

Stages of Change for Fruit and Vegetable Intake and Dietary Fat Modification in Maori Women: Some relationships with body attitudes and eating behaviours

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We examined the influence of psychological factors (social physique anxiety, dietary self-efficacy), difficulties associated with making dietary changes and food security on stages of change for dietary fat reduction and increased fruit and vegetable intake in a non-probability convenience sample of New Zealand Maori women (N = 111) recruited through several acquaintanceship networks of the first author. We found that dietary fat intake, dietary self-efficacy and difficulties associated with changing fruit intake were significantly related to the stages of change for both dietary fat intake reduction and increased fruit and vegetable intake. In addition, difficulties associated with reducing dietary fat intake were significantly related to the stages of change for dietary fat intake reduction. As one moved along the change continuum, dietary fat intake and barriers associated with dietary change steadily reduced, whilst dietary self-efficacy increased. Sixty eight percent of the sample were categorised as either overweight or obese, and these participants reported significantly more anxiety and lower self-efficacy. Discussion focussed on the applicability of the study variables in the implementation of dietary related interventions for Maori women.

some insights into the psychology of eating behaviour change (in particular dietary fat intake and fruit and vegetable consumption) among Maori women. The Western cultural ideal for thinness is not particularly salient for many Maori, with a greater degree of tolerance toward obesity being expressed (Durie, 1998; Sachdev, 1990). The Rapuora Study, a pioneering health study of Maori women by the Maori Women's Welfare League (Murchie, 1984) showed that despite being aware of the negative consequences of obesity, Maori women did not take appropriate decisive action on the behaviours that were believed to be the cause.

One important factor is the location of individuals at different stages of readiness to change. Health behaviour change is clearly not an "all or nothing" phenomena. The Stages of Change model (Cowan et al., 1995; Prochaska & DiClemente, 1992) considers a continuum from *pre-contemplation* (not intending to make changes) to *contemplation* (considering a change), to *preparation* (making small changes), to *action* (actively engaging in the new behaviour), to *maintenance* (sustaining the change over time).

The path from pre-contemplation to maintenance is not a smooth one and people usually relapse and possibly go through the stages repeatedly before they achieve stability. The model has been applied to quitting smoking (Abrams et al., 2000) and a range of other behaviours such as taking up exercise (Courneya, 1995),

More than one billion adults across many parts of the world are obese or overweight (World Health Organisation, 2003). The potential negative health consequences of excess weight are extensive and have been well documented (e.g., Type 2 diabetes, cardiovascular disease, hypertension, stroke, various forms of cancer, gallbladder disease, musculoskeletal disease, respiratory problems, lipid abnormalities). The social and psychological burdens of obesity (including prejudice, discrimination, stereotyping) are similarly far-reaching (Wolf, 1998).

Overweight and obesity are salient issues among the New Zealand Maori population. Around 61% of Maori women are obese or overweight, and

over 78% of Maori women aged 45 years and over are in this weight category (Grigg & Macrae, 2000). The etiology of excess weight is multifaceted with physiological predispositions, socio-economic and cultural factors playing a role (Cowan, Britton, Logue, Smucker, & Milo, 1995). Much has been written about the relative importance of different dietary components in contributing to this problem (e.g., Howarth, Saltzman, & Roberts, 2001). A reduction in dietary fat intake (particularly saturated fat) and a concomitant increase in fruit and vegetable consumption are integral parts of attempts to reduce the rates of overweight and obesity (5+ a day, n.d.; Grigg & Macrae, 2000; Ministry of Health, 2000).

The current research aims to provide

getting mammograms (Rakowski, Jube, & Marcus, 1992) and consuming a diet high in fruit and vegetables (Laforge, Greene, & Prochaska, 1994).

Recent research has provided some additional insights into eating behaviour change. Krane, Stiles-Shipley, Waldron and Michalenok (2001) noted the importance of considering body satisfaction, eating attitudes and social physique anxiety in their study of female athletes and exercisers. Social physique anxiety is an individual self-presentation concern that emerges from the belief that evaluations are being passed about one's body or physical appearance. This concern is associated with an increased risk of women engaging in unhealthy eating behaviours (Krane et al., 2001). The notion of social physique anxiety may help predict the stages of change for eating behaviour.

