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Motivations for healthful dietary change

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Abstract

Objective: To describe scales that measure motivations for changing dietary behaviour, and to examine associations of these scales with current diet and dietary change.

Design: A secondary analysis of a randomised trial of a self-help intervention to promote lower fat and higher fruit and vegetable consumption.

Participants and setting: Participants were 1205 adults selected at random from enrolees of a large Health Maintenance Organization. At baseline, data were collected on motives for changing diet, fruit and vegetable intake, fat-related dietary habits, and demographic characteristics. Participants were then randomised to receive the intervention or to receive no materials. A follow-up survey was administered at 12 months.

Results: A majority of participants reported that it was very important to make dietary changes to feel better (72%) and to control an existing medical problem (57%), but very few (4%) were motivated by pressure from others. Factor analysis of the diet motivation items yielded two intrinsic ('self-image' and 'personal health') and one extrinsic ('social pressure') scales with fair internal consistency reliabilities (Cronbach's $\alpha = 0.59$ to 0.68). Motivation scales were statistically significantly associated with demographic characteristics and baseline diet. For example, desire for a better self-image was a stronger motivator for changing diet among females, while personal health was more important to older persons and men ($P < 0.001$). Social pressure to change diet was statistically significantly associated with higher fat intake ($r = 0.11$) and self-image was associated with lower fat intake ($r = -0.14$, both $P < 0.001$). Motivation by social pressure and self-image were both significantly associated with greater fat reduction at 12 months post-intervention ($P < 0.05$).

Conclusions: The intrinsic and extrinsic motivation scales were weakly associated with current diet and predicted response to dietary intervention. More research is needed to better characterise and measure motives for dietary change, and to test whether tailoring interventions based on individuals' motives for dietary change would improve intervention effectiveness.

Keywords
Intrinsic motivations
Extrinsic motivations
Diet
Dietary change
Nutrition interventions

Research efforts are increasingly being focused on examining the processes and motives involved with changing behaviour[1–4]. In nutrition research, the processes involved in changing and maintaining healthful dietary behaviour have been examined using a number of conceptual frameworks, such as the Health Belief Model[5–7]. This model assumes a value expectancy approach, hypothesising that behaviour depends upon the expected outcomes of an action, such as perceived benefits, and the value individuals place on those outcomes[8].

While there have been several studies examining the processes involved in dietary change, less research has examined the reasons individuals *change or adopt* new dietary behaviour. The paucity of research on motivation for dietary change may be, in part, due to the lack of a theoretical or conceptual model. Theory and research on intrinsic and extrinsic motivations, which refer to the origins of the desire to engage in a particular behaviour, may provide such a framework[9,10]. According to Deci and Ryan[10], "intrinsically motivated behaviors are ones for which the rewards are internal to the person, while extrinsic motives are ones that the person performs to receive external rewards or punishment". This theoretical

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framework has been successfully applied to other behavioural domains, such as smoking cessation[11,12].

Few studies have used types of motivation to understand dietary behaviour. Trudeau *et al.* reported that intrinsic motives for eating a healthful diet were associated with higher intakes of fruits and vegetables[3]. Patterson *et al.* found a positive association between perceived pressure to eat a healthful diet (an extrinsic motivation) and healthful dietary practices[4]. These findings suggest that intrinsic and extrinsic motives may be associated with dietary behaviour, and may therefore be useful for designing health promotion programmes. Furthermore, types of motivation may not affect dietary behaviour equally, and may therefore result in different levels of success in dietary change. This motivates the need to develop reliable and valid instruments to better understand why people choose to change their dietary behaviour.

There is a large body of scientific evidence linking dietary patterns, specifically high-fat, low fruit and vegetable diets, to increased risk for obesity and several chronic diseases[13]. The Puget Sound Eating Patterns Study was a randomised trial of a dietary intervention to lower fat intake and increase consumption of fruit and vegetables[14]. We used data from this study to (1) describe scales of intrinsic and extrinsic motives for changing dietary behaviour, and (2) examine associations of these scales with current diet and dietary change.

Methods

Design and participants

Data are from the Puget Sound Eating Patterns Study, a two-group randomised trial of tailored, self-help dietary intervention versus usual care (no intervention). Details of the study procedures and the intervention have been published elsewhere[14].

