ORIGINAL ARTICLE

Oral Health Needs and Barriers to Care in Children with Learning Difficulties

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ABSTRACT

Introduction: Children with learning difficulties (LD) have poorer oral health compared to those without LD due to barriers in maintaining oral care. However, the scarcity of data for this population in Malaysia has left a huge gap in understanding their problems and how to overcome those barriers. Therefore, this study was conducted to evaluate the unmet dental needs and barriers to care perceived by the guardians of children with learning difficulties (CWLD) attending the Special Education Integrated Programmes of a mainstream primary school, in comparison to children without learning difficulties. **Methods:** This cross-sectional study surveyed the guardians of CWLD (case) and those without LD (control), aged 6-12 years old. A total of 225 questionnaires were distributed to the guardians with a response rate of 40.4% (N=91). Unmet dental needs and barriers in both groups were analysed using the chi-square test. Barriers with significant Chi-square results were further tested with logistic regression to investigate possible confounders. **Results:** Unmet dental needs of 23.1% of CWLD were found. Most of the guardians agreed that regular dental check-ups were the most needed dental treatment (27.1%) compared to other treatments. The child's behaviour and the unwillingness of the dentists to treat were among the significant barriers to dental care within the CWLD group. **Conclusion:** Despite regular dental visits, guardians of CWLD perceived that their children had the most unmet dental needs compared to other children without LD, with significant barriers in terms of accessing professional dental services.
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INTRODUCTION

Persons with disabilities (PWD) are those with either physical, psychiatric, intellectual, or sensory impairments that persist for a long duration in their lifetime. These impairments complicate their participation in the community because of discrimination and challenges posed by society (1). This study focuses on children with learning difficulties (CWLD) which may include those with Late Global Development, Down syndrome, autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), or specific learning difficulties such as dyslexia (difficulties in fluent word recognition, and poor spelling abilities), dyscalculia (difficulties in making sense of numbers), and dysgraphia (difficulty in writing or forming legible letters) (2). These children present with some learning issues and a lower intelligence level than other children of the same age (3).

Guardians of CWLD may enroll their children into special schools to provide an optimum learning environment. In Malaysia, there are about 2,000 primary and secondary schools offering Special Education Integrated Programmes (SEIP) (4). SEIP offers specific classes within mainstream schools for CWLD, which are tailored to each students' learning needs. The number of CWLD in SEIP is increasing, in which the enrolment of CWLD in SEIP increased almost three-fold from 27,096 students in 2012 to 69,628 students in 2019 (4).

In terms of oral health status among these children, higher mean of the decayed, missing, and filled teeth (DMFT) scores and high untreated caries, and periodontal diseases were reported, compared to children without

disabilities (5-10). Individuals with disabilities faced difficulties during dental treatment, whilst their oral health problems were mostly left untreated (10-11). The barriers to care and unmet dental needs of CWLD in Malaysia have not been well-studied. Most of the published local studies were more focused on caries prevalence and on the specific types of disabilities without addressing the dental needs of CWLD (12-15). This signifies the importance of addressing these children's oral health needs and remove barriers to achieve good oral health. This study aimed to evaluate parents' perceived unmet treatment needs and barriers in dental care for CWLD compared to children without LD. The results of this study should provide essential information for service providers and policymakers to establish a support mechanism for CWLD.

MATERIALS AND METHODS

This study has followed the principles of the Declaration of Helsinki and standard of good clinical practice. Ethical approval from the Medical Ethics Committee, Faculty of Dentistry, Universiti Malaya was obtained prior to the commencement of this study (DF DP1804/0053(U)). Permission to conduct the study at a public school was also obtained from the Department for Special Education, Ministry of Education, Malaysia, and the school authority.

Study design

The study was performed using a purposive non-probability sampling method in a mainstream primary school with SEIP in Kuala Lumpur during the "Oral Health Promotion Campaign" for school children. A total of 225 Malaysian parents/guardians of CWLD and without LD between the ages of six to twelve years-old were included. Those who refused to participate, returned empty questionnaires, and non-citizen school children were excluded from this study. In this cross-sectional study, a total of 105 sets of questionnaires were distributed to the parents/guardians of CWLD (case group) and 120 sets of questionnaires to those without CWLD (control group).

All ethical requirements involving human studies were followed. Participation in this study was on a voluntary basis, and all data were kept anonymous. All respondents were given a participant information sheet explaining the details of this study and signed the consent form prior to their participation. Respondents were asked to complete and return an enclosed survey to school teachers within a two-week period following distribution.

Questionnaire

The questionnaire that was adapted from Lai et. al. (2012) had been modified based on the feedback from the pre-tested questionnaires of ten parents/guardians for children aged 6 to 12 years-old attending dental treatment at the Faculty of Dentistry, Universiti Malaya, and was translated into the Malay language (16). The modified content was agreed on and validated by three dental specialists from paediatric dentistry, prosthodontics, and general dentistry for the use of this study.