Schwab (2001) focussed on dietary fat reduction and self-efficacy for health related diet behaviours in her study of heart disease risks in post-menopausal women. The generic notion of self-efficacy refers to the estimate of one's ability to successfully complete a task, and intervention efforts that focus on increasing efficacy expectations may prove fruitful. High self-efficacy is believed to have an influence on the action and maintenance stages of change when applied to smoking cessation (Schwab, 2000). As cognitions relating to oneself serve as a major component in motivation (Schwarzer, 1993), the concept of self-efficacy may further help to predict and understand the various stages of change for eating behaviour.

An array of contextual factors may also be correlated to the stages of change model (Trudeau, Kristal, Li, & Patterson, 1998). Difficulties associated with making dietary changes relating to fat reduction and fruit and vegetable intake were documented in the *National Nutrition Survey* (Ministry of Health, 1999). These included issues such as cost, availability, quality, preparation time, taste and other factors that might discourage individuals from attempting dietary change. These sorts of difficulties are considered in the research reported herein. They are seen as important in the sense that they may impede an individual from moving into the next stage of change for eating behaviour.

Food security is a term that describes an individual's socio-economic condition with respect to food affordability and availability. The Ministry of Health defined the concept as "an internationally recognised term that encompasses the ready availability of nutritionally adequate and safe foods, and the assured ability to acquire personally acceptable foods in a socially acceptable way" (1999, p.100). Results from the *National Nutrition Survey* found that 36% of Maori women ran out of food, 'sometimes' or 'often', due to a lack of money. Maori women aged 25-44 years were most likely to state that their household ran out of food due to a lack of money, with 33% reporting that they could afford to eat properly only 'sometimes'. The impact of such circumstances are reflected in the fact that 31% of Maori women were more likely to feel stressed 'sometimes' or 'often' due to a lack of money for food (Ministry of Health, 1999). Food security becomes important with respect to the stages of change in the sense that altering patterns of food consumption is difficult when there is direct pressure on the food supply. Thus, socio-economic factors influence the propensity with which individuals might engage in eating behaviour change.

The present study sought to consider the following research *aims*:

- Firstly, the role of social physique anxiety and dietary self-efficacy has been documented in specialist populations (e.g., female athletes, students) but the extent and nature of the relationships between these variables and stages of dietary change in Maori women is unclear. The current research will be used as a tool to gain insight into ways to encourage individuals in the belief that dietary change is achievable within their lifestyle.
- Secondly, the kinds of difficulties individuals report associated with changing the fat, fruit and vegetable consumption aspects of their diet warrant further investigation (Ministry of Health, 2000). Kingi (1998) noted that similar kinds of contextual difficulties were significant barriers for Pacific Island women attempting to initiate exercise programmes.
- Thirdly, we sought to consider the issue of food security. The essential

question here is how this relates to changing eating behaviour, and to the other psychological and demographic variables under consideration.

Method

Participants

The sample was a non-probability convenience sample collected through several acquaintanceship networks of the first author. The primary network utilised female students who were bursars of the Te Rau Puawai programme¹ at Massey University. Therefore, participants recruited via this method were all Maori female students studying toward a variety of mental health qualifications. The second method involved distributing questionnaires via a snowballing method to family, friends, and colleagues eligible to participate in the research. A total of 111 women, from various parts of New Zealand, who were of Maori descent took part in the study. The participants ranged in age from 17 to 58 years old, with a mean age of 36.