In brief, participants were adult (aged 18–69 years) enrolees of Group Health Cooperative (GHC) of Puget Sound, a consumer-owned Health Maintenance Organization. Potential participants were selected at random from computerised lists of GHC enrolees, restricted to one person per household. A letter was sent to describe the study and give notification that a study interviewer would soon call. Recruitment was spread evenly over a calendar year, beginning in March 1997. Interviewers made at least 12 attempts to reach potential participants, including attempts on weekends and evenings. At the recruitment call, interviewers administered a 15–20 minute baseline survey.

After completing the baseline telephone survey, participants were randomised to receive the intervention (consisting of a computer-generated personalised letter, a motivational telephone call, a self-help manual, a package of supplementary materials, computer-generated behavioural feedback based on a self-administered food-frequency questionnaire, and newsletters) or to receive no materials. Follow-up surveys were administered at 3 and 12 months.

The participation rate (the percentage of eligible GHC enrolees who completed the baseline interview) was 66.9%. One thousand two hundred and five (85.2% of baseline) participants completed all surveys, and constitute the sample for these analyses.

Survey instrument

Motivation scales

Motives for changing diet were assessed using constructs from the intrinsic–extrinsic motivation framework[10]. The items in the intrinsic–extrinsic motivation scale were adapted from an instrument that had been previously developed and tested in a random-digit dial survey on behavioural risk factors for cancer of 1450 Washington State residents[3].

In this study, we first asked participants whether they intended to change their consumption of fruit and vegetables and/or fat in the next six months. Based on reported intention to change, they were then asked which motivation items (if any) *are* most important in their decision to change their diet, or *would be* important were they planning to change. We asked these questions in order to be able to distinguish those intending to change from those who did not plan to change, as there could be differences in responses to the motivation items depending on an individual's intention to change their diet.

We asked eight questions to assess intrinsic and extrinsic motives for dietary change. Intrinsic motivation, which is driven by the desire for internal rewards, was measured with six questions regarding how important it is to change diet: 'to lose or control weight'; 'to prevent cancer and other serious illness'; 'to feel better'; 'because your doctor told you to'; 'to control an existing medical problem'; and 'to like yourself better'. Extrinsic motivation is generally a response to external rewards and punishment and was assessed with two questions regarding how important it is to change diet: 'so people will stop nagging you' and 'because people will be upset with you if you don't change your diet'. Responses were on a four-point Likert-type scale (not at all important, mildly important, somewhat important and very important). For analysis purposes, these items were coded 1 = not important and 4 = very important.

Factor analysis of the eight items suggested three scales (Table 1). The summary score of each scale was calculated as the mean of the non-missing responses. For analysis purposes, we also divided the intrinsic motivation scale scores approximately into tertiles of low, moderate and high, and due to restricted distribution divided the extrinsic scale into low and high social pressure. The final summary scale of eight items had fair internal consistency (Cronbach's $\alpha = 0.63$)[15].

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Table 1 Distribution of responses and scale characteristics, dietary change motivation items, the Puget Sound Eating Patterns Study, 1997/1998 ($n = 1205$)

Questionnaire item: '*How important is it that you change your diet…*'	Percentages				
	Very important	Somewhat important	Mildly important	Not at all important	Rotated factor loadings
Scale 1: Self-Image (Cronbach's $\alpha = 0.59$)					
So that you like yourself better	38	33	9	20	0.67
So that you feel better	72	21	5	2	0.75
To lose or control weight	61	24	6	9	0.75
Scale 2: Personal Health (Cronbach's $\alpha = 0.59$)					
Because your doctor told you to	35	24	7	34	0.81
To control an existing medical problem	57	12	4	26	0.83
To prevent cancer or another serious illness	55	32	9	3	0.47
Scale 3: Social Pressure (Cronbach's $\alpha = 0.68$)					
So that people will stop nagging you	4	10	9	77	0.85
Because people will be upset with you if you don't change your diet	4	11	11	75	0.84
Summary dietary change motivation scale* (Cronbach's $\alpha = 0.63$)					

Note that percentages may not add up to 100 because of rounding.
* Four-point summary score for scale developed by summing responses where 1 = not at all important, 2 = mildly important, 3 = somewhat important, 4 = very important, and dividing by number of items answered.

