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Oral health-related quality of life among home-dwelling older people with and without domiciliary care

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Objectives: The aim was to compare oral health-related quality of life (OHRQoL) between home-dwelling older people with and without domiciliary care when adjusted for gender, education, use of dental services and removable dental prostheses.

Background: OHRQoL of home-dwelling older people with and without domiciliary care is a neglected area of research, with few studies having been conducted.

Materials and Methods: A secondary analysis was conducted on the Finnish Health 2011 interview data. Home-dwelling participants (age ≥ 70) with or without domiciliary care were included (n = 758). OHRQoL was measured with the Oral Health Impact Profile questionnaire (OHIP-14) calculating three outcomes: prevalence of at least one impact reported: "occasionally," "fairly often" or "very often" (OFoVo), severity as mean sum score and mean of the seven OHIP-14 dimensions. These were evaluated by use of domiciliary care using logistic and negative binomial regression analyses.

Results: Domiciliary care clients tended to have poorer OHRQoL than non-clients (severity mean 4.33 vs 4.11, $P = .057$), especially men (6.71 vs 4.15, $P = .027$), and reported more psychological discomfort than non-clients (mean 1.10 vs 0.82, $P = .039$). The use of removable dental prostheses was the strongest predictor (OR 2.84, $P < .001$) of poor OHRQoL.

Conclusion: Domiciliary care clients tended to report poorer OHRQoL, especially with regard to psychological discomfort dimension than non-clients. Thus, support of oral hygiene and regular utilisation of oral health services should be part of domiciliary care among older people to enhance OHRQoL.

KEYWORDS
domiciliary care, older people, oral health, quality of life

1 | INTRODUCTION

Care dependency and frailty,[1] functional[2] and cognitional limitations,[3] medication induced hyposalivation,[4] poor oral hygiene[1,5,6] and irregular dental care service use[7–10] are typical causes for poor oral health among older people. Various health complications are connected to poor oral health,[4,11–17] which again may lead to poorer quality of life.

Impaired health and frailty[18] are typical among domiciliary care clients as they also require assistance in their daily routines,[19] but support of oral hygiene is mostly neglected in domiciliary care[5,20,21] despite of care dependency.[22] Furthermore, impaired functional

ability of domiciliary care clients[18] increases the probability of poorer oral health and oral hygiene.[6,22] This is further supported in previous research, where domiciliary care clients reported more tooth loss while also having poorer perceived oral health and oral health habits than older people without domiciliary care.[23]

Older people have poorer oral health-related quality of life (OHRQoL) when compared to younger age groups.[24–26] However, home-dwelling older people with remaining teeth have been reported to have better OHRQoL than edentulous older people.[27] Poor oral health,[7–9] tooth loss,[25,28,29] use of removable dental prostheses[25] and pain[30] decreases OHRQoL among older people, especially in nursing care facilities, where the occurrence of oral diseases and unattended dental care needs are typical.[7–9] Care dependency and frailty also have a negative impact on OHRQoL,[31] especially when oral hygiene is compromised and oral health services are used irregularly.[1,32] Home-dwelling older people with more significant care dependency and chewing difficulties perceive OHRQoL more negatively than those with less significant care dependency.[33] Care dependency, including domiciliary care, is expected to increase globally among the ageing population.[34] In Finland, the number of domiciliary care clients has nearly tripled in the past 10 years, while their proportion among people 75 years or older has remained between 10% and 12% of the same-aged population.[35,36] Public domiciliary care services are supported by state funding and provided by the public or the private sector. Individuals can also purchase domiciliary care services from the private sector. The eligibility and content of the services, such as health and/or social services and aid services in daily living, are based on the professional assessment of individual needs by case managers.[37] After the assessment, the domiciliary care is implemented by nursing staff. Clients may receive domiciliary care services from several times a day to a few times a month as home visits.

Well-being of older people ought to be supported with enhancing good OHRQoL as a part of active ageing.[38] OHRQoL of home-dwelling older people with and without domiciliary care is a less studied area,[28] while OHRQoL among older people in care facilities, such as nursing homes, is widely studied.[1,7,30,31] This increases the need for further population level studies about OHRQoL of older people with and without domiciliary care, so that the determinants of OHRQoL could be considered in domiciliary care planning.

