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Is the oral health-related quality of life associated with quality of life among pregnant Finnish families: a cross-sectional study

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ABSTRACT

Objective: The objectives of this study was to find out if oral health-related quality of life and its dimensions (OHRQoL) are associated with overall quality of life (QoL) among mothers and fathers during pregnancy and whether these two constructs were associated within the family sharing the same living environment.

Material and methods: The data (mothers $n=2580$, fathers $n=1467$) for this cross-sectional data study were collected from the FinnBrain Birth Cohort study during 2011–2015. OHRQoL was measured using a 14-item Oral Health Impact Profile (OHIP-14) questionnaire and QoL by using the WHOQoL-Bref questionnaire. Spearman correlation coefficients were used to assess the statistical significance of the associations.

Results: OHRQoL was weakly associated at the individual level with the overall QoL (mothers $r=0.21$, fathers $r=0.22$, $p<0.001$), but the correlations within families were low for QoL and OHRQoL.

Conclusions: Our findings suggest that overall QoL is a different construct than OHRQoL though slightly overlapping.

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Introduction


Since the patient centricity was included into the traditional biological paradigm in medical sciences several conceptual models and measures have been introduced to understand and capture the theoretical concepts of quality of life (QoL), health-related quality of life (HRQoL) and oral health-related quality of life (OHRQoL) [1–5]. Despite the vast interest and scientific research on these concepts, there is not yet a common consensus on their definitions, and the terms QoL, HRQoL and OHRQoL are often used interchangeably [1,2,5,6]. QoL has been defined by the WHOQoL group as ‘individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns’ [7]. Sischo and Broder [3] defined OHRQoL as multi-dimensional concept of various symptoms and experiences representing the person’s subjective perspective and incorporating biological, social, psychological and cultural factors.

The two commonly referred conceptual models by Wilson and Cleary for HRQoL [1] and by Locker [4] for OHRQoL point out the effects that disease-related symptoms have on physical, social and psychological functioning and wellbeing and different measures based on these models have been

developed to assess domains of QoL and OHRQoL, such as physical, psychological, social and environment across different cultures [4–10].

Besides Sischo and Broder [3] OHRQoL model, adapted from Wilson and Cleary [1] which incorporates biological, social, psychological and cultural factors of OHRQoL and a study by Elheeny [5] we could not identify any other theoretical models that include both concepts, namely OHRQoL and QoL as well as their relation. Sisco and Broder suggested OHRQoL to be a part of a wider concept of QoL, and that OHRQoL affects QoL [3]. The model indicates that the OHRQoL and QoL should be associated at least to some extent. However, evidence on the relationship between OHRQoL and QoL was available only from limited patient samples [11–17], and we could not find studies empirically testing the theory-based association between OHRQoL and QoL on general population and using validated population level measures. Thus, the aim of this study based on the secondary analysis of a birth cohort data including both mothers and fathers expecting a baby was to find out if OHRQoL and its dimensions are associated with QoL. Additionally, the aim was to study whether these two constructs were associated within the family sharing the same living environment.

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 Supplemental data for this article can be accessed [here](#).

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Based on the conceptual models, we hypothesized that the theoretical concept of QoL and OHRQoL are associated, also within the family.

Material and methods

Settings and design

This cross-sectional study is a secondary analysis of data from the FinnBrain Birth Cohort study (www.finnbrain.fi). FinnBrain is a multidisciplinary group of researchers. It studies prospectively the effects of environment and genes on child's brain development and health [18]. Participants were recruited after ultrasonography appointments that are offered free of charge for every pregnant mother in Finland by municipal maternity clinics during the first trimester of the pregnancy (gestational week 12) in the South-Western Hospital District and the Åland Islands in Finland in 2011–2015. The coverage of these appointments attended by mothers and the fathers of the children/partners of the mothers is close to 100% in the population at gestational week 12 [18,19]. The Intermunicipal Hospital District of Southwest Finland has given an ethical clearance for the FinnBrain Cohort Study in 14.6.2011. Recruitment took place at maternal welfare clinics in 2011–2015 in South-Western Hospital District and the Åland Islands in Finland.

Sample selection

At the ultrasonography appointments 5790 mothers were informed about the study as well as those fathers who participated the appointment with the mother. 3808 mothers and 2624 fathers or other partners of mother expecting 3837 babies (twins included) decided to participate. The parents gave written informed consent on their own and selected the mode of questionnaire they preferred. The data for this study were collected by paper and electronic questionnaires at gestational week 34. At that point 2609 mothers (69% of participants) and 1507 fathers (57% of participants) returned the questionnaires. About 29 mothers and 40 fathers did not meet the inclusion criteria (did not answer the questions concerning OHRQoL). Thus, the total number included in the analysis was 2580 mothers and 1467 fathers. In 1459 families both mother and father responded to the questionnaires

Table 1. Descriptive statistics of the participants, separately for all participants in this study, and for those included in the within-family analyses (both mother and father responded to the questionnaires).

