



Concept Paper Form

Provisional Paper Title: Is parity associated with periodontal disease and other oral conditions? A longitudinal study.
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Objective of the study:

The belief that a woman's dental health is likely to deteriorate through having children remains common and may originate from the old wives' tale "a tooth per child". Epidemiological studies have suggested an association between parity (the number of times a women has given birth) and tooth loss (Christensen et al. 1998; Meisel et al. 2008; Russell et al. 2008; Ueno et al. 2013), and parity and periodontal attachment loss (Scheutz et al. 2002).

While causality for the association between parity and dental health cannot be established on the basis of existing data, several possible explanations for this association have been considered in a recent review (Morelli et al. 2018). Firstly, it may be due to greater dental disease experienced during pregnancy. The severity of gingival inflammation increases during pregnancy (Gonzalez-Jaranay et al. 2017; Hugoson 1971). Although, these changes are generally transient, without irreversible loss of periodontal attachment, and postpartum resolution can be expected (Cohen et al. 1969; Tilakaratne et al. 2000). For women with destructive periodontal disease, the effects of pregnancy and parity are unclear.

Secondly, it is also plausible that parity and socioeconomic position (SEP) have shared risk factors, increasing the incidence of disease or influencing its management. Education, one measure of SEP, is an important determining factor for women's fertility rate, following a gradient of fewer children with higher educational attainment. Data from the 2013 New Zealand Census indicated a fertility rate of 2.3 among women with no formal qualifications, 1.8 among those who had completed secondary school, and 1.4 among those with a tertiary qualification (Statistics NZ 2013). Higher levels of education are favourably associated with behaviours conducive to oral health including; higher

frequency of oral self-care and regular attendance for dental check-ups (Thomas et al. 2008), and a lower incidence of damaging health behaviours, such as smoking (Graham et al. 2010). Thus, the potential for confounding is considerable.

Our aims are as follows:

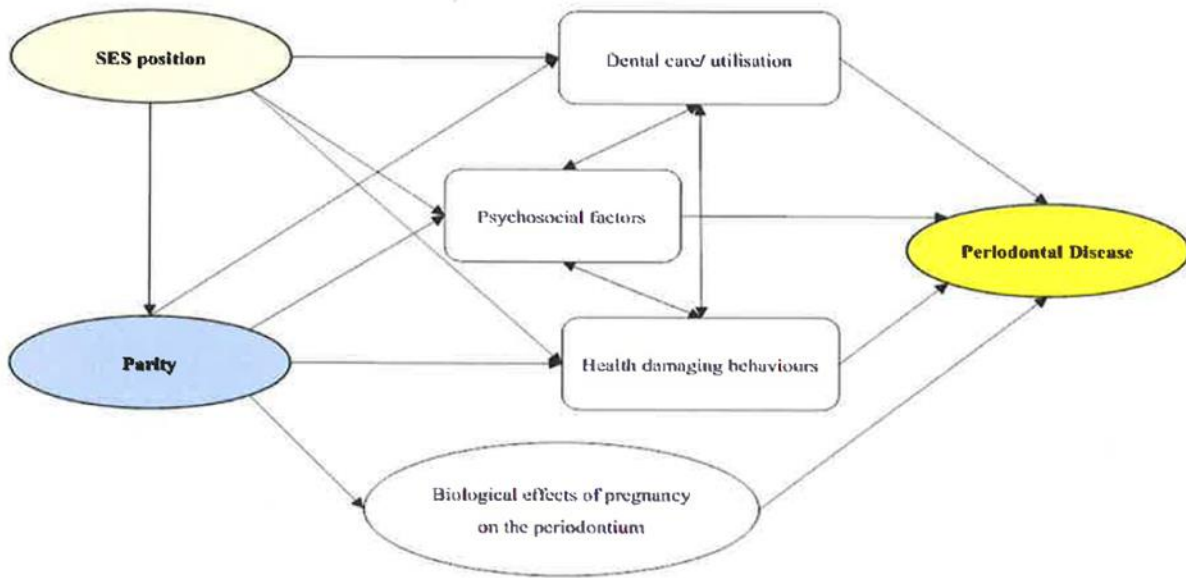
- i. To investigate whether greater parity is associated with periodontal disease, caries, and tooth loss.
- ii. If such an association is found, we will investigate whether this association may be confounded by socio-economic position

Data analysis methods:

We aim to explore whether an association exists between higher parity and dental health specifically periodontal disease, and caries, and tooth loss. The rationale for doing so is described below, in the section on 'significance of this study'.