The aim of this study was to compare OHRQoL and its seven dimensions between home-dwelling older people with and without domiciliary care adjusting for confounders using the data from the Finnish national Health 2011 Survey.

2 | MATERIALS AND METHODS

This study was a secondary analysis of the Finnish nationally representative Health 2011 Survey data (BRIF8901)[39,40] conducted by the Finnish Institute for Health and Welfare (THL, formerly KTL) in 2011. The utilisation of data for this study was permitted by the Finnish Institute for Health and Welfare (THL). The Ethical Committees of THL and the Hospital District of Helsinki and Uusimaa (HUS) provided approval for the Health 2011 Survey.[40] All participants provided informed and signed consent. Ability to respond was evaluated by a trained nurse, and in the case of cognitive- or health-related impairment, the consent was signed by a family member or relative of the participant.[39,40]

The Health 2011 Survey assessed health, function and well-being with structured interviews, validated questionnaires, laboratory tests and health examinations. The sample for the Health 2011 Survey was based on the main sample of previous Health 2000 Survey, with all participants being re-invited. In 2011 the sample was 7964 adults, aged at least 18 years. The applied sampling design was a two-stage stratified cluster, in which strata was formed by five university hospitals and clusters from 80 health centers.[39,40]

OHRQoL was assessed using the Oral Health Impact Profile 14 (OHIP-14)[41] which is a validated and reliable[42] measurement, also in Finnish,[39] and often used in other studies among older people.[7,25–27,29,30] The data from participants who returned the self-reported questionnaire including OHIP-14 and participated in the interviews conducted by trained nurses in 2011 were used. Inclusion criteria for participants were age (70 years or older) and living at home with or without domiciliary care service (n = 1027). Participants who were in nursing care facilities or had missing information about living circumstances, utilisation of domiciliary care service were excluded (n = 540). Furthermore, completely missing OHIP-14 responses or missing value for the survey-specific weighting coefficient (n = 269) led to exclusion. Number of included participants was 758 (74%) of the 1027 older people with or without domiciliary care.

The OHIP-14 comprised of 14 questions about OHRQoL in seven dimensions (Functional Limitation, Physical Pain, Psychological Discomfort, Physical Disability, Psychological Disability, Social Disability and Handicap).[41] The 5-point Likert scale response alternatives for frequency of oral health-related problems during the last month were "never," "hardly ever," "occasionally," "fairly often" and "often."

The following outcome variables: prevalence, severity and sum scores for seven dimensions were formed from the OHIP-14 items. Prevalence refers to the percentage of participants who reported at least one impact "occasionally," "fairly often" or "very often" (OFoVo). Severity (OHIP-total) is the sum of ordinal responses with a range of 0-56. For dimensions, the sum of ordinal responses to two items forming each dimension was calculated. If data was missing for both items of any of the seven the OHIP-14 domains, the participants were not included in the analysis. If one item of a domain was missing, the value 0 was imputed for the missing value. The missing OHIP-14 item value was replaced with the mean of other responses to the current item if one or two of the OHIP-14 items were missing. A lower proportion of OFoVo and lower mean severity scores indicated better OHRQoL.

Two questions were used to determine the utilisation of domiciliary care services. The first question was "Do you receive repeated assistance or help in your everyday activities (for example household work, washing up, shopping) because of your reduced functional

capacity?" with yes or no response alternatives. If a positive response was given, the following question was "Have you received help from a home care assistant or a nurse?". Those who responded having received help from a home care assistant or nurse were categorised as domiciliary care clients and those who did not receive help or where received help was from family members, relatives or friends were categorised as non-clients.

Gender, educational background, and the use of dental care services or the use of removable dental prostheses were used as confounding variables. Education was categorised into low (less than primary school, primary school or secondary school), middle (grammar or comprehensive school) and high (high school or matriculation examination). The use of dental care services was based on the question "When did you last visited dental care in 2011?" and responses were categorised to "1-2 years ago," 3-5 years ago" and "over 5 years ago or never." Responses for the use of removable dental prostheses were dichotomised as "dentate" (no dentures, has own teeth) and "removable dental prostheses" (complete dentures [no own teeth nor roots], partial dentures and own teeth, no dentures nor teeth).