The questionnaire was structured into two main sections. The first section was the socio- demographic data of the child which includes date of birth, age, gender, ethnicity, and type of disability. The details of the child's primary guardian (adult responsible for coordinating the dental care of the child based on self-report, defined as a parent, grandparent, aunt, uncle, or guardian) such as age, relationship with patient, level of education, income, and working time of the primary guardian were also obtained.

The second section served to investigate unmet dental needs through multiple choice close-ended questions including; "what kind of treatment do you think your child needs", "why do you feel your child does not need any dental treatment", "during the past 12 months, was there a time when your child needed dental care but could not get it at that time?", "how long has it been since your child last visited a dentist?" and "how often does your child visit the dentist?". The subsequent questions pertaining to possible barriers that children might face in seeking dental treatment were grouped into four main categories, namely child factor (five-item), parental factor (four-item), environmental factor (four-item), and service provider factor (four-item). Each item was scored on a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'.

Statistical analysis

The IBM SPSS Statistics for Windows, version 20 [IBM Corp., Armonk, N.Y., USA] software package was used for data tabulation and data analysis. Pearson chi-square test was used to determine the presence of an association between CWLD vs dependent variables (perceived barriers and unmet dental needs). The Mantel-Haenszel common odds ratio estimate was used to obtain the crude odds ratio in this study. Any significant association between CWLD and barriers as determined by the chi-square test previously would then warrant a multivariate logistic regression to be carried out. The adjusted odds ratio was obtained after adjustment with possible confounding factors using multiple logistic regression analysis with a significant value set (p) at $p<0.05$.

The presence of association between the following findings; (i) CWLD and unmet dental needs with p-value set at 0.05, and (ii) CWLD and barriers to care with p-value set at 0.1 was determined by using the chi-square test. This was to avoid overlooking any potential confounders or effect modifiers.

RESULTS

A total of 91 guardians from 225 identified potential respondents submitted their completed questionnaires, leading to a response rate of 40.4%. The number of respondents from the case group guardians (guardians of CWLD) was N=41, and N=50 (guardians without CWLD) for the control group. Table I summarises the socio-demographic profile of the CWLD, their counterparts, and parents/guardians of the children. Dyslexia (27.5%) was identified as the most common type of learning difficulty, followed by Down syndrome (20.0%) and ASD (17.5%).

Perceived unmet dental needs

Table II summarises the distribution of children with perceived unmet dental needs. Most of the guardians for CWLD indicated that their child needed dental treatment. In both case and control groups, the highest reported dental treatment needs were regular dental check-ups, followed by scaling and tooth extraction. For the item 'last dental visit', more than 50% of the children in both groups were taken to the dentist within the last six months to one year by their parents/guardians. A high percentage of children from both groups obtained dental treatment in school, with more than 40% seeking dental treatment elsewhere either at government or private facilities. Unmet dental needs for the past 12 months were reported by 23.1% of the CWLD, compared to 8.2% in the control group. The odds ratio (OR) of CWLD having unmet dental needs compared to the control group was 2.077 (p = 0.387).

Perceived obstacles to dental care

Table III shows the perceived obstacles to oral health care. In the "child factor" category, 84.2% of the CWLD were "anxious during dental treatment", followed by "child unable to communicate with the dentist about the dental problem" (71.4%) and "child is afraid of dentist" (56.8%)". These factors were identified as the top three barriers preventing CWLD from receiving proper dental treatment. For the "socio-environmental factor'' and "guardian factor" categories, "long waiting time at the dental clinic" (71.8%) and "no time to send a child to the clinic" (56.4%) were identified as the top two perceived barriers to care.

The relationship between groups of children (case or control group) and types of barriers are shown in Table III and Table IV using the crude OR. As the significant value of the chi-square test was set at 0.1, nine types of barriers showed statistical significance, including all barriers under the "child factor" category (Table IV). Hence, only statistically significant OR were adjusted with the possible confounding factors using multivariate logistic regression. OR, 95% confidence interval, and significant value before and after adjustment (if needed) for each barrier were tabulated in Table IV.

