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Exploring the associations between sweet taste perception and habitual dietary intake in New Zealand European women

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

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in

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New Zealand

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Abstract

Background: Obesity is a global epidemic, leading to the development of chronic diseases. Sweet taste perception has been identified as a driver of habitual dietary intake, thus may contribute to excessive weight gain. Investigating these associations in New Zealand (NZ) European women may provide insight into the factors leading to obesity.

Aim: To investigate sweet taste perception and habitual dietary intake in a group of NZ women of two distinct body mass index (BMI) groups, obese (BMI ≥30 kg/m²) and normal (BMI ≥18.5 - 24.9 kg/m²), aged between 18-45 years, and to identify potential associations between these factors.

Methods: One hundred and forty eight NZ European women, aged 18-45 years, were recruited. Participants were presented with four different aqueous glucose concentrations to assess sweet taste perception. Sweet hedonic liking and perceived intensity of each concentration were rated on a general Labelled Magnitude Scale. Participants completed a 220-item validated food frequency questionnaire to assess dietary intake. Height and weight were measured to calculate BMI (kg/m²).

Results: Negative correlations between sweet hedonic liking and perceived sweet taste intensity were observed at the two highest glucose concentrations for the obese group, and at all four concentrations for the normal BMI group. Carbohydrate and sugar intake was significantly correlated with liking for the obese BMI group (r = 0.337, p = 0.004, and r = 0.313, p = 0.008, respectively). Significant associations between intensity ratings were found for the normal BMI group and with intake of fats, with polyunsaturated fat displaying the strongest correlation (r = 0.300, p = 0.008). Positive correlations between intake of desserts and liking ratings (r = 0.257, p = 0.032), and intake of starchy vegetables and intensity ratings (r = 0.298, p = 0.012) were observed for the obese BMI group at the highest glucose concentration.

Conclusion: The present study highlights a clear BMI-specific association between hedonic liking and perceived intensity of sweet taste, with intake of macronutrients and sugars, and with intake of sweet food groups, contributing to our understanding of the underlying aetiology leading to the development of obesity and chronic disease.

Key words: sweet taste perception, sweet hedonic liking, perceived sweet taste intensity, habitual dietary intake, obesity
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## Abbreviation List

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMDR</td>
<td>Acceptable Macronutrient Distribution Range</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>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>DFE</td>
<td>Daily Frequency Equivalent</td>
</tr>
<tr>
<td>DLW</td>
<td>doubly labelled water</td>
</tr>
<tr>
<td>EAR</td>
<td>Estimated Average Requirement</td>
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<td>EER</td>
<td>Estimated Energy Requirement</td>
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<tr>
<td>FFQ</td>
<td>food frequency questionnaire</td>
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<tr>
<td>GLAST</td>
<td>glutamate aspartate transporter</td>
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<tr>
<td>gLMS</td>
<td>general Labelled Magnitude Scale</td>
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<tr>
<td>PROMISE</td>
<td>PRedictors linking Obesity and gut MicrobiomE</td>
</tr>
<tr>
<td>PROP</td>
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<tr>
<td>ROMK</td>
<td>renal outer medullary potassium channel</td>
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<td>SNP</td>
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<td>taste receptor type 1 member 2</td>
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<tr>
<td>TE</td>
<td>total energy</td>
</tr>
<tr>
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<td>waist:hip ratio</td>
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