The data analysis was conducted using IBM SPSS 26 software (IBM Corporation) or SAS statistical software 9.4. The survey-specific weighting coefficients were used to correct effects of oversampling in older age groups and non-response. Descriptive statistics were calculated, and analyses were conducted by the utilisation of domiciliary care services. Chi-squared, Mann–Whitney U, Kruskal–Wallis and Fisher exact tests were used to assess the statistical significance of the associations between use of domiciliary care service and confounding factors. Meeting the testing assumptions were checked with graphs and the Kolmogorov–Smirnov test, when appropriate. For multivariable analyses, logistic and negative binomial (NB) regression analyses were used for the prevalence and severity outcomes, respectively.

Based on the bivariate associations, the mediating effect of education was assessed using exact closed-form mediation effect formulas for binary–binary logistic analysis. The analysis was conducted with Valeri-VanderWeele.[43] With the use of mediation analysis enabling causal interpretation, the associations were evaluated while considering the mediating effect of education with the direct and indirect pathways, while also controlling the use of removable dental prostheses, gender and use of dental services. The assessed model is presented in Figure 1.

Finally, two parallel adjusted models, both adjusted for gender and use of oral health services were performed. In the first, educational background was added, and in the second use of removable dental prostheses. Spearman correlation coefficients were used to evaluate the relationship between two variables. The relevant estimates and confidence intervals with *P*-values were evaluated considering statistical significance $P < .05$.

3 | RESULTS

The mean age of the non-clients was 76 years (SD = 5.45), and of the domiciliary care clients 83 years (SD = 5.93; range 70-97 for both groups). Of the participants (N = 758), 4.9% were domiciliary care clients of whom 78% were women, and 72% had low education (middle 19% and high 9%). Of non-clients 56% were women and 59% had low education (middle 22% and high 19%). Last dental service use was 1-2 years ago in 45% and over 5 years ago or never in 43% of domiciliary care clients while 57% of non-clients had used dental services 1-2 years ago. Domiciliary care clients were more often edentulous or had removable dental prostheses (72%) than non-clients (60%).

Domiciliary care clients tended to report poorer OHRQoL both in terms of OHIP-prevalence and severity (Table 1). However, the differences were statistically significant only among those with high education for both prevalence and severity, among those having their last dental visit 1-2 years ago for prevalence and among men and dentate for severity.

Domiciliary care clients reported poorer OHRQoL in the dimensions of functional limitation, physical pain, and psychological discomfort and better in other dimensions. However, the difference was statistically significant only in the psychological discomfort (Figure 2).

Those, receiving domiciliary care tended to have higher the risk (OR) for poorer OHRQoL than those without domiciliary care (Table 2). Education mediated the effect of domiciliary care on OHRQoL, but the strength of the direct effect was 0.98-fold to

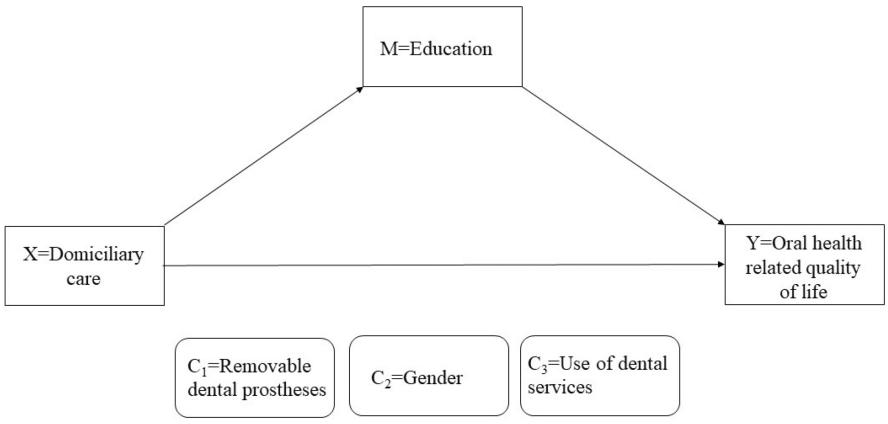

FIGURE 1 Model used to assess the mediation (X = exposure, M = mediator, Y = outcome and C = confounder)