		All participants	Both parents responded
Mothers	<i>N</i>	2580	1459
Age	mean (SD)	30.6 (4.5)	30.3 (4.4)
	Range	17–46	18–46
Education (%)	Low	35	33
	Mediocre	30	30
	High	35	37
Fathers	<i>n</i>	1467	1459
Age	mean (SD)	32.2 (5.3)	32.2 (5.3)
	Range	17–60	17–60
Education (%)	Low	45	45
	Mediocre	28	28
	High	27	27

and were included also in the within-family analyses. Parents' background information on age and education were collected during pregnancy (Table 1). Education was chosen from different socio-economic variables due to its best predictive ability in this population [20].

In Finland, education is divided into different levels which are: compulsory (9 years), vocational or secondary general/academic (11–12 years) schooling, Polytechnics and University level. In this study, education level was divided into three levels: low (≤ 12 years), medium (polytechnics) and high (university degree).

Measuring tools

QoL was measured with the WHOQoL-Bref questionnaire, which consist of eight questions. Each question (Table 2) is rated on a five-point scale ranging from 1 to 5. [21] The items were analyzed separately and as a sum score (range 8–40). The higher the score the better the QoL [9]. The scale had high internal consistency (Cronbach alpha 0.810 for mothers and 0.823 for fathers).

The OHRQoL was measured by validated Finnish translation of Oral Health Impact Profile 14 (OHIP-14) questionnaire [22]. It contains 14 questions about the frequency of adverse impacts caused by oral conditions in seven dimensions (Table 3). The respondents reported the frequency of each impact during the preceding month on the following five-point scale ranging from 0 (never) to 4 (very often). Severity sum score was calculated as a sum of the ordinal responses. Sum scores were also calculated for the seven dimensions. Lower scores indicated better OHRQoL. The scale had high internal consistency (Cronbach alpha 0.842 for mothers and 0.878 for fathers).

Both the WHOQoL-Bref and the OHRQoL questionnaires are attached as [supplemental data](#).

Statistical analysis

Distributions of the variables were evaluated using mean and median values and interquartile range (Q_1 – Q_3), separately among mothers and fathers. Associations between OHIP-14 severity and dimension scores and WHOQoL-Bref sum and item scores were studied using Spearman

Table 2. Descriptive statistics for WHO Quality of Life (WHOQoL-Bref) sum (range 8–40) and item scores (range 1–5); higher scores indicate better quality of life.

	Mothers (<i>n</i> = 2580)			Fathers (<i>n</i> = 1467)		
	Mean	Md	Q1–Q3	Mean	Md	Q1–Q3
WHOQoL-8 sum	32.09	32	30–35	32.66	33	30–35
1. Quality of life	4.20	4	4–5	4.14	4	4–5
2. Health	3.92	4	4–4	3.90	4	4–4
3. Energy for everyday life	3.79	4	3–4	4.16	4	4–5
4. Financial situation	3.88	4	3–5	3.85	4	3–5
5. Ability to perform daily activities	3.89	4	4–4	4.19	4	4–5
6. Satisfied with self	3.89	4	4–4	3.97	4	4–4
7. Personal relationships	4.24	4	4–5	4.18	4	4–5
8. Living place	4.27	4	4–5	4.28	4	4–5

Md: median; Q1–Q3: interquartile range.

correlation coefficients. Associations between mothers' and fathers' scores were studied using Spearman correlation coefficients among those families that both mother and father returned the questionnaire. Associations between education and OHIP-14 severity and WHOQoL-Bref sum scores were assessed using Kruskal–Wallis test.

Results

The descriptive statistics of the participants are presented in Table 1. Distributions of age and education of those included in the within-family analyses (both mother and father responded to the questionnaires) were very similar to the total sample.

Both fathers and mothers reported also consistently good QoL, scores around 32–33 out of 40, interquartile range 30–35 showing only a little variation for both genders (Table 2). The mothers reported poorest QoL for energy for everyday life and fathers for financial situation. Both fathers (mean 2.07) and mothers (mean 1.66) reported consistently good OHRQoL, with Md = 0, interquartile range 0–2, for both genders indicating only a little variation (Table 3). The poorest

Table 3. Descriptive statistics for Oral health-related quality of life (Oral Health Impact Profile, OHIP-14) severity score (range 0–56) and 7 dimensions (range 0–4); lower scores indicate better oral health-related quality of life.

