Mental health consumers' experiences of becoming evaluation researchers

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THE EFFECTIVENESS OF STRUCTURED FOOD PATTERN ADVICE FOR ACHIEVEMENT OF MACRONUTRIENT TARGETS IN NUTRITION INTERVENTION

A thesis submitted in fulfilment of the requirements for the award of the degree

Doctor of Philosophy

from

University of Wollongong

by

Lynda Jacqueline Gillen

Bachelor of Nutrition and Dietetics (Honours Class 1)
University of Wollongong

Department of Biomedical Science
2005
DECLARATION

I hereby declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Department of Biomedical Science, University of Wollongong, is my own work unless otherwise referenced or acknowledged. This document has not been submitted in whole, or in part, for qualifications at any other academic institution.

____________________

Lynda Jacqueline Gillen

14th April 2005
DEDICATION

To my parents, Mavis (deceased) and Jack an inspiration still at 91 years of age,
to my second mum Joan,
my sisters Jeanette, Helen and Tracey,
and to my children David, Todd, Laraine, Brant, Jarryd and Adam,
and close friends Rose, Alan, Leonie, Paul, Barbara, Pat and Keely and Kay
for their continued support
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>%E</td>
<td>Percentage of energy</td>
</tr>
<tr>
<td>ADA</td>
<td>American Diabetes Association</td>
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<td>ADIPS</td>
<td>Australasian Diabetes in Pregnancy Society</td>
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<td>AHA</td>
<td>American Heart Association</td>
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<tr>
<td>ALA</td>
<td>Alpha-linolenic acid</td>
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<tr>
<td>ANOVA</td>
<td>Analysis of variance</td>
</tr>
<tr>
<td>APD</td>
<td>Accredited Practicing Dietitian</td>
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<tr>
<td>AusNut</td>
<td>Australian nutrient tables</td>
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<tr>
<td>BMI</td>
<td>Body mass index</td>
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<tr>
<td>BMR</td>
<td>Basal metabolic rate</td>
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<tr>
<td>CHD</td>
<td>Coronary heart disease</td>
</tr>
<tr>
<td>CHO</td>
<td>Carbohydrate</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular disease</td>
</tr>
<tr>
<td>DASH</td>
<td>Dietary Approaches to Stop Hypertension</td>
</tr>
<tr>
<td>DH</td>
<td>Diet history</td>
</tr>
<tr>
<td>DHA</td>
<td>Docosahexaenoic acid</td>
</tr>
<tr>
<td>EE</td>
<td>Energy expenditure</td>
</tr>
<tr>
<td>EE&lt;sub&gt;est&lt;/sub&gt;</td>
<td>Estimated energy expenditure</td>
</tr>
<tr>
<td>EI&lt;sub&gt;rep&lt;/sub&gt;</td>
<td>Reported energy intake</td>
</tr>
<tr>
<td>EPA</td>
<td>Eicosahexaenoic acid</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>FAO</td>
<td>Food Authority Organization</td>
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<tr>
<td>FPG</td>
<td>Fasting plasma glucose</td>
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<td>FR</td>
<td>Food record</td>
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<tr>
<td>GDM</td>
<td>Gestational diabetes mellitus</td>
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<tr>
<td>GI</td>
<td>Glycaemic Index</td>
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<tr>
<td>HDL-C</td>
<td>High density lipoprotein cholesterol</td>
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<tr>
<td>IGT</td>
<td>Impaired glucose tolerance</td>
</tr>
<tr>
<td>ISSFAL</td>
<td>International Society for the Study of Fatty Acids and Lipids</td>
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<tr>
<td>KANWU</td>
<td>Kuopio, Aarhus, Naples, Wollongong, Uppsala</td>
</tr>
<tr>
<td>kcal</td>
<td>Kilocalorie</td>
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<tr>
<td>kJ</td>
<td>Kilojoule</td>
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<tr>
<td>Kg</td>
<td>Kilogram</td>
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<tr>
<td>L</td>
<td>Litre</td>
</tr>
<tr>
<td>LDL-C</td>
<td>Low density lipoprotein cholesterol</td>
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<tr>
<td>LCh-3</td>
<td>Long chain omega-3 fatty acid</td>
</tr>
<tr>
<td>MNT</td>
<td>Medical Nutrition Therapy</td>
</tr>
<tr>
<td>mmol</td>
<td>Millimoles</td>
</tr>
<tr>
<td>MUFA</td>
<td>Monounsaturated fatty acid</td>
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<tr>
<td>n-3</td>
<td>Omega-3</td>
</tr>
<tr>
<td>n-6</td>
<td>Omega-6</td>
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<tr>
<td>OGTT</td>
<td>Oral glucose tolerance test</td>
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<tr>
<td>P</td>
<td>Confidence value</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
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<tr>
<td>PAL</td>
<td>Physical activity level</td>
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<tr>
<td>P:S</td>
<td>Polyunsaturated: saturated fatty acid ratio</td>
</tr>
<tr>
<td>PUFA</td>
<td>Polyunsaturated fatty acid</td>
</tr>
<tr>
<td>R</td>
<td>Correlation coefficient</td>
</tr>
<tr>
<td>RBC</td>
<td>Red blood cell</td>
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<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SEM</td>
<td>Standard error of the mean</td>
</tr>
<tr>
<td>SFA</td>
<td>Saturated fatty acid</td>
</tr>
<tr>
<td>T2DM</td>
<td>Type 2 diabetes mellitus</td>
</tr>
<tr>
<td>Total-C</td>
<td>Total cholesterol</td>
</tr>
<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
</tr>
<tr>
<td>VLDL-C</td>
<td>Very low density lipoprotein cholesterol</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</table>
PUBLICATIONS

Peer reviewed publications in support of this thesis


**Gillen L.J.** Tapsell LC. The development of food groupings to guide dietary advice for people with diabetes. *Nutr Diet*: In review.

