Dunedin Multidisciplinary Health & Development Study Concept Paper Form

Provisional Paper Title: Oral health in childhood as an early marker for general health in adulthood.
Proposing Author: Begoña Ruiz Conrads
Author's Email:
P.I. Sponsor: Jonathan Broadbent (if the proposing author is a student or colleague of an original PI)
Today's Date:03/04/2020

Objective of the study:

We intend to identify new strategies to reduce inequalities in New Zealand by exploring modifiable exposures during the early years of life, whether protective or harmful, and provide evidence of whether those who experience dental health problems early in life are likely to experience poor health later in life, and whether targeting these children for intensive preventive care may have benefits to general health in later life. Accordingly, our objective is to examine the association between childhood oral health and adult health outcomes including physical health, mental health, and markers for chronic diseases.

The quality of published, available data on the possible associations between oral and systemic disease is diverse due to the different study designs, participant populations, selection criteria, and measurement and reporting of outcome measures, all of which can lead to heterogeneous findings and conclusions. Many studies are cross-sectional and focus on the claim that oral health problems cause general health problems; however, any such associations observed are likely to be attributable to the many risk factors and health determinants shared between oral and other non-communicable chronic diseases. The question remains whether early-life-exposure to (oral-health-related) risk variables is associated with general health outcomes in adulthood. In other words, could poor childhood oral health play a role as a risk marker for poor general health later in life (adulthood)?

Data analysis methods:

We propose an approach, using data from both the Christchurch (CHDS) and Dunedin (DMHDS) Health & Development studies. Our analytic approach will be to conduct separate analyses for each study, but then to combine the two studies for a final 'DunChurch' analysis and interpretation, depending what data compatibility allows.

Primary Analysis:

The proposed analyses will involve estimating the extent to which dental health in childhood is associated with general health at age 38/40/45.

For each outcome variable:

- Model 1: control for sex only
- Model 2: control for sex and childhood SE position only
- Model 3: control for sex, childhood SE position, and IQ

Statistical analyses will be conducted using STATA 15.

Secondary Analysis:

If self-rated health items used in the Christchurch and Dunedin studies are acceptably similar, we will conduct a joint analysis using a mixed model. To match dental caries experience between the Christchurch and Dunedin studies for age 7, we may take an average between the deciduous dentition caries experience at ages 5 and 9 to impute an age 7 value. We may also account for the number of teeth present, if these data are available from the CHDS.

Variables needed at which ages:

Early life dental health variables

- CHDS: enrolment in School Dental Service at age 7 years (now Community Oral Health Service) – *Note that as the CHDS data were drawn from the SDS, unenrolled children would have been those lacking SDS data at age 7 years. Some investigation is required to verify that all these cases were based on age 7 dental examination*
- CHDS: dmfs/DMFS at age 7 years (mixed dentition)
- CHDS: untreated decay & early loss of deciduous teeth at age 7 years
- DMHDS: parents' self-rated oral health when Study members aged 5 years
- DMHDS: enrolment in SDS at age 5 years
- DMHDS: dmfs at age 5 years (deciduous dentition)
- DMHDS: untreated decay & early loss of deciduous teeth at age 5 years
- DMHDS: dental hygiene at age 5 years
- DMHDS: gingival bleeding at age 5 years

Age 38/40/45 general health variables

- CHDS
    - Self-rated health at age 40, specific items *(to be confirmed)*
- DMHDS
    - Body mass - BMI and body impedance at 45
    - Central adiposity (waist-hip) at age 45
    - Endothelial function at age 38
    - Retinal imaging (adjusted for arterioles) at age38
    - Walking speed at age 45
    - VO2max at age 45
    - IQ at age 45
    - Self-rated health at age 45
    - Mental health at age 45
    - Life success at 45
    - Relationship history
    - Employment history

Confounders/mediators:

- Sex
- Childhood socioeconomic position
- IQ

Other variables:

- Pregnancy - pregnant study members should be excluded from analyses

<u>Significance of the Study (for theory, research methods or clinical practice)</u>:

Oral diseases are classified as non-communicable diseases (NCDs) because they result from interactions between genetic, biological, behavioural and environmental factors (FDI, 2015). The primary causes of dental caries are related to diet and oral hygiene (plaque biofilm), whereas other oral conditions such as periodontal disease are attributable to exposure to tobacco, alcohol, and stress (Sheiham and Watt 2000). Thus, oral conditions share the social, economic and environmental underlying determinants and risk factors that characterise the four most prevalent NCDs worldwide (cancer, type 2 diabetes, cardiovascular and respiratory diseases) (Touger-Decker and van Loveren 2003). Risk factors for these NCDs include tobacco and alcohol use, sedentary life, poor dietary habits (including high consumption of salt, saturated fats and free sugars), and socio-structural aspects (including education, poverty, employment and trade policies) (FDI, 2015). Risk factors for chronic conditions frequently cluster in individuals (Sheiham and Watt 2000; Arena et al. 2015). The combined lifestyle factors are not isolated but rather interact to increase NCD risk, meaning that unhealthy habits as drinking, smoking, poor diet and a low level of physical activity will frequently occur together.

Inequality in access to optimal and timely dental care is a concern in New Zealand. This project will provide evidence on whether the same people with poor oral health as children, become the adults with poor general health by midlife. If so, our findings could help make recommendations so that the health-care system targets their preventive efforts into the children at higher risk.

Our research will also address the goal of driving innovation through the creation of new knowledge relating to health and wellbeing. It will enhance knowledge on the epidemiology of dental diseases and the long-term effectiveness of population- and person-level health interventions. Significant control of oral and other chronic diseases is a matter of combined task forces that engage not only lifestyle and behaviour modifications but the need for social alliances and policies, and a better understanding of commercial determinants. The evidence we might gather from this research could be of use to policymakers and sectors involved in health promotion to undertake more/the most beneficial decisions for society.

References:

Arena R, Guazzi M, Lianov L, Whitsel L, Berra K, Lavie CJ, Kaminsky L, Williams M, Hivert MF, Franklin NC, et al. 2015. Healthy Lifestyle Interventions to Combat Noncommunicable Disease - A Novel Nonhierarchical Connectivity Model for Key Stakeholders: A Policy Statement from the American Heart Association, European Society of Cardiology, European Association for Cardiovascular Prevention and Rehabilitation, and American College of Preventive Medicine. Mayo Clin Proc. 90(8):1082–1103. doi:10.1016/j.mayocp.2015.05.001.

FDI Oral Health Atlas: The Challenge of Oral Disease - A Call for Global Action. 2015. 2nd Editio. FDI World Dental Federation.

Sheiham A, Watt RG. 2000. The common risk factor approach: a rational basis for promoting oral health. Community Dent Oral Epidemiol. 28(6):399–406.

Touger-Decker R, van Loveren C. 2003. Sugars and dental caries. Am J Clin Nutr. 78(4). doi:10.1093/ajcn/78.4.881s.

Data Security Agreement

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Please keep one copy for your records and return one to the PI Sponsor

Please initial your agreement: (customize as necessary)

BRC	I am current on Human Subjects Training [CITI www.citigrogram.org] or equivalent.
BRC	My project is covered by the Dunedin Study's ethics approval OR I have /will obtain ethical approval from my home institution (please specify).
BRC	I will treat all data as "restricted" and store in a secure fashion. My computer or laptop is: • encrypted (recommended programs are FileVault2 for Macs, and Bitlocker for Windows machines) • password-protected • configured to lock-out after 15 minutes of inactivity AND • has an antivirus client installed as well as being patched regularly.
BRC	I will not "sync" the data to a mobile device.
BRC	In the event that my laptop with data on it is lost, stolen or hacked, I will immediately contact my PI Sponsor or Study Director, Richie Poulton (richie.poulton@otago.ac.nz).
BRC	I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper.
BRC	I will not post data online or submit the data file to a journal for them to post. *Some journals are now requesting the data file as part of the manuscript submission process. The Dunedin Study Members have not given informed consent for unrestricted open access, so we have a managed-access process. Speak to your PI Sponsor or Richie Poulton for strategies for achieving compliance with data-sharing policies of journals.*
BRC	I will delete all data files from my computer after the project is complete. Collaborators and trainees may not take a data file away from the office. The data remains the property of the Study and cannot be used for further analyses without an approved concept paper for new analyses.

Signature: _____ ____