Table I: Child and primary guardians' demographic characteristics

Demographic Characteristics / Information obtained from guardians	Children with Learning Difficulties (Case), N=41		Children without Learning Difficulties (Control), N=50		Total	
	n	%	n	%	n	%
Age						
Mean (SD)	9.24(1.800)		10.08(.900)			
Median (IQR)	9(3)		10(2)			
Min, max	6, 12		9, 11			
Mode	9		11			
Gender of child						
Male	30	73.2	23	46.0	53	58.2
Female	11	26.8	27	54.0	38	41.8
Race of child						
Malay	34	82.9	48	95.9	81	90.0
Chinese	6	14.6	0	0.0	6	6.7
Indian	0	0.0	1	2.0	1	1.1
Others	1	2.4	1	2.0	2	2.2
Type of disability						
Late Global Development	5	12.5				
Down's Syndrome	8	20.0				
Autism/ASD	7	17.5				
Dyslexia	11	27.5				
Combined Condition	5	12.5				
Others	4	10.0				
Guardian						
Age of guardian						
Mean (SD)	40.39(6.475)		42.55(5.319)			
Median (IQR)	39(9)		42(9)			
Min, max	29,61		31,52			
Mode	37		40			
Categories						
<40 years old	20	52.6	15	30.6	35	40.2
≥40 years old	18	47.4	34	69.4	52	59.8
Relationship with child						
Father/Mother	39	95.1	48	96.0	87	95.6
Grandfather/Grandmother	1	2.4	2	4.0	3	3.3
Others	1	2.4	0	0.0	1	1.1
Level of education						
Primary	2	5.1	3	6.7	5	6.0
Secondary	23	59.0	18	40.0	41	48.8
Tertiary	14	35.9	24	53.3	38	45.2
Total monthly household income (RM)						
Mean (SD)	5190.34 (3579.83)		6179.13 (6432.37)			
Median	3980 (5145)		4200 (6000)			
Min, max	750, 14500		500, 30000			
Categories						
Low Income (< RM3000)	11	28.9	16	34.8	27	32.1
Middle Income (RM3000-RM6999	15	39.5	15	32.6	30	35.7
High Income (≥RM7000)	12	31.6	15	32.6	27	32.1
Total working hours / Day						
Mean (SD)	8.2 (2.247)		8.84 (1.167)			
Median (IQR)	8 (1)		8 (2)			
Min, max	2,13		7,12			
Categories						
≤8 Hours	19	54.3	24	53.3	43	53.8
>8 Hours	16	45.7	21	46.7	37	46.3
Total working days / Week						
Mean (SD)	5.33 (0.586)		5.51 (0.787)			
Median (IQR)	5 (1)		5 (1)			
Min, max	5,7		4,7			
Categories						
≤5 days	26	72.2	28	62.2	54	66.6
> 5 days	10	27.8	17	37.8	27	33.3

Table II: Perceived Dental Needs

Questions		Children with learning difficulty (Case)[x]		Children without learning difficulty (Control)	
		n	%	n	%
Treatment/treatments needed by child in the past 12 months	No	2	4.9	6	10.2
	Yes	39	95.1	44	89.8
If yes, please state type of treatment required by your child (can choose more than one)	Treatment for toothache	9	9.4	13	9.8
	Scaling	19	19.8	34	25.6
	Extraction	14	14.6	14	10.5
	Bleeding gums	2	2.1	6	4.5
	Regular dental check-up	26	27.1	39	29.3
	Restoration	13	13.5	16	12.0
	Malocclusion	12	12.5	9	6.8
	Others	1	1.0	2	1.5
If no, please pick the reason child not requiring any treatment	No dental/oral health problem	1	2.45	4	8.2
	Dental problem is insignificant compared to medical problem	0	0	1	2.0
	Unsure with the presence of dental problem/ treatment needs	1	2.5	0	0.0
	Answered 'Yes' for this question	39	95.1	44	89.8
How long since child's last dental visit?	Less than 6 months	13	31.7	16	32.0
	6 months - 1 year	10	24.4	16	32.0
	1 year - 3 years	4	9.8	6	12.0
	More than 3 years	4	9.8	0	0.0
	Unsure	4	9.8	6	12.0
	Never receive dental treatment/ check-up	6	14.6	6	12.0
Have your child received any dental treatment in school?	No	9	24.3	2	4.0
	Yes	28	75.7	48	96.0
Does your child receive any dental treatment from private/government sector apart from school?	No	23	56.1	25	51.0
	Yes	18	43.9	24	49.0
	Not specified	3	16.7	8	33.3
If yes, please specify how many times per year	1	8	44.4	10	41.7
	2	3	16.7	5	20.8
	3	3	16.7	1	4.2
	5	1	5.5	0	0.0
During the past 12 months, was there a time when your child needed dental care but could not get it at that time?	No	20	51.3	36	73.5
	Yes	9	23.1	4	8.2
	Not sure	10	25.6	9	18.4
	Odds Ratio (95% Confidence Interval)	2.077 (0.409, 10.555)		reference	
	p-value	0.387			

[x] Odds Ratio (95% confidence interval) is the odds ratio obtained from the Mantel-Haenszel Common Odds Ratio Estimate Table, significance value (p) set at 0.05

"Difficulty in understanding simple instructions" among CWLD exhibited an OR of 7.598 times (95% CI, 2.166-26.655 and p=0.002) compared to the control group. After adjusting for the age and gender of the child, all barriers categorized under the "child factor" revealed a statistically significant OR for the case group (Table IV). Following logistic regression analysis for perceived barriers and covariates, it was found that both age and gender of the child were not confounders of barriers related to the "child factor" category. Logistic regression results (Table V) portrayed a significant influence of longer working hours on "no time to send children to the clinic" (OR=4.440, p=0.009) among low-income guardians having a significantly lower probability to afford treatment (OR=4.439, p=0.037). "Dentists unwilling to treat children" remained a significant barrier for CWLD, after adjusting for the age and gender of the child (OR=7.451, p=0.010).