**Gillen L.J.** Tapsell LC. Advice that includes food sources of unsaturated fat supports future risk management of Gestational Diabetes Mellitus. *J Am Diet Assoc* 2004;104(12):1863-1867

**Gillen L.** Tapsell LC, Martin GS, Daniels S Knight S, Moses RG. The type and frequency of consumption of carbohydrate-rich foods may play a role in the clinical expression of insulin resistance during pregnancy. *Nutr Diet* 2002;59(2):135-143


Presentations in support of this thesis

**Gillen L.** Tapsell L. Advice including walnut supplementation may assure achievement of fatty acid recommendations during diabetes management. Proceedings of the 5th International Conference on Nutrition and Fitness, Athens, Greece, 2004

**Gillen L.**, Kennedy M, Tapsell L, Patch C, Bare M, Moses R. Programmed services produce better dietary adherence than flexible follow-up in diabetes management. Proceedings of the 5th International Conference on Nutrition and Fitness, Athens, Greece, 2004
Gillen L, Tapsell L. Targeting polyunsaturated-rich foods during low fat advice strategies for diabetes management ensures a better fatty acid profile than low fat advice alone. Proceedings of the 22nd National Dietitians Association of Australia Conference, Melbourne, Australia, 2004


Gillen LJ. Tapsell LC. Dietary advice targeting fatty acid guidelines for gestational diabetes mellitus requires reference to additional food groups. Proceedings of the ADS and ADEA Annual Scientific Meeting, Adelaide, Australia, 2002


Gillen L, Tapsell L. Utilising the diet history to formulate dietary advice for intervention research. Mahidol University 2001?


Tapsell L, Gillen L, Patch C. Linking dietetic research to dietetic practice using metabolic syndrome as a case study. 22nd National Dietitians Association of Australia Conference, Melbourne, Australia, 2004 [workshop presentation]

Tapsell L, Gillen L, Patch CS, Bare M, Batterham M, Owen A. Walnuts deliver ideal fatty acid profiles in the dietary management of type 2 diabetes mellitus. Experimental Biology. Washington DC, 2004

Bare M, Gillen L, Patch C. Tapsell L. Patterns of test food consumption in response to dietary advice to increase n-3 PUFA intakes. Proceedings of the 5th International Conference on Nutrition and Fitness, Athens, Greece, 2004

Bare M, Patch C, Gillen L, Tapsell L. Patterns of test food consumption in response to dietary advice in a clinical trial. Proceedings of the 22nd National Dietitians Association of Australia Conference, Melbourne, Australia, 2004
Tapsell LC, Gillen LJ, Barnard JA, Jenkins AB, Moses RG. Optimising dietary fat to prevent obesity? A dietetic approach in the context of gestational diabetes mellitus. AHMRC, 2002

Non-peer reviewed publications


Other publications

Tapsell LC, Gillen L, McMahon AT, Gutteridge IF, Owen AJ. Congruence of red meat descriptors reported by a group of elderly volunteers and those found in an Australian nutrient database. Proceedings of the Nutrition Society of Australia, Hobart, 2003
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ABSTRACT

Dietary advice to individuals in Medical Nutrition Therapy for the prevention and treatment of disease should be based on the best available evidence. A review of the evidence identifies appropriate nutrients on which to base advice. However, evidence to support the application of advice for the achievement of nutrient targets in free-living individuals has not been adequately determined. In this doctoral program the hypothesis tested was that structured advice based on the pattern of intake from food group sources of required nutrients will result in better achievement of dietary targets and thereby clinical outcomes than advice based on existing core food guides.

In developing a more comprehensive food guidance system, nutritional therapy for diabetes treatment provides an appropriate example in which individual macronutrients and the type of fat are targets of advice. A cross-sectional survey of the food habits of a sample of women with Gestational Diabetes Mellitus was conducted to confirm the relevance of food patterns to specific clinical outcomes, in this case, glucose tolerance. Secondly, foods commonly consumed by these women enabled the identification of food groups likely to impact on macronutrient and fat profiles within the diet. Subsequent determination of a total diet model demonstrated that a structured approach to dietary advice relating to nine food groups (vegetables, starch, fruit, milk, soymilk, meat, oily fish/soybeans, monounsaturated and polyunsaturated fats) for the identification of sources of saturated and unsaturated fats would achieve nutritional adequacy and targets for
energy and individual macronutrients with minimal variation. This then formed the basis of individualised advice in dietary intervention trials.

Applying the newly developed advice system in an intervention trial demonstrated its feasibility in women with Gestational Diabetes Mellitus. Compared with a similar group receiving standardised low fat advice, 80% achieved saturated and polyunsaturated fat targets compared with nil in the standard intervention group, without detrimental changes to the overall macronutrient profile.

The clinical effectiveness of the advice system was again demonstrated in a second trial. In this study men and women with Type 2 Diabetes Mellitus followed two alternative patterns of advice based on the newly developed food guidance system for six months. In these two groups respectively, 79% and 100% of subjects, achieved targeted proportions of total polyunsaturated fat compared to 25% in a control group (p<0.05). In addition, greater improvements were achieved for HDL-cholesterol (+18% and +21% compared to +13% control, p<0.05) and triglyceride levels (-12% and -11% compared to -2% control).

In summary, this thesis has outlined the development and evaluation of an advice system to support nutrition intervention in people with diabetes. Individualised advice based on a structured food pattern identifying food group sources of target nutrients was both feasible to implement and effective in practice. The application of this knowledge will help support nutrition intervention research as well as provide an evidence-based approach to Medical Nutrition Therapy.