TABLE 1 Oral health-related quality of life with a prevalence of at least one oral impact occasionally, fairly often or very often (OFoVo) and sum of all impacts (severity mean) between domiciliary care clients and non-clients according to gender, education, use of dental services and use of removable dental prostheses (n = 758). Frequency presented as unweighted; percentages presented as weighted

	Domiciliary care					
	Yes (n = 37)	No (n = 721)		Yes (n = 37)	No (n = 679)	
	OFoVo%	OFoVo%	*P*-value*	Severity mean (SD[a])	Severity mean (SD[a])	*P*-value*
All	41.7	33.8	.334[b]	4.3 (6.4)	4.1 (8.0)	.057[c]
Gender						
Men	62.5	35.0	.109[b]	6.7 (7.3)	4.2 (7.6)	.027[c]
Women	39.3	32.8	.481[b]	3.8 (6.2)	4.1 (8.3)	.246[c]
P-value†	0.244[b]	0.568[b]		0.099[c]	0.228[c]	
Education						
Low	38.5	38.4	.993[b]	3.6 (6.7)	4.8 (8.9)	.802[c]
Middle	33.3	26.6	.660[d]	3.1 (3.0)	3.4 (6.8)	.274[c]
High	100.0	27.4	.023[d]	11.5 (6.3)	2.9 (6.1)	.002[c]
P-value†	0.109[b]	0.012[b]		0.029[e]	0.032[e]	
Use of dental services						
1-2 years ago	56.3	32.2	.046[b]	4.6 (6.8)	3.9 (8.3)	.317[c]
3-5 years ago	50.0	33.6	.605[d]	9.0 (8.9)	3.8 (6.5)	.071[c]
Over 5 years ago or never	31.3	38.0	.609[b]	3.1 (5.3)	4.9 (8.4)	.957[c]
P-value†	0.353[b]	0.443[b]		0.340[e]	0.027[e]	
Use of removable dental prostheses						
Dentate (no prostheses)	40.0	21.0	.154[b]	2.8 (2.4)	1.9 (5.3)	.005[c]
Removable dental prostheses	44.4	42.1	.815[b]	4.9 (7.3)	5.7 (9.2)	.879[c]
P-value†	0.809[b]	<0.001[b]		0.984[c]	<0.001[c]	

[a]Standard deviation.

[b]Chi-squared test.

[c]Mann–Whitney *U* test.

[d]Fisher exact test.

[e]Kruskal–Wallis test.

*P-value for the difference between domiciliary care clients and non-clients.

†P-value for the difference within domiciliary care clients or non-clients group according to the background variable.

the total effect. A very weak moderating effect of removable dental prostheses on education to domiciliary care was observed. The regression-based mediations are presented in Table 3.

The results of the negative binomial regression analyses on severity showed similar tendency of the effect of use of domiciliary care on OHRQoL. In the dimension-wise analyses, domiciliary care clients tended to have higher risk for poor OHRQoL on psychological discomfort, but lower risk for poor OHRQoL on psychological disability (Table 4).

4 | DISCUSSION

In this study, domiciliary care clients tended to report poorer OHRQoL than non-clients, especially among men. The use of removable dental prostheses was the strongest predictor of poor OHRQoL and mediated the effect of education on OHRQoL. Domiciliary care clients also reported higher psychological discomfort.

The fact that the differences between domiciliary care clients and non-clients did not reach statistical significance was likely due to small number of domiciliary care clients in the study. Otherwise, the study population was a representative sample of Finnish home-dwelling older people. The percentage of older people of 75 years or older in domiciliary care (12.2%) in 2011[44] was similar to that this study (16.8%), but in this study age distribution was slightly wider. Differences in functional limitation and physical pain were not statistically significant. However, despite not being statistically significant, over than a 2.5-unit difference in OHIP-14 severity score has been considered clinically significant.[45]

In the present study, older people receiving domiciliary care had a tendency to have poorer OHRQoL. Compared to older people

