 (6.57)	5.33 (6.17)	1.36	.18
<b>Caries experience into enamel</b>				
ICDAS 2 (surfaces decalcificated)	6.24 (6.53)	6.08 (5.21)	0.71	.94
ICDAS 3 (surfaces microcavitated)	1.24 (1.68)	2.00 (2.00)	2.07	<.05
	%	%	Z	p
<b>Smoking</b>				
Never	83	36	4.73	<.001
Sometimes	7	34		
Every day	10	30		
<b>Dental visits</b>				
Twice a year	45	43	0.01	.99
Once a year	45	25		
Less than once a year	3	11		
I don't now	7	17		
Never	0	4		
<b>Brushing frequency</b>				
Not every day	6	6	0.60	.56
Once a day	24	21		
Twice a day or more	71	73		
<b>Utility</b>				
	Mean (SD)	Mean (SD)	t	p
CHU-9D-NL	0.96 (0.12)	0.83 (0.21)	5.62	<.001

Abbreviations: CHU-9D-NL, Dutch version of Child Health Utility 9 Dimensions; ICDAS, International Caries Detection and Assessment System; OHI-s, Simplified oral hygiene index (0-3).

Nevertheless, all participants were properly diagnosed on the basis of their IQ. Besides that, both the clinical and non-clinical part of the survey in adolescents with mild or borderline intellectual disabilities was conducted under exactly the same conditions as in the national study.

Adolescents with mild or borderline intellectual disabilities had a higher caries experience. Not only did they have more untreated cavitated, extracted and filled tooth surfaces (DMFS) reflecting more irreversible damage to their dentition than their peers in the general population, they also showed higher scores on microcavitated carious lesions. These lesions are likely to progress into lesions into dentin without a proper level of oral hygiene or tooth-friendly diet. These findings are in line with other lifestyle diseases described by Allerton et al. (2011). Although no differences were found in

periodontal health nor in levels of tooth wear, it is important to keep a close watch at these variables in older age groups. One should be aware that this may be explained by the fact that these conditions usually are reflected later on in life. The fact that adolescents with mild or borderline intellectual disabilities had higher levels of dental anxiety was in line with the higher prevalence of other type of anxieties and depression levels that were found in adolescents with mild intellectual disability (Klein et al., 2018).

One of the main factors that is responsible for caries development is the presence of dental plaque, containing micro-organisms that transform fermentable carbohydrates (like sugars) to acidic products that can dissolve tooth enamel and dentin, and therefore causing tooth decay. Although no difference in self-reported oral health behaviour was found compared to results from the national

representative sample of adolescents, clinical measurements showed the opposite. This may be explained by the fact that it can be regarded common knowledge to brush one's teeth twice a day and people with mild or borderline intellectual disabilities may have reported socially desired answers more often. Besides this, poorer motor skills may also play a role. It is known that adequate plaque removal by toothbrushing is a complex task for a large part of the population, requiring regular evaluation, instruction and supervision by dental professionals. Possibly, in spite of twice daily toothbrushing, the manual dexterity of adolescents with mild or borderline intellectual disabilities might hinder efficient plaque removal. This assumption is supported by findings of Vuijk et al. (2010) who reported a poorer motor performance and more specifically deficiencies in manual dexterity in children with borderline and mild intellectual disability. They highlighted the importance of improving motor skill performance in children with mild or borderline intellectual disabilities, an advice that may be embraced by dental professionals giving toothbrushing instructions.

Concerning dietary habits, adolescents with mild or borderline intellectual disabilities reported to eat breakfast, lunch and dinner on a less regular basis than the reference population. This may be an indication that their daily routine may be less structured as well. Although the total number of between-meal snacks did not differ statistically significantly, the time of the day did. The 17-year-olds in the national sample were found to eat more between-meal snack in the afternoon, while people with mild or borderline intellectual disabilities reported to snack more during night-time, what could be an indication of a less regular daily pattern as well. In addition, one should be aware that night-time snacking is considered even more an unfavourable habit than snacking during the day because since the production of saliva in night-time is less than in daytime. Saliva is important for neutralizing the acids produced by the micro-organisms from transform fermentable carbohydrates.

As an aside, data of the group of adolescents with mild or borderline intellectual disabilities were subjected to further analysis between adolescents living at home together with their parents and those who live in the shelter of an institution. Despite the modesty of the samples, it appeared that the latter have worse outcomes concerning smoking habits, and their health-related quality of life was found to be statistically significantly lower than their peers living at home with their parents. Of course, this is no surprise because the reason for them living institutionalized or in shelter is not seldomly because of psychological comorbidity which has a considerable impact on their generic quality of life as well. Having these problems may cause putting their oral health on lower priority.

In conclusion, it is hard for health professionals (including dentists and dental hygienists) to recognize mild and borderline intellectual disabilities in their patients when still officially undiagnosed. Like stated by Tiller et al. (2001), a growing awareness of health professionals for the existence of this group is needed. Since this vulnerable and often neglected group of young individuals with MBID

showed less favourable outcomes than the reference population, more attention for their status and their oral health is required.

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## DATA AVAILABILITY STATEMENT

Schuller, dr. A.A. (TNO); Vermaire, dr. J.H. (TNO) (2020): Mondgezondheid Nederland. Data available at: DANS.<https://doi.org/10.17026/dans-zz5-mffx>.

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