	Mothers (n = 2580)			Fathers (n = 1467)		
	Mean	Md	Q1–Q3	Mean	Md	Q1–Q3
OHIP-14 severity score	1.66	0	0–2	2.07	0	0–2
Functional limitation	0.06	0	0–0	0.15	0	0–0
Physical pain	0.65	0	0–1	0.79	0	0–1
Psychological discomfort	0.44	0	0–0	0.52	0	0–0
Physical disability	0.08	0	0–0	0.10	0	0–0
Psychological disability	0.23	0	0–0	0.26	0	0–0
Social disability	0.08	0	0–0	0.12	0	0–0
Handicap	0.11	0	0–0	0.13	0	0–0

Md: median; Q1–Q3: interquartile range.

Table 4. Spearman correlation coefficients between oral health-related quality of life (OHIP-14 severity and dimensions^a) and quality of life (WHOQoL-Bref sum score and item scores).

OHIP-14 total (severity) and dimension scores	Severity	Func. lim	Phys. pain	Psyc. disc.	Phys. disab.	Psyc. disab.	Soc. disab.	Handicap
Mothers (n = 2580)								
WHOQoL-Bref mean	0.21	0.10	0.17	0.17	0.12	0.16	0.11	0.12
Quality of life	0.14	0.08	0.11	0.11	0.09	0.10	0.09	0.09
Health	0.18	0.05	0.15	0.12	0.10	0.14	0.07	0.09
Energy for everyday life	0.17	0.09	0.12	0.13	0.10	0.13	0.09	0.09
Financial situation	0.13	0.05	0.11	0.11	0.06	0.10	0.06	0.08
Ability to perform daily activities	0.14	0.07	0.10	0.11	0.12	0.12	0.09	0.08
Satisfied with self	0.15	0.07	0.12	0.12	0.09	0.12	0.07	0.09
Personal relationships	0.13	0.07	0.10	0.09	0.06	0.10	0.09	0.07
Living place	0.11	0.07	0.10	0.09	0.05	0.06	0.05	0.04
Fathers (n = 1467)								
WHOQoL-Bref mean	0.22	0.16	0.16	0.19	0.13	0.18	0.15	0.18
Quality of life	0.16	0.11	0.11	0.15	0.09	0.12	0.14	0.12
Health	0.15	0.12	0.13	0.11	0.13	0.12	0.10	0.12
Energy for everyday life	0.17	0.11	0.13	0.13	0.10	0.12	0.13	0.14
Financial situation	0.16	0.10	0.11	0.15	0.07	0.14	0.09	0.10
Ability to perform daily activities	0.17	0.13	0.11	0.15	0.10	0.13	0.11	0.13
Satisfied with self	0.14	0.13	0.11	0.11	0.08	0.12	0.11	0.14
Personal relationships	0.15	0.16	0.12	0.11	0.10	0.11	0.14	0.13
Living place	0.08	0.09	0.06	0.09	0.10	0.09	0.08	0.10

All *p* values were < .001.

^aFunc.lim: functional limitation; Phys. pain: physical pain; Psyc.disc: psychological discomfort; Phys.disab.: physical disability; Psyc. disab.: psychological disability; Soc. disab.: social disability.

OHRQoL scores were reported in physical pain dimension both among mothers and fathers.

Both OHRQoL and QoL were poorer among those with low education than those with medium or higher education. The mean OHRQoL scores according to educational level were 1.86 for low, 1.57 for medium and 1.46 for high education in mothers ($p = .049$), and 2.34 for low, 1.79 for medium and 1.81 for high education in fathers ($p < .001$). The corresponding means for QoL were 31.23, 32.46 and 32.65 in mothers ($p < .001$), and 32.03, 33.07 and 33.34 ($p < .001$) in fathers, respectively.

Even though all correlations between the total QoL and OHRQoL scores and their items and dimensions were statistically significant the strength of the correlations was very weak (Table 4). The only modest correlation observed was between the total scores of OHRQoL and QoL.

When looking at families, where both mother and father had returned the questionnaire, the OHRQoL and its dimensions correlated very weakly within the family (Table 5). In the QoL, moderate correlations were found in the total score and following items: financial situation and living place. Weak correlations were found in the items of QoL and personal relationship.

Discussion

The association between OHRQoL and QoL was weak both among mothers and fathers. Within mothers and fathers QoL and its items of financial situation and living place were more strongly associated than OHRQoL or its dimensions.