This project will begin by reporting descriptive statistics to characterize changes in periodontal health to age 45 years. Primary analysis will investigate bivariate associations between parity and periodontal disease, parity and caries, and parity and tooth loss.

If an association is identified, confounders will be added to the model, to see if the association remains. The confounders for inclusion in this analysis are either SES index or highest education level achieved at each age (both to be used in separate analysis), smoking history and smoking status, dental service attendance, and plaque control. These confounders are outlined in the DAG diagram below. This analysis will be repeated for each dental outcome- periodontal disease, caries and tooth loss, although the below diagram in this instance just indicates periodontal disease.



If an association between higher parity and periodontal disease, or higher parity and caries, or tooth loss exists after the inclusion of confounders, it could suggest a biological link occurring during pregnancy. To account for this we will perform the analysis for both men and women, and if this hypothesis is supported, an association would only remain for women and not men.

Variables needed at which ages:

PARITY: Number of children born to male and female Study members by age 26, 32, 38 & 45

PREGNANCY: Pregnancy at the time of each assessment age 26, 32, 38 & 45

SES Position: variables for SES at each age 26 Elley-Irving 1985 scale, 32 NZSEI, 38, NZSEI-06, 45, NZSEI-13

EDUCATION: Highest education level by 26, 32, 38 & 45.

POTENTIAL CONFOUNDERS:

Smoking history by 2+6, 32, 38 & 45; smoking status at each age (current, ex-quit, never) 26, 32, 38 & 45.

DENTAL VARIABLES:

Use of dental services

- Dental attendance: Visited dentist for checkup or problem:

reason for last dental visit at 26, 32, 38 & 45.

- Usual reason for visiting the dentist, problem or checkup:
Usual reason for visiting the dentist at age 26, 32, 38 & 45: denx3_p45
- Length of time since last visit (months):
Months since last visit Age 26, 32, 38, 45 denx1_p45

PLAQUE CONTROL:

- Plaque Score at each age: plqscore26, plqscore32, plqscore38, plqscore45
- Tooth brushing (When do you usually brush your teeth) Age 26, 32, 38 & 45: dh2p45
- Tooth flossing (how frequently do you floss your teeth) 26, 32, 38 & 45: denx4_p45

DENTAL OUTCOME VARIABLES

CARIES:

- Number of decayed coronal surfaces (excluding carious retained roots): dscor26, 32, 38 & 45
- Number of filled coronal surfaces (excluding crowns): fscor26, 32, 38 & 45
- Number of decayed, missing and filled surfaces: dmfs26, 32, 38, 45
- Number of decayed, missing and filled teeth: dmft26, 32, 38, 45
- Number of decayed, and filled coronal surfaces: dfscpr26, 32, 38, 45
- 1+ teeth missing due to caries by each age msgtthprv26, 32, 38, 45

PERIODONTAL:

- % of teeth with bleeding on probing (BOP): bleedrate26, 32, 38, 45
- Prevalence of sites with 4+mm CAL at each age: cal4nsites26, 32, 38, 45
- % of sites with 4+mm CAL at each age: extentcal4p26, 32, 38, 45
- Prevalence of sites with 4+mm CAL at each age: cal4nsites26, 32, 38, 45
- % of sites with 4+mm CAL at each age: extentcal4p26, 32, 38, 45
- Prevalence of sites with 5+mm CAL at each age: cal5nsites26, 32, 38, 45
- % of sites with 5+mm CAL at each age: extentcal5p26, 32, 38, 45
- Prevalence of sites with 6+mm CAL at each age: cal6nsites26, 32, 38, 45
- % of sites with 6+mm CAL at each age: extentcal6p26, 32, 38, 45
- Mean clinical attachment loss (CAL) at each age: meanCAL26, 32, 38, 45

TOOTH LOSS

- Tooth loss due to caries at each age: mtcor26, 32, 38, 45

Significance of the Study (for theory, research methods or clinical practice):

Our study aims to explore whether an association exists between higher parity and poorer dental outcomes, specifically periodontal disease, and dental caries, and tooth loss. Currently, all evidence of an association between greater

parity and tooth loss, and greater parity and periodontal attachment loss is based on cross-sectional studies. The longitudinal Dunedin Multidisciplinary Study could contribute, and potentially expand on this evidence as there is extensive data of potential confounding factors that can be included in the analytical model when assessing for any association.

The significance of this study may be identifying parity related dental health disparities. It could highlight specific needs of women with young children regarding dental disease and access to dental care. The findings could therefore contribute evidence to support the implementation of dental programs aimed at women during pregnancy, or in the early years of raising children.

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