Dietary assessment

We assessed fat intake with a modified version of the Fat-related Diet Habits Questionnaire (DHQ). Details on the development and validation of this instrument have been published previously[16]. The 12-item questionnaire asks about diet over the past three months and assesses five dimensions of low-fat dietary habits: avoiding fat as a flavouring, substituting specially manufactured low-fat foods, modifying meats to be lower in fat, replacing high fat foods with fruit and vegetables, and avoiding fried foods. Responses were on a four-point scale ('usually or always', 'often', 'sometimes' and 'rarely or never') and scored 1 to 4 to correlate positively with fat intake. The summary score was calculated as the mean of the non-missing responses. The correlation of the baseline DHQ summary scale with percentage energy from fat from two 24-hour recalls (among controls only, at baseline and 12 months) was 0.44 and after de-attenuation was 0.79[14]. A unit change in the DHQ score corresponds to a change of 8.0 percentage points in per cent energy from fat[14].

Fruit and vegetable intake over the previous month was assessed with a standard approach used for evaluation in the '5 A Day' programme[17]. Fruit intake was the sum of 'fruit juice' and 'fruit, not counting juice', and vegetable intake was calculated as the sum of 'potatoes, not fried', 'salads' and 'vegetables, not including salad and potatoes'.

Data analysis

Data analyses were conducted using SAS 6.12 (SAS Institute Inc., Cary, NC, 1993). Psychometric methods were used to select intrinsic and extrinsic motivation items and assign them to sub-scales. For factor analyses, we used principal components with orthogonal rotation. We first examined the scree plot, which suggested a maximum of three factors, and we examined successively one-, two-, three- and four-factor solutions. There were no items with communalities less than 0.15 or factor loadings less than 0.25, so all eight items were retained. Cronbach's α was used as a measure of internal consistency reliability for the scales.

Analysis of variance were used to test for significant differences in mean values of the intrinsic and extrinsic motivation scale scores between subgroups of demographic variables, and *post hoc* Duncan's multiple range tests assessed which groups differed significantly from each other. Linear regression models were used to examine associations of the motivation scales (the independent variable) with baseline fat-related diet habits and fruit and vegetable intake (the dependent variables) after adjusting for demographic characteristics. Effects of the motivation scales on dietary change were assessed using linear regression models in which the dependent variable was change in diet from baseline to follow-up and the independent variables included baseline diet, demographic characteristics, treatment arm, and each motivation scale. We used a log-normal transformation for the fruit and vegetable variable (adding a constant of 1 for computational feasibility) to approximate normality, and present the results back-transformed into servings per day. We also give correlation coefficients for the motivation scales and the dietary measures, partialled for participant characteristics. We stratified participants by intention to change their diet during preliminary data analyses but, because there were no differences between the two groups, we present the results for all participants combined.

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Table 2 Mean scores on dietary change motivation scales by demographic characteristics, the Puget Sound Eating Patterns Study, 1997/1998 ($n = 1205$)

		Dietary change motivation scales*					
		Self-Image		Personal Health		Social Pressure	
	n (%)	Mean ± SD 2.04 ± 0.84		Mean ± SD 1.94 ± 0.82		Mean ± SD 1.25 ± 0.43	
Demographic characteristics	1205 (100)	Raw†	Adjusted†,‡	Raw†	Adjusted†,‡	Raw†	Adjusted†,‡
Age (years)							
18–34	354 (29.4)	3.05	3.06	2.07[a]	2.05[a]	1.33	1.34
35–54	411 (34.1)	3.11	3.11	2.23[b]	2.23[b]	1.30	1.30
≥55	440 (36.5)	3.05	3.07	2.62[c]	2.61[c]	1.32	1.32
P for trend§				<0.001	<0.001		
Sex							
Male	602 (50.0)	2.91[a]	2.93[a]	2.45[a]	2.48[a]	1.37[a]	1.39[a]
Female	603 (50.0)	3.22[b]	3.24[b]	2.20[b]	2.16[b]	1.25[b]	1.24[b]
P-value§		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Race							
White	1047 (86.9)	3.06	3.07	2.32	2.29	1.30[a]	1.30
Non-white	158 (13.1)	3.19	3.17	2.40	0.47	1.41[b]	1.41
P-value§						<0.001	<0.001
Income ($)							
≤24 000	123 (11.0)	3.19[a]	3.19	2.44	2.47	1.32	1.32
25 000–49 000	476 (42.5)	3.09[a,b]	3.07	2.28	2.29	1.29	1.30
50 000+	521 (46.5)	3.05[b]	3.07	2.31	2.30	1.34	1.33
P for trend§							

* Items scored on a 4-point Likert scale (1 = not at all important, 2 = mildly important, 3 = somewhat important, 4 = very important).
† Means with different superscripts are significantly different ($P \leq 0.05$).
‡ Adjusted for age, sex, race and income.
§ Only *P*-values less than 0.05 are shown.