Table III: Perceived Barriers to Dental Care

Type of Barriers	Children with Learning Difficulties (Case)		Children without Learning Difficulties (Control)	
	No Barrier n (%)	Has Barrier n (%)	No Barrier n (%)	Has Barrier n (%)
Child Factor				
Afraid of dentist	16(43.2)	21(56.8)	35 (74.5)	12 (25.5)
Anxious during dental treatment	6(15.8)	32(84.2)	24 (49.0)	25 (51.0)
Unable to communicate with the dentist	10(28.6)	25(71.4)	32 (72.7)	12 (27.3)
Difficulty in understanding simple instructions	16(44.4)	20(55.6)	40 (87.0)	6 (13.0)
Uncooperative	19(52.8)	17(47.2)	40 (85.1)	7 (14.9)
Guardian Factor				
Unable to afford treatment	25(69.4)	11(30.6)	28 (59.6)	19 (40.4)
No time to send the child to the clinic	17(43.6)	22(56.4)	28 (58.3)	20 (41.7)
No one else able to send the child to the clinic	19(50)	19(50.0)	28 (59.6)	19 (40.4)
Do not know where to seek dental treatment	36(92.3)	3(7.7)	46 (97.9)	1 (2.1)
Socio-environmental Factor				
Transportation problem	30(81.1)	7(18.9)	40 (80.0)	10 (20.0)
Distance (of the clinic) too far	29(76.3)	9(23.7)	41 (85.4)	7 (14.6)
Too long waiting time at the clinic	11(28.2)	28(71.8)	23 (47.9)	25 (52.1)
The benefit of PwD cardholders insufficient	17(54.8)	14(45.2)	-	-
Service Provider Factor				
Dentist unwilling to treat my child	20(57.1)	15(42.9)	41 (91.1)	4 (8.9)
Inadequate facilities	23(71.9)	9(28.1)	38 (80.9)	9 (19.1)
The clinic was not "special-needs" friendly	19(55.9)	15(44.1)	-	-
Dentist/staffs was unpleasant/rude	29(85.3)	5(14.7)	38 (80.9)	9 (19.1)

PwD: person with disability

Table IV: Crude and Adjusted Odds Ratio, 95% Confidence Interval and p-value for Perceived Barriers

Type of Barriers	Odds Ratio*	95% Confidence Interval		p-value from Chi-square (p<0.1)[a]	Adjusted Odds Ratio**	95% Confidence Interval		p-value from logistic regression (p<0.05)[b]
		Lower	Upper			Lower	Upper	
Child Factor								
Afraid of dentist	3.500	1.207	10.153	**0.018**	3.728	1.220	11.391	**0.021**
Anxious during dental treatment	4.320	1.276	14.627	**0.014**	5.375	1.456	19.849	**0.012**
Unable to communicate with the dentist	5.333	1.733	16.411	**0.002**	5.894	1.801	19.292	**0.003**
Difficulty in understanding simple instructions	7.333	2.182	24.649	**0.001**	7.598	2.166	26.655	**0.002**
Uncooperative	4.762	1.491	15.213	**0.006**	5.588	1.608	19.417	**0.007**
Guardian Factor								
Unable to afford treatment	0.327	0.096	1.121	**0.068**	0.347	0.095	1.259	0.107
No time to send the child to the clinic	2.333	0.853	6.381	**0.095**	2.482	0.743	8.293	0.140
No one else able to send the child to the clinic	1.351	0.495	3.688	0.557	No adjustment made			
Do not know where to seek dental treatment	2.091	0.125	35.008	0.612	No adjustment made			
Socio-environmental Factor								
Transportation problem	0.182	0.022	1.515	**0.057**	0.138	0.011	1.778	0.129
Distance (of the clinic) too far	0.837	0.196	3.571	0.808	No adjustment made			
Too long waiting time at the clinic	1.840	0.663	5.104	0.239	No adjustment made			
The benefit of PwD cardholder is insufficient	-	-	-	-	-			
Service Provider Factor								
Dentist unwilling to treat my child	6.833	1.751	26.671	**0.004**	7.451	1.609	34.513	**0.010**
Inadequate facilities	1.206	0.320	4.551	0.783	No adjustment made			
The clinic was not special-needs friendly	-	-	-	-	-			
Dentist/staffs was unpleasant/rude	0.222	0.026	1.885	0.105	No adjustment made			