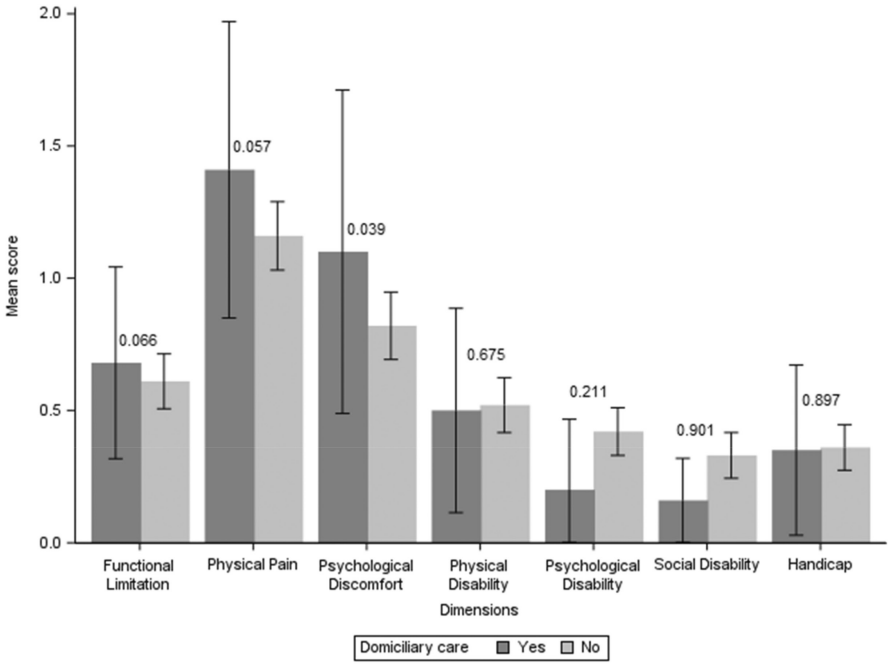

FIGURE 2 Mean scores, confidence interval of standard error of mean and *P*-values (Mann–Whitney *U* test) for the seven dimensions of OHIP-14 between domiciliary clients and non-clients (n = 758)

TABLE 2 Parallel adjusted logistic regression models on prevalence of at least one oral impact occasionally, fairly often or very often (OFoVo) between domiciliary care clients and non-clients (n = 758)

	Model 1			Model 2		
	OR[a]	95% CI[b]	*P*-value[c]	OR[a]	95% CI[b]	*P*-value[c]
Domiciliary care (ref. No)	1.49	0.74-2.99	.262	1.48	0.73-3.00	.279
Gender (ref. Women)	1.20	0.86-1.67	.286	1.17	0.84-1.64	.362
Education (ref. High)						
Low	1.47	0.93-2.30	.098			
Middle	0.86	0.50-1.48	.584			
Use of dental services (ref. Over 5 years ago or never)						
1-2 years ago	1.32	0.87-1.99	.759	1.28	0.85-1.92	.237
3-5 years ago	0.92	0.56-1.52	.745	1.10	0.66-1.84	.712
Use of removable dental prostheses (ref. Dentate, no prostheses)						
Removable dental prostheses				2.84	1.99-4.24	<.001

[a]Odds ratio.

[b]95% confidence interval.

[c]Wald chi-squared value.

without domiciliary care, domiciliary care clients are more likely to be frail, and their health and functional ability is typically impaired.[18] This may lead to poorer oral health,[8,11–17] and poorer OHRQoL especially due to care dependency,[31] tooth loss,[25,28,29] use of dental prostheses,[25] compromised oral hygiene[22] and irregular utilisation of oral health services.[1,24,32] Furthermore, the previous study showed that domiciliary care clients had poorer perceived oral health, compromised oral hygiene and more tooth loss than older people without domiciliary care.[23] Psychological discomfort was also higher among domiciliary care clients than non-clients in this study. Domiciliary care clients with more care dependency might even have lower OHRQoL than those with less need for domiciliary care.[33]

Negative impact of the use of removable dental prostheses to OHRQoL is in line with the previous study,[25] especially among older people.[46] This highlights the importance of the concept of shortened dental arch, as OHRQoL is higher among those who have at least 20 remaining teeth.[24] Poorer OHRQoL was also evident among highly educated domiciliary care clients, which diverges from the previous study indicating the negative impact of lower educational background on the OHRQoL of older people.[47] However, the previous study population consisted of home-dwelling, non-disabled older people, whereas in this study population care-dependent older people were also included.[31] Domiciliary care clients with higher education might have had

TABLE 3 Unadjusted and adjusted analysis for oral health-related quality of life outcome when the exposure is domiciliary care and the mediator education, with the odds ratios (OR) for the direct and indirect exposure-to-outcome effect represented though the mediator with bootstrap 95% confidence intervals (CI)

	Unadjusted model		Adjusted model[a]	
	OR	Bootstrap 95% CI	OR	Bootstrap 95% CI
Direct effect	1.81	0.78-3.66	1.84	0.80-3.59
Indirect effect	1.03	0.97-1.10	1.06	0.99-1.15
Total effect[b]	1.85	0.82-3.74	1.94	0.87-3.84

[a]Adjusting for removable dental prostheses, gender and use of dental services.