Measures

Dietary fat intake was assessed using a 10-item food habits questionnaire, modelled on those Kristal, Shattuck and Henry (1990), and Yaroch, Resnicow, Petty and Khan (2000). Ten of the original eighteen questions from Yaroch et al.'s (2000) study were used in the present investigation. Each of the questions began with "How often do you...", whilst a four-point, Likert-type probability scale, varying in intervals from 1 to 4, was used to categorise responses according to frequency of behaviour (never, occasionally, usually, always). Of the ten questions, four directly assessed low-fat behaviours, such as consuming low-fat and non-fat foods. For example, "How often do you drink low-fat or non-fat milk?", "How often do you eat meals without meat (a vegetarian meal)?" Three of the questions related to high-fat behaviours and assessed the consumption of high-fat foods (e.g., "How often do you add butter or margarine to vegetables?"). The remaining three questions were related indirectly to fat-intake behaviours (e.g., "How often do you snack on raw vegetables?"). A total score was calculated where a higher score

represented lower fat-intake behaviours (possible range 10 to 40).

The stages of change for fruit and vegetable intake and dietary fat modification were assessed using an eight-item scale. The maintenance, action and preparation stages for each of the behaviours (e.g., fruit/vegetable intake and dietary fat modification) were assessed individually. The questions to assess stage of change for fruit and vegetable intake were similar to those used by Laforge et al. (1994). Assessment of the stages of change for dietary fat modification was done using questions modelled on those of Schwab (2000).

The pre-contemplation stage of change for fruit/vegetable intake was defined as an absence of consideration and/or initiative to effect dietary change, for either behaviour, within the next four weeks. The contemplation stage was defined by a consideration of changes, within the past month, that the individual could make to increase fruit/vegetable consumption and reduce dietary fat. The preparation stage was characterised by an active intention, within the past month, to increase daily fruit/vegetable consumption and decrease dietary fat intake. The action stage of change was similarly defined, however, the time period for carrying out the behaviours was six months or less. The maintenance stage of change for fruit/vegetable intake was defined as the consistent, daily consumption of five servings of fruit and/or vegetables for more than six months, whilst the maintenance stage of change for dietary fat modification was defined as consistently avoiding the consumption of food high in fat for more than six months. Responses were categorised as either yes or no. The coding algorithm reported in Curry, Kristal and Bowen (1992) was used to categorise individuals into the five stages of change for each type of behaviour.

Schwarzer's (1993) scale of self-efficacy for health-related diet behaviours was used to record how individuals felt about their ability to make dietary changes, and included such statements as: "I know for sure that I could adhere to a healthy diet if I really wanted to", "I doubt that I could manage to really carry through

a healthy diet", "I usually can't resist the temptation of delicious, but unhealthy food". Self-efficacy ratings were obtained using a four-point, Likert-type probability scale (not at all, barely true, moderately true, exactly true), reflecting the extent to which respondents agreed that the statements represented their ability to make dietary changes. A total score was calculated where higher scores indicated higher levels of diet-related self-efficacy.

Barriers to Dietary Change: The 1997 National Nutrition Survey's scale of 'difficulties involved in making dietary changes' (Ministry of Health, 1999) was used to measure the barriers to dietary change. Assessment of the barriers to change was done using three statements that identified any difficulties participants had, or were experiencing, in their attempts to reduce their consumption of foods high in fat and increase their fruit and vegetable intake.

For fat intake the statement was worded thus: "I find it difficult to reduce the amount of butter, margarine, oils, or other foods high in fat because...". A total of 13 possible difficulties that ranged from statements such as "They taste good" to "I wouldn't enjoy food as much". Respondents could tick as many items as applied to them.

For fruit and vegetable intake the statements were worded: "I find it difficult to increase the amount of fruit/vegetables in my diet because...". Fifteen fruit intake difficulties were identified and included such statements as "Cost too much" and "Fruit is not good for me". A total of 17 possible difficulties were identified concerning vegetable intake such as "I don't like vegetables" and "Pesticides or chemicals on vegetables". The final statement of "None of the above" was included as an option at the end of each set of difficulties. A total number of difficulties score was calculated for each of the three types of dietary change. Full item wordings are given in the 1997 National Nutrition Survey (Ministry of Health, 1999).