NOTE: All Odds ratios were taken for Learning Difficulties and normal children used as control/ reference category.
* Odds Ratio (95% confidence interval) is the odds ratio obtained from the Mantel-Haenszel Common Odds Ratio Estimate Table
**Adjusted Odds Ratio (95% confidence interval) is the odds ratio after adjustment with possible confounding factors using logistic regression
[a] Level of significant value(p) was set at 0.10 [b] Level of significant value(p) was set at 0.05 PwD: person with disability

Table V: Logistic Regression Analyses for Perceived Barriers and Covariates

Barriers & Covariates	Odds Ratio**	95% Confidence Interval		p value from logistic regression (p<0.05)[b]
		Lower	Upper	
Guardian Factor				
Unable to afford treatment				
Total Monthly Household Income				
Low income (<RM3,000)	4.439	1.094	18.018	**0.037**
Middle income (RM3,000- RM6,999)	1.247	0.338	4.594	0.740
High income (≥ RM7,000)	reference	-		-
No time to send child to clinic				
Total Working Hours/Day of Guardian				
≤ 8 hours	reference	-		-
> 8 hours	4.440	1.452	13.576	**0.009**
Total Working Days/Week of Guardian				
≤ 5 days	reference	-		-
> 5 days	1.310	0.391	4.389	0.661
Socio-environmental Factor				
Transportation problem				
Level of Education				
Primary	15.136	0.806	284.254	**0.069**
Secondary	0.562	0.080	3.964	0.563
Tertiary	reference	-		-
Total Monthly Household Income				
Low income (<RM3,000)	4.461	0.272	73.166	0.295
Middle income (RM3,000- RM6,999)	5.640	0.521	61.089	0.155
High income (≥ RM7,000)	reference	-		-
Service Provider Factor				
Dentist unwilling to treat my child				
Age of Child				
9	reference	-		-
10	3.015	0.519	17.527	0.219
11	0.366	0.056	2.376	0.292
Gender of Child				
Male	2.241	0.457	10.989	0.320
Female	reference	-		-

**Adjusted Odds Ratio (95% confidence interval) is the odds ratio after adjustment with possible confounding factors using logistic regression.
[a] Level of significant value(p) was set at 0.10
[b] Level of significant value(p) was set at 0.05

DISCUSSION

Despite policies pertaining to service inclusion for people with disabilities, children with disabilities and special needs, including those with learning difficulties still have significant barriers in accessing dental services (9,17-18). Obstacles to oral health care for this population can be divided into five main domains, namely the primary medical care system, the parents, the child, the dentist, and the dental payment system (19). These include the cost of dental care, low family income, and the child's uncooperative behaviour (18-21). CWLD were also less likely to receive dental treatment compared to children without learning disabilities, especially among children from families with lower socio-economic backgrounds (22).

To date, a limited number of studies have reported on the dental treatment needs of CWLD or any type of PWD in Malaysia. A local study that was conducted in North Peninsular, Malaysia showed that more than 50% of children with learning, sensory, physical, and multiple disabilities required dental treatments (10). In another study that was conducted in Dubai, United Arab Emirates, higher unmet dental treatment needs were reported among children with Down syndrome and learning problems compared to their counterparts (23). The reported unmet dental treatment needs of CWLD in this study was higher compared to the findings reported by local and international studies (14, 23-25). The "School Dental Services" (SDS) has been implemented

in both primary and secondary schools in Malaysia from the early 1970s with the expansion of SDS to more than 98% of primary school children. Therefore, the reported unmet dental treatment needs among CWLD in an urban school covered by the SDS were considered high. Guardians who participated in the study revealed that a quarter of the children did not receive any dental treatment at school. These findings were corroborated by Hendaus et.al (2020), who reported that two-thirds of children with special healthcare needs in their study did not receive dental check-ups for the past year during the duration of their study (26).

This study showed that the OR of CWLD "having dental needs but could not get it at that time" was two times higher compared to those without learning difficulties. However, due to the limitations of the study where only a small number of guardians participated and just one question about assessing the needs of dental care was included in the survey, the result was not statistically significant. On another note, perceived dental treatment needs can often be influenced by guardians' knowledge and attitude, and not based on the actual needs (27). Furthermore, within the limitations of this study, the actual needs of CWLD subjects could not be verified as findings were solely based on the results of the questionnaires without performing any clinical examination. Judging from the high tendency of yearly dental visits in both groups, the assumption can be made that guardians who participated in this study might have good dental awareness and perceptions of dental needs. Hence, further studies can be carried out in the future to assess the correlation between the actual and perceived dental treatment needs of CWLD.