[b]Total effect = Direct effect · Indirect effect.

TABLE 4 Negative binomial regression models for the effects of OHIP-14 severity and dimensions between domiciliary care clients and non-clients (n = 758)

	Model 1			Model 2		
	OR[a]	95% CI[b]	*P*-value[c]	OR[a]	95% CI[b]	*P*-value[c]
Severity	1.14	0.60-2.17	.699	1.06	0.57-1.97	.858
Functional limitation	1.17	0.54-2.53	.683	1.18	0.55-2.51	.676
Physical pain	1.26	0.78-2.03	.350	1.21	0.76-1.92	.418
Psychological discomfort	1.44	0.72-2.87	.300	1.47	0.75-2.87	.262
Physical disability	1.01	0.39-2.62	.984	0.84	0.34-2.11	.720
Psychological disability	0.44	0.14-1.42	.172	0.52	0.14-1.99	.340
Social disability	0.51	0.13-1.98	.330	1.01	0.33-3.09	.990
Handicap	1.01	0.33-3.09	.990	0.78	0.27-2.25	.644

Note: Model 1 adjusted for education, gender, use of dental services. Model 2 adjusted for use of removable dental prostheses gender, use of dental services.

[a]Odds ratio.

[b]95% confidence interval.

[c]Wald chi-squared test.

more teeth needing treatment[6,18,23] resulting in a negative impact on OHRQoL.[7,24,25] More frequent dental care visits of older people without domiciliary care can also be related to the fact that they had more teeth to be treated,[23] which may lead again to poorer OHRQoL.

Good OHRQoL is an important prerequisite for healthy and functional ageing, especially among care-dependent domiciliary care clients who also have higher risk of psychological discomfort. Including assessment of oral health status and capacity for oral self-care as a part of the domiciliary care need assessment could improve both oral health and OHRQoL and prevent further oral health problems of domiciliary care clients. Moreover, support of oral health should also be a designated part of daily care measures of domiciliary care. Enhanced accessibility and availability of dental care services could also improve OHRQoL of domiciliary care clients, as well as promote regular utilisation of dental care services.[10] This study offered new information about OHRQoL among home-dwelling older people with and without domiciliary care. For further research, it would be interesting to see whether HRQoL and OHRQoL are cross-related with general and oral health statuses of older people receiving domiciliary care. After all, functional limitations arising from health status in general are the main reasoning for the need of domiciliary care.

5 | CONCLUSION

Poor OHRQoL, especially with regard to the psychological discomfort dimension, were more common among domiciliary care clients than non-clients. This implies that support of oral health is not prioritised by domiciliary care. Thus, assessment of oral health, support for oral hygiene and regular utilisation of oral health services should be part of domiciliary care among older people to enhance better OHRQoL.

AUTHOR CONTRIBUTIONS

R. Salmi was the main contributor in writing of the manuscript with the support of T. Närhi, A. Suominen, A.-L. Suominen and S. Lahti, who also critically revised the manuscript. Statistical analyses were conducted by R. Salmi and A. Suominen. All authors were responsible for conception, design and interpretation of the data, and gave full approval for the manuscript.

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CONFLICTS OF INTEREST

The authors report no conflicts of interest.

DATA AVAILABILITY STATEMENT

Due to data protection reasons, personal data cannot be publicly available. The data controller of the Health 2000/2011 Survey is The Finnish Institute for Health and Welfare. Access to confidential data requires permission to handle the data, signed non-disclosure agreement as well as collaboration agreement with The Finnish Institute for Health and Welfare. Access to data can also be applied from THL Biobank: https://thl.fi/en/web/thl-biobank/for-researchers.

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