Social physique anxiety was assessed using the 12-item Social Physique Anxiety Scale (Hart, Leary, & Rejetski, 1989). Each question was used to identify the participant's

level of anxiety about their figure/physique, in social situations, and included such statements as: "I am uncomfortable with the appearance of my physique/figure...", "When I look in the mirror I feel good about my physique/figure" and "It would make me uncomfortable to know that others were judging my physique/figure". A five-point, Likert-type scale was used to categorise responses depending on the degree to which the statement was characteristic or true of the participant (not at all, slightly, moderately, very or extremely). A mean total score was calculated across the items.

Seven items from the 1997 National Nutrition Survey's scale of 'household food security' were used to assess food security. The items included such statements as: "I/we can afford to eat properly" and "I feel stressed because of not having enough money for food". Responses were categorised using a four-point Likert-type scale, reflecting the degree of agreement between the statements and participants' experiences within the past year (often, sometimes, never, don't know). A total food security score was calculated across the seven items.

Demographic variables of height, weight, age, annual family income, involvement with family/friends, current pregnancy status and age of children were recorded. Two additional items were included also: "Which statement best describes how you feel about your ability to get along on your income" and "Which statement best describes how satisfied you are with your overall standard of living" (Eve, 1988). A four-point, Likert-type scale was used to categorise responses to the first question ('can't make ends meet', 'have just enough money', 'have enough with a little left over' and 'always have money left over'). The responses for the latter items included: 'very dissatisfied', 'dissatisfied', 'satisfied' and 'very satisfied'.

Procedure

Questionnaires were distributed via the acquaintanceship networks of the first author. The purpose of the study was outlined, which was to investigate Maori women's attitudes and behaviours in relation to food and

eating. The participants were assured of their rights and confidentiality, and the questionnaires were returned to the researchers.

Results

The demographic characteristics of the sample are reported in Table 1. The median age was 36 years. Most women reported being able to "get along on their income" and being relatively satisfied with their "overall standard of living". Net household income ranged from \$9000 to \$130,000 per annum although it is unclear as to whether some respondents interpreted the question correctly (i.e., as 'net' rather than 'before tax' income). Fourteen percent of respondents had children aged three years and younger and most respondents reported social contacts with friends and relatives in "the past week". Body Mass Index (kg/m²) indicated that approximately 32% of the sample were in normal weight range, 43% were overweight, and 25% were obese, using cut-offs specified in Tikanga Oranga Hauora (Te Puni Kokiri, 2000) as being appropriate for Maori.

The categorisation of the stage of change variable was modified by merging some of the stages (due primarily to a relatively small number in the pre-contemplation stage). The Pre-contemplation and Contemplation stages were merged and renamed "Pre-action". The Preparation and Action stages were merged and labelled "Action". The final "Maintenance" stage remained unaltered. These modified categories continued to reflect the notion of a change continuum inherent in the stages of change model as originally conceptualised. Other studies (e.g., Kraft, Sutton, McCreath, & Reynolds, 1999) report similar modifications to the stages of change for particular health behaviours.

Means, SD's and, where appropriate, reliabilities (Cronbach's alpha) for dietary self-efficacy, social physique anxiety, food security, dietary fat intake, barriers to the three types of dietary change (fruit intake, vegetable intake, fat reduction) are reported in Table 2 (by stage of change for fruit and vegetable intake) and Table 3 (by stage of change for dietary fat modification).

Table 1. Demographic characteristics of the sample

	Height (cm)	Weight (kg)	Age (years)	Income (\$NZ)
Mean	162.98	75.84	36.02	42089.02
SD	7.73	17.10	10.70	24385.33

For stage of change for fruit and vegetable intake (see Table 2), a series of one-way between-subjects analyses of variance indicated that differences between the groups were significant for amount of dietary fat intake, dietary self-efficacy, and difficulties associated with changing fruit intake. As indicated in the Table, the partial *Eta*² statistics showed that the stage of change for fruit and vegetable intake accounted for from 3% (social physique anxiety) to 13% (difficulties associated with changing fruit intake) of the variation in the dependent variables. The most commonly reported difficulty associated with changing fruit intake was simply that "they cost too much" (35% of respondents). Other commonly reported difficulties were "don't always have fruit at home" (34%), "can't store fruit for too long" (16%), and "often of poor quality" (15%).