This study is the first to compare between CWLD and children without disabilities for each of the possible factors. In this study, dental anxiety, fear, and communication problems were highly reported barriers to dental care for CWLD compared to their counterparts as reported by other studies (16, 28). These findings can be associated with a lack of dental visits and difficulty among the clinicians to manage and provide dental treatment, leading to untreated dental caries and dental infections. Nevertheless, a child's behaviour in dental clinics might also vary according to the treatment complexities and the child's acceptance. Thus, dentists' perceptions on the child's level of cooperation and behaviour during dental treatment should be explored in future studies.

In general, CWLDs are known to have problems in learning, understanding, and communicating (3). Hence, it is not surprising to find a high OR for "difficulty in understanding simple instructions among children with learning disability" compared to their counterparts. From this study, communication also proved to be a significant hindrance, being the second most named barrier among CWLD after controlling for age, gender, and absence of disability (control group).

Apart from the child's behaviour, "unwillingness of dentists to treat children" with learning difficulties emerged as one of the top barriers and was statistically significant even after adjusting for potential confounders. This might be due to a lack of exposure, experience, patience, and confidence among dentists in managing patients with difficult behaviour (29-30). Additional time, costs, and staff might be needed for managing such patients, thus leading to the unwillingness of dentists to treat (29-31). Therefore, training for dentists in primary care, as well as future dentists are highly recommended to prepare them with adequate knowledge and to maintain good professional ethics when treating patients with disabilities (32-34). Continuous dental education through seminars and workshops at the national level for new dentists would also enable proper care to meet the varying oral health care needs for CWLD, who are also amongst the underserved population (35). In addition, parental awareness through community and preventive oral health education programmes that emphasise the importance of oral health among these children with special healthcare needs should also be conducted (23). The initiative to provide school dental treatments for CWLD as part of the government's policy should also be improved. Indirectly, it provides alternatives for CWLD so they would not need to receive dental treatments in other government and private dental health facilities. It is also an idea worth exploring to allocate skilled dentists to treat these groups of children at SEIP schools to improve and promote a positive dental experience among these children when receiving dental treatment.

Multivariate logistic regression was carried out to assist in determining the real determinant of perceived barriers and identify the presence of any confounding factors which could influence the objective of the study. This study found that CWLD were significantly protective against barriers associated with "guardian factors" such as inability to afford treatment and "environmental factors" such as transportation problems. This means that having a CWLD does not lead to barriers associated with the guardian or environmental factors. This could also explain why treatment of toothache and bleeding gums was the lowest, as these two diseases can be prevented through early intervention by their guardians. This significant relationship however diminishes after controlling for other covariates potentially associated with the barriers, including income and level of education. Consequently, a significant confounder was identified, i.e., low income among respondents that were four times more likely to be unable to afford dental treatment in comparison to the higher-income group (reference group). Total working hours per day of the guardians was also identified as a confounder which ultimately affects whether respondents have the time to bring their child for dental treatment. Guardians who work more than eight hours per day were four times

more likely to have no time to bring their child for dental treatment compared to those that work less than eight hours per day. Both confounders were found statistically significant following adjustment.

A low response rate may affect the interpretation of results for this study. The main limitation was that the results cannot be generalized to the whole population as subjects were only selected from one school in Klang Valley. Another similar study can be conducted by taking samples across the country, not only children from SEIP but also from special needs homes. Limited data were found on unmet dental needs and obstacles in accessing dental care among CWLD in Malaysia. Therefore, more detailed studies on this issue should be explored, while it is essential to collect samples from various socio-demographic backgrounds, thus giving a more accurate representation of CWLD in Malaysia.

CONCLUSION

Within the limitations of the study, it can be concluded that despite regular visits to the dentist and SDS within public dental institutions, there were still unmet dental needs among CWLD. The identified obstacles to oral health care were the child's behaviour at the dental clinic and dentists' refusal to provide dental treatment for CWLD. Low income and education level, as well as long working hours amongst guardians of CWLD, were found to be confounding factors, indicating that parents of the CWLD are especially in need of further guidance and support regarding the importance of routine dental visits. Therefore, it is essential for the service providers and policymakers to establish a support mechanism for this group.