The strength of this study includes the use of reliable and valid instruments of OHRQoL and QoL that have been used also in other population level studies thus, allowing the results from different populations and countries to be compared [9,10,22–24]. The study had a large sample and

Table 5. Correlations between mothers' and fathers' oral health-related quality of life (OHIP-14 mean) and quality of life (WHOQoL-Bref -mean) ($n = 1459$ for both).

	Mothers	Fathers	<i>r</i>	<i>p</i> Value
OHIP-14 severity score	1.62	2.07	0.087	.001
Functional limitation	0.07	0.15	0.049	.065
Physical pain	0.61	0.79	0.067	.011
Psychological discomfort	0.44	0.52	0.063	.018
Physical disability	0.08	0.10	0.062	.019
Psychological disability	0.24	0.26	0.038	.147
Social disability	0.08	0.12	0.063	.017
Handicap	0.11	0.13	0.017	.529
WHOQoL-Bref sum score	32.35	32.61	0.318	<.001
Quality of life	4.25	4.14	0.210	<.001
Health	3.93	3.89	0.145	<.001
Energy for everyday life	3.79	4.15	0.181	<.001
Financial situation	3.97	3.83	0.377	<.001
Ability to perform daily activities	3.90	4.18	0.163	<.001
Satisfied with self	3.92	3.96	0.168	<.001
Personal relationships	4.29	4.18	0.268	<.001
Living place	4.29	4.28	0.304	<.001

families represented all socio-economic levels, as the recruitment took place at the free of charge municipal maternity ultrasonography examinations that, are offered to all parturients with the coverage close to 100% [19]. The study included both mothers and fathers, which could also be regarded as strength of the study, especially since fathers are not included in most studies and associations between QoL and OHRQoL within a family sharing the same environment have not been reported earlier. There are some weaknesses in this study. Fathers were under-represented, in future studies, extra attention needs to be paid to retaining the fathers in the study and to get them to answer all the questionnaires. Recruiting was carried out at ultrasonography appointments in maternity clinics, which may be one reason why there are fewer participating fathers (57%) than mothers (69%) in this study. However, the participation rates are rather good for a birth cohort study. The sample comprised families expecting a baby, which means they represent limited age group in specific life situation.

This study showed similar results with previous studies where Finnish women have reported their OHRQoL to be better than men did [22] and that men perceive their oral health worse than women [23,24]. When comparing to national results pregnant families of this study seem to have better OHRQoL than Finnish adults of same age (30–34 years) and the association between the OHRQoL and the education is similar, possibly reflecting poorer oral health and psychosocial situation [22]. Pregnant or not the same OHRQoL dimensions (physical pain and psychological discomfort) had scores indicating poorest OHRQoL [21]. Pregnancy is a major life event which may have a positive effect on OHRQoL and overall QoL. Mothers reported lower overall QoL and had lower scores of energy for everyday life than fathers did. This may be a result of hormonal function and physical pregnancy changes which can have an effect on overall QoL, dental fear and personal relationship [25–27].

To our knowledge associations between OHRQoL and QoL has not been studied at population level previously, which makes comparison with other studies difficult. The QoL items which were most strongly associated within families were financial situation and living place followed by personal

relationships and QoL which is likely to be due to the fact that pregnant families share the same living environment. This finding suggests that the WHOQoL-Bref captures also the effects of environment dimension, specifically living conditions of the QoL. However, not more than moderate association between OHRQoL and QoL confirms the model of Sischo and Broder [3] that they are slightly overlapping constructs. However, this cross-sectional design does not confirm the suggested direction of the relationship. This calls for longitudinal studies including variables such as environment and use of oral health care services, and further looking at the effect of parental QoL and OHRQoL on their children oral health.

Conclusion

Considering the limitations of this study, it could be concluded that QoL is different construct than OHRQoL though they are slightly overlapping. They do not associate considerably within parents sharing the same living environment. Thus, measures of both and for each individual of the family are needed when assessing the effects of oral health and oral diseases on populations in a wider context.

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No potential conflict of interest was reported by the author(s).

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References

- [1] Wilson I, Cleary P. Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *JAMA*. 1995;273(1):59–65.
- [2] Baiju RM, Peter E, Varghese NO, et al. Oral health and quality of life: current concepts. *J Clin Diagn Res*. 2017;11(6):ZE21–ZE26.
- [3] Sischo L, Broder HL. Oral health-related quality of life: what, why, how, and future implications. *J Dent Res*. 2011;90(11):1264–1270.
- [4] Locker D. Measuring oral health: a conceptual framework. *Community Dent Health*. 1988;5(1):3–18.
- [5] Elheeny AAH. Determinants of oral-health related quality of life and overall quality of life among early adolescents with type-1 diabetes. *Community Dent Health*. 2020;37(3):199–204.
- [6] Locker D, Allen F. What do measures of 'oral health-related quality of life' measure? *Community Dent Oral Epidemiol*. 2007;35(6):401–411.
- [7] Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group. *Qual Life Res*. 2004;13(2):299–310.