Considering the results presented in Table 3 for dietary fat modification, a series of one-way between-subjects

analyses of variance indicated that differences between the groups were significant for amount of dietary fat intake, dietary self-efficacy, and difficulties associated with increasing fruit intake and reducing dietary fat intake. As indicated in the Table, the partial *Eta*² statistics showed that the stage of change for dietary fat reduction accounted for from 2% (food security) to 41% (dietary fat intake) of the variation in the dependent variables. The most commonly reported difficulties associated with reducing fat intake was that "they taste good" (52%), "they're convenient" (32%), and the respondent's "wouldn't enjoy food as much" without them (19%).

A series of post-hoc tests (Tukey's HSD) were calculated for each significant dependent variable. Focussing on fruit and vegetable intake, the general picture that emerged was one where dietary fat intake and difficulties or barriers associated with increasing fruit intake steadily reduced,

Table 2. ANOVA results by stage of change for fruit and vegetable intake

Variable	Pre-Action	Action	Maintenance		F	Partial <i>Eta</i> ²
	Mean SD	Mean SD	Mean	SD		
Dietary Self-Efficacy	13.45 2.61	13.91 2.66	15.13	2.08	3.40*	0.07
Social Physique Anxiety	30.60 10.20	31.60 10.57	27.54	9.61	0.71	0.03
Food Security	10.71 2.53	11.32 2.44	10.36	1.88	1.85	0.04
Dietary Fat Intake	21.81 4.24	23.16 3.91	24.79	3.12	4.36*	0.02
Barriers to Fruit Intake	2.13 1.67	1.56 1.36	0.71	1.09	8.12***	0.13
Barriers to Vege Intake	1.41 2.02	1.02 1.49	0.53	1.21	2.33	0.04
Barriers to Fat Intake	2.18 2.08	1.98 1.98	1.56	1.35	0.90	0.00

p*<0.05, **p*<0.001

Table 3. ANOVA results by stage of change for dietary fat modification

Variable	Pre-Action	Action	Maintenance		F	Partial <i>Eta</i> ²
	Mean SD	Mean SD	Mean	SD		
Dietary Self-Efficacy	13.05 2.87	14.15 2.28	14.97	2.37	4.20*	0.08
Social Physique Anxiety	28.90 11.30	32.45 10.31	28.40	9.89	0.93	0.04
Food Security	10.83 2.17	11.26 2.53	10.57	2.19	0.98	0.02
Dietary Fat Intake	19.22 3.06	23.36 2.94	25.76	3.00	35.63***	0.41
Barriers to Fruit Intake	2.13 1.48	1.58 1.53	0.82	1.06	7.90***	0.13
Barriers to Vege Intake	1.25 1.73	1.19 1.87	0.52	0.90	2.72	0.05
Barriers to Fat Intake	2.50 2.15	2.23 1.89	1.18	1.33	5.85**	0.10

* $p < 0.05$, *** $p < 0.001$

and dietary self-efficacy increased as one moved along the change continuum. For dietary fat reduction, a similar picture was identified with the addition of the barriers to dietary fat reduction variable showing the same steady decline across the stages of change.

A series of additional exploratory analyses considered the relationships between weight group (normal, overweight, obese) and the other study variables. This weight categorisation was unrelated to demographic variables with the exception of age (older respondents were significantly more likely to be in the obese category).

There were significant group differences in dietary self-efficacy and social physique anxiety with those in the overweight and obese categories reporting less self-efficacy and more anxiety.