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REFERENCES

1. Laws of Malaysia. Persons with Disabilities Act 2008, Section 2. [Internet]. 2008 [cited 2022 Feb 2]. Available from: https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/86297/117930/F139356912/MYS8 6297.pdf
2. World Health Organisation. World Report on Disability. [Internet]. 2011 [cited 2022 Feb 2]. Available from: https://www.who.int/disabilities/world_report/2011/report.pdf
3. Emerson E, Heslop P. A. Working Definition of Learning Disabilities. Improving Health and Lives: Learning Disabilities Observatory Report No.1. [Internet]. 2010 [cited 2022 Feb 2]. Available from: https://www.researchgate.net/profile/Eric-Emerson/publication/265306674_A_working_definition_of_Learning_Disabilities/links/5428856f0cf26120b7b5692b/A-working-definition-of-Learning-Disabilities.pdf
4. Children with Disabilities in Malaysia. Mapping the Policies, Programs, Interventions and Stakeholders. National Early Childhood Intervention Council. [cited 2022 Feb 2]. Available from: www.necicmalaysia.org/view_file.cfm?fileid=129
5. Chen CY, Chen YW, Tsai TP, Shih WY. Oral Health Status of Children with Special Health Care Needs Receiving Dental Treatment under General Anesthesia at the Dental Clinic of Taipei Veterans General Hospital in Taiwan. J Chin Med Assoc 2014;77:198- 202. doi:10.1016/j.jcma.2014.01.008
6. Nqcobo CB, Yengopal V, Rudolph MJ, Thekiso M, Joosab Z. Dental caries prevalence in children attending special needs schools in Johannesburg, Gauteng Province, South Africa. SADJ. 2012 Aug;67(7):308-13. PMID: 23951782.
7. Kenney MK, Kogan MD, Crall JJ. Parental perceptions of dental/oral health among children with and without special health care needs. Ambulatory Pediatrics 2008;8: 312-320. doi:10.1016/j.ambp.2008.04.005
8. Bissar AR, 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. doi: 10.1111/j.1365-263x.2010.01065.x
9. Fisher K. Is there anything to smile about? A review of oral care for individuals with intellectual and developmental disabilities. Nurs Res Pract. 2012;2012:860692. doi: 10.1155/2012/860692.
10. S. H. Tan. Unmet health care service needs of children with disabilities in Penang, Malaysia. Asia Pac J. Public Health 2015;27:41S–51S. doi: https://doi.org/10.1177/101053951559246
11. Roberts T, Chetty M, Kimmie-Dhansay F, Fieggen K, Stephen LX. Dental needs of intellectually disabled children attending six special educational facilities in Cape Town. S Afr Med J 2016;106:94. doi:10.7196/samj.2016.v106i6.11006
12. Alsanabani AA, Ismail NM, Ismail AR, Alyamani HA, Oo MM. Periodontal status and its relationship with sociodemographic factors among special needs children in schools of Kota Bharu, Kelantan, Malaysia. International Medical Journal [Internet]. 2012 [cited 2022 Feb 2];19:61-64. Available from: https://www.researchgate.net/profile/Mon-Tin-Oo/publication/264710171_Periodontal_Status_and_Its_Relationship_with_Sociodemographic_Factors_among_Special_Needs_Children_in_Schools_of_Kota_Bharu_Kelantan_Malaysia/links/53ec69f50cf24f241f156db6/Periodontal-Status-and-Its-Relationship-with-Sociodemographic-Factors-among-Special-Needs-Children-in-Schools-of-Kota-Bharu-Kelantan-

