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Abstract

**Background:** Caffeine is one of the most widely used psychoactive substances worldwide, and can be found in a wide variety of food and beverages. It is regularly used for mental and physical stimulation; however its use has also been linked to adverse effects such as uncontrollable tremors, headaches, hospitalisation and even death. The caffeine intake of New Zealanders is unknown. There is currently no comprehensive tool available to assess caffeine intake patterns, influences, and adverse experiences in the New Zealand adult population.

**Aim:** To develop a questionnaire that accurately evaluates caffeine intake patterns, influences on consumption, and positive and negative experiences across a range of caffeinated products in New Zealand adults aged 15 years and over.

**Method:** The caffeine consumption habits questionnaire (CaffCo) was developed in two stages. Firstly, seven focus groups (n=43) were conducted across a range of demographic groups to explore factors influencing the consumption of tea, coffee, chocolate, kola drinks, energy drinks, caffeinated alcoholic premixed beverage (RTDs), caffeinated sports supplements, and caffeine tablets. Focus groups were audio recorded and then transcribed. NVivo software was used for qualitative analysis of the transcripts. Sections of text were coded by inductive analysis into 4 key themes, each with their own set of theme descriptors. Findings from the thematic analysis were then used to develop a draft of the online CaffCo using Qualtrics online survey software. Online pilot testing of CaffCo was then undertaken among focus group participants, academic staff and community members (n=227). The pilot test participants provided feedback on the comprehensibility and ease of use of the questionnaire.

**Results:** From thematic analysis of the focus group transcripts four main themes which influenced caffeinated product intake were identified. These were social drivers, environmental opportunity, functional expectations and individual experiences. The questionnaire items were derived from associations of products with theme descriptors.
Conclusion: The caffeine consumption habits questionnaire CaffCo was successfully developed as a result of this study. CaffCo has the potential to be used in New Zealand-wide studies of adults aged 15 years and over, or adapted for use in different population groups / countries to identify potentially harmful patterns of caffeine consumption across a range of caffeinated products. Pilot testing of CaffCo demonstrated an accurate reflection of influences of caffeinated product consumption, and identified three additional influences on consumption. Pilot testing of the resultant questionnaire enabled demonstration of content validity, construct validity and inter-rater reliability. Further testing of the CaffCo to determine test-retest reliability is warranted.

Key words: focus groups, survey, stimulant, patterns
Acknowledgements

I would like to acknowledge the support of the many people who have helped and encouraged me through this thesis journey, for which I am forever grateful.

To my wonderful supervisors; Dr Kay Rutherfurd-Markwick, Dr Ajmol Ali and Dr Carol Wham – thank you for the knowledge, support and confidence you have provided me with throughout this journey, it has been invaluable not only for this thesis but to carry forward with me into the future.

To the focus group and pilot test participants; without you this study would not have been possible. It was a pleasure meeting those of you who took part in focus groups and hearing feedback from those who gave their time to pilot test the questionnaire. A big thank you also to Ben Taufua for aiding me in contacting focus group participants and making me feel welcome at Pasifica @ Massey events and shared lunches.

To my friends and classmates; thank you for inspiring me, keeping me laughing and motivating me to be the best that I can be while still retaining my sanity.

Last but certainly not least - my family. Thank you for believing in me even on the days that I didn’t believe in myself. You have provided the foundations to build me up to where I am now; everything I achieve is testimony to the overwhelming love, support, and encouragement you show me day after day.
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AMP</td>
<td>Adenosine monophosphate</td>
</tr>
<tr>
<td>AR</td>
<td>Adenosine receptor</td>
</tr>
<tr>
<td>ATP</td>
<td>Adenosine triphosphate</td>
</tr>
<tr>
<td>CaffCo</td>
<td>Caffeine consumption habits questionnaire</td>
</tr>
<tr>
<td>CaffEQ</td>
<td>Caffeine expectancy questionnaire</td>
</tr>
<tr>
<td>cAMP</td>
<td>Cyclic AMP</td>
</tr>
<tr>
<td>CNS</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>DSM-5</td>
<td>Diagnostic and statistical manual of mental disorders</td>
</tr>
<tr>
<td>EFSA</td>
<td>European Food Safety Authority</td>
</tr>
<tr>
<td>FFQ</td>
<td>Food frequency questionnaire</td>
</tr>
<tr>
<td>FSANZ</td>
<td>Food Standards Australia New Zealand</td>
</tr>
<tr>
<td>IDC-10</td>
<td>International Classification of Diseases</td>
</tr>
<tr>
<td>MELAA</td>
<td>Middle Eastern, Latin American and African</td>
</tr>
<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>PNS</td>
<td>Peripheral nervous system</td>
</tr>
<tr>
<td>RTD</td>
<td>Ready to drink (alcoholic premixed drink)</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
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<td>WHO</td>
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