Discussion

The results indicate that the stage of change model can provide some insight into changes in diet related behaviours in a sample of Maori women. The findings indicate that dietary self-efficacy is significantly associated with an individual's stage of change for both fruit and vegetable intake, and dietary fat reduction. Specifically,

the data suggested an increase in self-efficacy as one moves along the continuum of stages for behaviour change, and is partially consistent with the findings of Schwab (2000), who found that higher levels of self-efficacy, when applied to smoking cessation, promoted participants to the action and maintenance stages of change. An additional finding revealed that individuals who were categorised as overweight or obese showed lower levels of efficacy. Self-efficacy, or an estimation of one's own capacity for effectiveness, may have an important role as an internal motivator that might facilitate dietary change in adaptive ways. Recent research suggests that dietary self-efficacy may have an important mediating role in the relationship between diet knowledge and behaviour in general population settings (e.g., Rimal, 2000), and among individuals with chronic health problems such as diabetes (e.g., Savoca & Miller, 2001; Senecal, Nouwen & White, 2000). Long (2001) found that a nutrition education intervention increased self-efficacy for healthy eating in a school setting. These recent findings, along with the current findings reported here, suggest that the notion of self-efficacy may contribute to a better understanding of the variables

influencing dietary patterns among Maori women investigated locally.

A total of 36% of women were in the early stages of change (pre-contemplation, contemplation, preparation) for attempting to reduce dietary fat intake. Just over 50% of women were at the same point regarding attempting to increase fruit and vegetable intake. Stage of change models emphasise that behaviour change is not an all-or-nothing event and the present findings provide moderate support for this notion.

Popularly-held notions of behaviour change tend to dichotomise health behaviours, for example, classifying people as dieters or non-dieters. In this study there was some evidence of a continuum of change for 'pre-action', to 'action' to 'maintenance' of healthy dietary behaviour. The stages of change model concerns itself with motivation for change, and suggests that respondents at different stages are likely to move further along the continuum of change through exposure to different types of interventions. For example, while contemplators need to be shown ways to move themselves to action, precontemplators need to be made aware that health risks are associated with their current behaviour (Perz, DiClemente, & Carbonari, 1996; Rosen, 2000). Progress from thinking to doing requires action-oriented messages (Booth, Macaskill, Owen, Oldenburg, Marcus, & Bauman, 1993). The current findings support recognising the importance of designing relevant health programmes to meet the specific needs of Maori women, at individual, community and cultural levels.

Individuals in the 'pre-action' stages consistently reported higher levels of dietary fat intake. Dietary fat reduction will likely have some long-term effectiveness as a method for achieving and maintaining weight loss (e.g., Kanter, 2000). Nutrition education programmes have emphasised the importance of reducing dietary fat for some time but the challenge for researchers continues to be one of understanding the difficulties encountered by individuals when applying such nutritional recommendations to their eating practices. Consideration

of the perceived barriers to change (both psychological and practical) is an important aspect of this process.

The most commonly reported difficulties associated with reducing fat intake were good taste, convenience and difficulties in enjoying non-fatty food. Dietary information interventions are important (e.g., Armitage & Connor, 2002) and findings have emphasised the importance of information on how to cook convenient food that is low in fat, and that is enjoyable to eat. The most commonly reported difficulty associated with changing fruit intake was simply that "they cost too much". Controlling market cost of food is outside the orbit of standard public health interventions, but is perhaps a signal to those concerned with health education at a policy level that there are highly practical barriers to healthy eating for some households. Barriers to healthy dietary practice such as financial cost have been acknowledged elsewhere in the literature (e.g., Ma, Betts, Horacek, Georgiou, White, & Nitzke, 2002).

In conclusion, the adoption of a diet regulated by increased fruit and vegetable intake and reduced fat consumption appears to be mediated by both psychological and practical factors in this sample of Maori women. However, future research could benefit from seeking to better understanding of the social context within which food is consumed and the sometimes overriding influences of cultural food sharing patterns and family hospitality traditions for Maori, and many other ethnic groups (e.g., Andersen & Lean, 1995; Bush et al., 1998; Farrales & Chapman, 1999; Krummel et al., 2002). Such research is imperative for the provision of a greater understanding as to how these influences might constrain food choices in a way that is not supportive of the adoption of a healthy diet for the New Zealand Maori population. The research reported here is an encouraging foray into the area, useful for its relevance to the health concerns (e.g., obesity and diabetes) facing modern Maori. However, the relatively small, non-random nature of the sample limits the extent to which generalisations can be made. Nevertheless a number of speculations were made possible. The report here is

offered in the hope of encouraging further exploration of this area among Maori.

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