Malaysia.pdf
13. Harun, N., Kenali, N., Ab. Halim, N. F. et al. Dental Caries Status of Children and Young Adult with Disabilities Attending Special Needs Boarding Schools in Kuantan, Pahang. International Journal for Studies on Children, Women, Elderly and Disabled. [Internet]. 2018;5, 191-5. ISSN: 0128-309X. Available from: https://core.ac.uk/download/pdf/300469784.pdf
14. Mokhtar SM, Abd Jalil L, Muhd Noor N, Tan BC, Shamdol Z, Ali Hanafiah H. Dental Status and Treatment Needs of Special Needs Children in Negeri Sembilan, Malaysia. World Journal of Research and Review. [Internet]. 2016;2, 64–70. ISSN:2455-3956. [cited 2022 Feb 2] Available from: https://www.wjrr.org/download_data/WJRR0206030.pdf
15. Rahman NA, Yusoff A, Daud MKM, Kamaruzaman FN. Salivary parameters, dental caries experience and treatment needs of hearing-impaired children in a special school for deaf in Kelantan, Malaysia. Arch Orofac Sci. [Internet]. 2015;10(1): 17-23. [cited 2022 Feb 2] Available from: http://aos.usm.my/docs/Vol_10/aos-article-0200.pdf
16. Lai, B., Milano, M., Roberts, M.W. et al. Unmet dental needs and barriers to dental care among children with Autism Spectrum Disorders. J Autism Dev Disord. 2012;42, 1294–1303. doi:10.1007/s10803-011-1362-2
17. Guidelines for Oral Health Care for People with a Physical Disability. British Society for Disability and Oral Health [Internet]. 2000 [cited 2022 Feb 2]. Available from: http://www.bsdh.org/documents/physical.pdf
18. Davis MJ. Issues in access to oral health care for special care patients. Dental Clinics of North America 2009;53:169-181. doi:10.1016/j.cden.2008.12.003
19. Nelson LP, Getzin A, Graham D, Zhou J, Wagle EM, McQuiston J, et.al. Unmet dental needs and barriers to care for children with significant special health care needs. Pediatr Dent [Internet]. 2011 [cited 2022 Feb 2];33:29-36. Available from: https://web.s.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=63aa21c6-2ab7-4af1-a70b-5c37a0c15b93%40redis
20. Lewis CW, Robertson AS, Phelps S. Unmet dental care needs among children with special health care needs: Implications for the medical home. Pediatrics 2005;116: 426-431. doi:10.1542/peds.2005-0390
21. Lehl G. Issues in the dental care of children with intellectual disability. Open Access Scientific Reports 2013;2(3). doi:10.4172/scientificreports.695.
22. Schultz ST, Shenkin JD, Horowitz AM. Parental perceptions of unmet dental need and cost barriers to care for developmentally disabled children. Pediatr Dent [Internet] 1998 [cited 2022 Feb 2];20: 321-325. PMID: 11572490. Available from: https://www.researchgate.net/profile/Jonathan-Shenkin/publication/11774835_Parental_perceptions_of_unmet_dental_need_and_cost_barriers_to_care_for_developmentally_disabled_children/links/0912f5141c9d4e4bb0000000/Parental-perceptions-of-unmet-dental-need-and-cost-barriers-to-care-for-developmentally-disabled-children.pdf
23. Ghaith B, Al Halabi M, Khamis AH, Kowash M. Oral Health Status among Children with Down Syndrome in Dubai, United Arab Emirates. J Int Soc Prev Community Dent. 2019; 9(3):232-239. doi: 10.4103/jispcd.JISPCD_396_18
24. Mansoor D, Al Halabi M, Khamis AH, Kowash M. Oral health challenges facing Dubai children with autism spectrum disorder at home and in accessing oral health care. Eur J Paediatr Dent. 2018 ; 19(2):127-133. doi: 10.23804/ejpd.2018.19.02.06
25. Barry S, O'Sullivan EA, Toumba KJ. Barriers to dental care for children with autism spectrum disorder. Eur Arch Paediatr Dent 2014;15(2):127–134. doi: 10.1007/s40368-013-0075-y
26. Hendaus MA, Shaltout D, Yasrab D, Al-Noubani A, Hamad SG, Alamri M, Alhammadi AH. Parental perception of a dental home for children with special needs. Pediatric Health Med Ther 2020;11:379-384. doi:10.2147/phmt.s263358
27. Breiner H, Ford M, Gadsden VL. National Academies of Sciences, Engineering, and Medicine. Parenting knowledge, attitudes, and practices. In: Parenting Matters:Supporting Parents of Children Ages 0-8. Washington (DC): National Academies Press (US) 2016;45-79. doi:10.17226/21868
28. Smith G, Rooney Y. Provision of dental care for special care patients in Ireland: A qualitative and quantitative study. Trinity Student Medical Journal [Internet] 2008 [cited 2022 Feb 2]; 9:18-20. Available from: https://www.esr.ie/index.php/tsmj/article/view/1884
29. Gizani S, Kandilorou H, Kavvadia K, Tzoutzas J. Oral health care provided by Greek dentists to persons with physical and/or intellectual impairment. Spec Care Dentist 2012;32:83–89. doi:10.1111/j.1754-4505.2012.00251.x
30. Pradhan A, Slade GD, Spencer AJ. Access to dental care among adults with physical and intellectual disabilities: residence factors. Aust Dent J 2009;54:204–211. doi:10.1111/j.1834-7819.2009.01120.x
31. Steinberg BJ. Issues and challenges in Special Care Dentistry. J Dent Educ 2005;69:323-324. doi:10.1002/j.0022-0337.2005.69.3.tb03918.x
32. Fuad NA, Jacob J, Koh WT, Mani SA, Lim W-LS, Wong CS. et al. Special Care Dentistry Curriculum at the undergraduate level: students' perspective. J Dent Indones 2015;22: 3. doi:10.14693/jdi.v22i3.976
33. Weil TN, Inglehart MR. Dental education and

dentists' attitudes and behaviour concerning patients with autism. J Dent Educ 2010; 74:1294-1307. doi:10.1002/j.0022-0337.2010.74.12.tb05005.x

34. Ahmad MS, Razak IA, Borromeo GL. Undergraduate education in special needs dentistry in Malaysian and Australian dental schools. J Dental Educ 2014;78:1154–1161. doi:10.1002/j.0022-0337.2014.78.8.tb05786.x
35. Albino JEN, Inglehart MR, Tedesco LA. Dental education and changing oral health care needs: Disparities and demands. J Dent Educ 2012;1:75–88. doi:10.1002/j.0022-0337.2012.76.1.tb05236.x