Dunedin Multidisciplinary Health & Development Study Concept Paper Form

Provisional Paper Title: The role of occlusal features in predicting tooth wear: a prospective cohort study.
Proposing Author: Benny Shen
Author's Email: Benny Shen <shebe054@student.otago.ac.nz>
P.I. Sponsor: Jonathan Broadbent (if the proposing author is a student or colleague of an original PI)
Today's Date: 15/9/2020

Objective of the study:

The purpose of this study is to answer the following research questions:

- Is abnormal (high) overjet, overbite and tooth crowding associated with greater tooth wear?
- Is parafunctional activity or psychological stress and anxiety a mediator of this relationship?

Data analysis methods:

Analysis A

> We will investigate whether certain occlusal features (and dental aesthetic index score) are associated with tooth wear in each sextant and overall

Analysis B

> We will investigate whether oral parafunction and psychological factors are associated with tooth wear

Analysis C

> We will investigate whether any association between parafunction and tooth wear may be exacerbated by certain occlusal features.

Variables needed at which ages:

Sex, BMI

Variables needed from age 15:

> overjet, overbite, crowding, crossbite, and other DAI features.

Variables needed at age 45:

> overjet, overbite, crowding, crossbite, and other DAI features. Self-reported clenching, stress/anxiety, Tooth Wear Index (TWI) codes for tooth wear (not yet available), history of orthodontic treatment.

New variables:

> The Tooth Wear Index (TWI) proposed by Smith & Knight (1984) was designed to code for tooth wear cause by erosion, attrition, abrasion, and/or a combination of these factors. All teeth, with the exception of those missing or heavily restored, are coded on a five point ordinal scale on a surface level, with the buccal/lingual/occlusal, incisal and cervical surfaces having slightly different criteria (Smith & Knight, 1984). The scoring of tooth wear in this study will be conducted on intraoral scans.

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

Tooth wear is the non-carious loss of tooth tissue (Kelleher & Bishop, 1999). Although it is a relatively physiological process that accumulates as one ages, it may be deemed as pathological if the rate of loss exceeds that of the norm (Smith, 1984). Pathological tooth wear can affect quality of life through pain and have both aesthetic and functional limitations (Al-Omiri, 2006).

Tooth wear can be further classified as attrition, erosion, or abrasion, attributable to the different aetiologies of tooth wear (Kelleher & Bishop, 1999). Attrition is tooth wear associated with tooth-to-tooth contact and naturally, the incisal and occlusal surfaces of teeth are most at risk (Rees & Somi, 2018). This raises the question as to whether occlusal features or certain malocclusions predispose one to greater tooth wear.

Longitudinal studies conducted in the past to investigate this have yielded mixed results (Carlsson et al., 2003; Knight et al., 1997; Mwangi et al., 2009; Silness et al., 1993).

The rationale to undertake orthodontic treatment is often driven by aesthetic or functional needs. If an association were to exist between an occlusal feature and tooth wear, orthodontists may be more inclined to give it more weighting when identifying treatment need, such as when using the Index of Complexity Outcome and Need (ICON) (Daniels & Richmond, 2000). This index incorporates the presence of aesthetic handicaps and different features of malocclusions, all of which is given a weighting of relative importance and summated together to provide a score indicative of treatment need (Daniels & Richmond, 2000). For example, anterior vertical relationship (includes deep overbite) is given a weighting of 4, with one of the rationales being that a greater overbite is associated with more attritional tooth loss (Daniels & Richmond, 2000). Thus, this study may produce findings that require redefining of such indices.

This study also aims to add to the present understanding around the associations between occlusal factors and tooth wear as there is debate in the literature with mixed opinions. Cross-sectional studies such as Ritchard et al. (1992) found increased attrition with greater overbite and a decrease in attrition with increased overjet until a critical value, where it then went on to increase. Meanwhile, another cross-sectional study by Seligman & Pullinger (1998) found no clinically important associations between attrition and occlusal factors investigated (Angle's class). Longitudinal studies have also failed to reach a sound consensus. Silness et al. (1993) investigated 51 subjects over 12 years and concluded that overjet and overbite were possible predictors of wear in the central incisors of adolescents. Carlsson et al. (2003) concluded that postnormal occlusion at age 15 was associated with increased anterior tooth wear at age 35. On the other hand, Knight et al. (1997) and Mwangi et al. (2009) found no longitudinal relationships and could not postulate any predictive value of occlusal factors in tooth wear. A systematic review carried out in 2006 also incorporated some of the studies outlined above and by looking at associations between attrition and occlusal factors, failed to find evidence supporting the role of occlusal-based interventions in the management of tooth wear (Van't Spijker et al., 2006).

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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)

BS	I am current on Human Subjects Training [CITI www.citigrogram.org] or equivalent.
BS	My project is covered by the Dunedin Study's ethics approval OR I have /will obtain ethical approval from my home institution (please specify).
BS	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.
BS	I will not "sync" the data to a mobile device.
BS	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).
BS	I will not share the data with anyone, including my students or other collaborators not specifically listed on this concept paper.
BS	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.*
BS	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:

CONCEPT PAPER RESPONSE FORM

A To be completed by the proposing author:

Provisional Paper Title	The role of occlusal features in predicting tooth wear: a prospective cohort study.
Proposing Author	Benny Shen
Other Contributors	Jonathan Broadbent, Peter Mei, Mauro Farella
Potential Journals	Journal of Dental Research
Today's Date	15/9/2020
Intended Submission Date	

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B. To be completed by potential co-authors:

☐ Approved   ☐ Not Approved   ☐ Let's discuss, I have concerns

Comments:

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Please check your contribution(s) for authorship:

	Conceptualizing and designing the longitudinal study
	Conceptualizing and collecting one or more variables
	Data collection
	Conceptualizing and designing this specific paper project
	Statistical analyses
	Writing
	Reviewing manuscript drafts
	Final approval before submission for publication
	Acknowledgment only, I will not be a co-author

Signature: _____