- [8] The WHOQOL group. The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. *Soc Sci Med*. 1995;41(10):1403–1409.
- [9] Rocha N. S d, Power MJ, Bushnell DM, et al. The EUROHIS-QOL 8-item index: comparative psychometric properties to its parent WHOQOL-BREF. *Value Health*. 2012;15(3):449–457.
- [10] Allen PF. Assessment of oral health related quality of life. *Health Qual Life Outcomes*. 2003;1:40.
- [11] Zimmer S, Bergmann N, Gabrun E, et al. Association between oral health-related and general health-related quality of life in subjects attending dental offices in Germany. *J Public Health Dent*. 2010;70(2):167–170.
- [12] Barrios R, Bravo M, Gil-Montoya JA, et al. Oral and general health-related quality of life in patients treated for oral cancer compared to control group. *Health Qual Life Outcomes*. 2015;13:9
- [13] Alpkiliç Baskirt E, Ak G, Zulfikar B. Oral and general health-related quality of life among young patients with haemophilia . *Haemophilia*. 2009;15(1):193–198.
- [14] Queiroz Herkrath AP, Herkrath FJ, Rebelo MA, et al. Measurement of health-related and oral health-related quality of life among individuals with nonsyndromic orofacial clefts: a systematic review and meta-analysis. *Cleft Palate Craniofac J*. 2015;52(2): 157–172.
- [15] Mohamed N, Saddki N, Yusoff A, et al. Association among oral symptoms, oral health-related quality of life, and health-related quality of life in a sample of adults living with HIV/AIDS in Malaysia. *BMC Oral Health*. 2017;17(1):119.
- [16] Tamme JA, Rohnen M, Gaßling V, et al. Correlation of general and oral health-related quality of life in malocclusion patients treated with a combined orthodontic and maxillofacial surgical approach. *J Craniomaxillofac Surg*. 2017;45(12):1971–1979.
- [17] Balik A, Peker K, Ozdemir-Karatas M. Comparisons of measures that evaluate oral and general health quality of life in patients with temporomandibular disorder and chronic pain. *Cranio*. 2019; 1–11.
- [18] Karlsson L, Tolvanen M, Scheinin N, et al.; FinnBrain Birth Cohort Study Group. Cohort profile: the FinnBrain birth cohort study (FinnBrain). *Int J Epidemiol*. 2018;47(1):15–16j.
- [19] Kiuru S, Gissler M, Heino A. Perinatal statistics – parturients, deliverers and newborns. Helsinki: Finnish Institute for health and welfare; 2020.
- [20] Härkönen J, Lindberg M, Karlsson L, et al. Education is the strongest socio-economic predictor of smoking in pregnancy. *Addiction*. 2018;113(6):1117–1126.
- [21] Schmidt S, Muhlan H, Power M. The EUROHIS-QOL 8-item index: psychometric results of a cross-cultural field study. *Eur J Public Health*. 2006;16(4):420–428.
- [22] Lahti S, Suominen-Taipale L, Hausen H. Oral health impacts among adults in Finland: competing effects of age, number of teeth, and removable dentures. *Eur J Oral Sci*. 2008;116(3): 260–266.
- [23] Brennan DS, Teusner DN. Oral health impacts on self-rated general and oral health in a cross-sectional study of working age adults. *Community Dent Oral Epidemiol*. 2015;43(3):282–288.
- [24] Torppa-Saarinen E, Tolvanen M, Suominen A, et al. Changes in perceived oral health in a longitudinal population-based study. *Community Dent Oral Epidemiol*. 2018;46(6):569–575.
- [25] Hagqvist O, Tolvanen M, Rantavuori K, et al. Short-term longitudinal changes in adult dental fear. *Eur J Oral Sci*. 2018;126(4): 300–306.
- [26] Tolvanen M, Hagqvist O, Luoto A, et al. Changes over time in adult dental fear and correlation to depression and anxiety: a cohort study of pregnant mothers and fathers. *Eur J Oral Sci*. 2013;121(3 Pt 2):264–269.
- [27] Sundström Poromaa I, Comasco E, Georgakis MK, et al. Sex differences in depression during pregnancy and the postpartum period. *J Neurosci Res*. 2017;95(1-2):719–730.