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Exploring the relationship between dietary patterns, eating behaviour and fat taste detection thresholds

A thesis presented in partial fulfilment of the requirements for the degree of

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New Zealand

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Abstract

**Background:** Dietary pattern analysis provides a unique opportunity to explore combinations of food intake in conjunction with factors known to affect dietary intake. Fat taste sensitivity is an emerging correlate of dietary intake and, when impaired, has a proposed role in the dysregulation of dietary intake and eating behaviours.

**Aim:** To investigate dietary patterns, eating behaviours and fat taste detection thresholds in a group of New Zealand European women aged 19-45 years and identify associations between these factors.

**Methods:** Fifty post-menarche, pre-menopausal New Zealand European (NZE) women, (18-40 years) completed a partially validated, semi-quantitative 220-item food frequency questionnaire and a validated Three-factor eating questionnaire. Height and weight were measured to calculate body mass index (BMI) (kg/m²) and a bioelectrical impedance analysis (BIA) was completed to measure body fat percentage (BF%). During sensory testing protocol participants were exposed to increasing concentrations of ultra-heat treatment (UHT) milk/oleic acid (OA) solutions using the three alternative forced choice method (3-AFC). A naïve OA detection threshold was determined at the point where the participant identified the OA solution correctly three times at the same concentration. Dietary patterns were determined using principal component factor analysis. Associations between dietary pattern scores, taste sensitivity, eating behaviour and baseline characteristics were investigated.

**Results:** Three dietary patterns were identified: ‘unhealthy’, ‘healthy’ and ‘snacking’. Most women had low eating behaviour scores for cognitive restraint (90%) and disinhibition (74%). Hunger scores were comparatively higher, only 40% had low scores. Twenty-three participants (46%) were classified as hypersensitive and 54% were hyposensitive to OA taste. ‘Unhealthy’ pattern scores were inversely associated with cognitive restraint \( r=0.391, P=0.005 \) and positively associated with age \( r=0.297, P=0.036 \). ‘Healthy’ pattern scores were positively associated with cognitive restraint \( r=0.418, P=0.003 \), OA taste detection thresholds \( r=0.446, P=0.001 \) and BMI \( r=0.325, P=0.021 \). Women with low ‘snacking’ pattern scores were significantly older (31.7 years (24.7, 40.4)) than those with moderate scores (24.0 years (22.0, 28.1)) \( P=0.037 \). No relationship was found between OA taste detection thresholds and eating behaviour.
Conclusion: Participants in this study showed a significant link between habitual dietary intake and measures for eating behaviour and fat taste sensitivity. Both ‘healthy’ and ‘unhealthy’ dietary patterns were associated with one, or both, of these factors. An unexpected positive association between the ‘healthy’ dietary pattern and fat taste sensitivity indicates a need for further investigation to better understand this relationship. Findings from the current study support the use of dietary patterns to better represent habitual intake in future research investigating fat taste sensitivity or eating behaviour.

Key words: Habitual intake, dietary intake, fat taste sensitivity, cognitive restraint, disinhibition, hunger
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<th>Abbreviation</th>
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<tbody>
<tr>
<td>3-AFC</td>
<td>Three Alternative Forced Choice</td>
</tr>
<tr>
<td>5-HT</td>
<td>5-hydroxytryptamine</td>
</tr>
<tr>
<td>AMDR</td>
<td>Acceptable Macronutrient Distribution Range</td>
</tr>
<tr>
<td>AMPM</td>
<td>Automated Multiple Pass Method</td>
</tr>
<tr>
<td>ATP</td>
<td>Adenosine Triphosphate</td>
</tr>
<tr>
<td>BF%</td>
<td>Body Fat Percentage</td>
</tr>
<tr>
<td>BIA</td>
<td>Bioelectrical Impedance Analysis</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>CVD</td>
<td>Cardiovascular Disease</td>
</tr>
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<td>DASH</td>
<td>Dietary Approaches to Stop Hypertension</td>
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<td>Dutch Eating Behaviour Questionnaire</td>
</tr>
<tr>
<td>DFE</td>
<td>Daily Frequency Equivalent</td>
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<tr>
<td>EDTA</td>
<td>Ethylenediaminetetraacetic acid</td>
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<td>EXPLORE</td>
<td>Examining The Predictors Linking Obesity Related Elements</td>
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<td>FFA</td>
<td>Free Fatty Acid</td>
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<td>Food Frequency Questionnaire</td>
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<td>Intra-class Correlation</td>
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<td>LCFA</td>
<td>Long Chain Fatty Acid</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>NZE</td>
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<td>NZW-FFQ</td>
<td>New Zealand Women’s Food Frequency Questionnaire</td>
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<td>Acronym</td>
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<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>OA</td>
<td>Oleic acid</td>
</tr>
<tr>
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<td>Total Energy Intake</td>
</tr>
<tr>
<td>TFEQ</td>
<td>Three-factor Eating Questionnaire</td>
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<tr>
<td>TRC</td>
<td>Taste Receptor Cell</td>
</tr>
<tr>
<td>UHT</td>
<td>Ultra Heat Treatment</td>
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<td>World Health Organisation</td>
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