Results

The mean age of the 1205 respondents was 45.8 (standard deviation (SD), 14.6) years, 36% were older than 55 years, 50% were female, and 86.9% were Caucasian. Nearly half of respondents had annual household incomes of $50 000 or greater. Only 14% smoked cigarettes and 15% were obese (defined as having a body mass index (kg m^{-2}) greater than or equal to 31.1 for men and 32.2 for women)[18].

Table 1 gives the distributions of responses to items in the motivation scales, factor loadings after orthogonal rotation, and Cronbach's α coefficients for each scale. Most respondents stated that it is very important to change their diet so that they can feel better (72%), to control or lose weight (61%), and to prevent cancer and other serious diseases (55%). Only 4% of participants reported that it is very important that they change their diet so that people will stop nagging them or because not changing their diet will upset others. Factor analysis of these items yielded two intrinsic scales ('self-image' and 'personal health') with three items each, and one extrinsic scale ('social pressure') with two items. The scales had fair internal consistency reliability, with Cronbach's α coefficients ranging between 0.59 and 0.68.

Table 2 gives mean scores of the motivation scales by participant characteristics. In both unadjusted analysis and analysis adjusted for age, sex, race and income, females were more likely than males to be motivated to change their diets for self-image (*P* for trend <0.001). Changing diet because of personal health was significantly more important to older (55+ years) persons and males ($P < 0.001$). Men and non-whites were more likely to be motivated to change their diets because of pressure from others ($P < 0.001$). Household income was not significantly associated with any of the motivation scales. Correlations of the motivation scales with demographic characteristics were generally weak, ranging from 0.05 to 0.20 (most $P < 0.05$).

Table 3 gives associations of diet with the motivation scales at baseline, after adjustment for age, sex, race and income. The self-image and social pressure scales were statistically significantly associated with baseline diet measures. Specifically, individuals for whom it was very important to change diet for self-image practised more low-fat dietary behaviours than those for whom self-image was less important (fat-related diet habits score = 2.24 versus 2.34, *P* for trend <0.01). Compared with those who were less motivated by social pressure, respondents who would change their diets because of pressure from others had both a higher fat-related diet habits score and consumed fewer servings of fruit and vegetables per day (2.36 versus 2.27 and 3.3 versus 3.6, respectively, both *P* for trend <0.05). The correlation coefficients between the

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Table 3 Associations of dietary change motivation scales with baseline diet, the Puget Sound Eating Patterns Study, 1997/1998 ($n = 1205$)

	Dietary measures						
		Fruit and vegetable intake (servings day^{-1})		Fat-related diet habits (summary score)			
Diet change motivation scales*	*n* (%) 1205 (100)	Mean ± SD 3.53 ± 1.5 Raw†	Adjusted†,‡	Mean ± SD 2.30 ± 0.49 Raw†	Adjusted†,‡	Adjusted correlation coefficient for fruit and vegetable intake‡	Adjusted correlation coefficient for fat-related diet habits‡
Self-Image							
Low	399 (33.1)	3.4[a]	3.4	2.38[a]	2.34[a]		
Moderate	359 (29.8)	3.7[b]	3.7	2.28[b]	2.28[b]	0.06	−0.14
High	447 (37.1)	3.6[a,b]	3.5	2.24[b]	2.24[b]	(0.05)	(<0.001)
P for trend§				<0.001	0.01		
Personal Health							
Low	435 (36.1)	3.4	3.4	2.27	2.27		
Moderate	396 (32.9)	3.5	3.6	2.33	2.33	0.06	0.005
High	374 (31.0)	3.6	3.7	2.29	2.29	(0.04)	
P for trend§							
Social Pressure							
Low	900 (74.7%)	3.6[a]	3.6[a]	2.26[a]	2.27[a]		
High	305 (25.3%)	3.3[b]	3.3[b]	2.39[b]	2.36[b]	−0.04	0.11
P for trend§		0.03	0.04	<0.001	<0.001		(<0.001)

* Items scored on a 4-point Likert scale (1 = not at all important, 2 = mildly important, 3 = somewhat important, 4 = very important).
† Means with different superscripts are significantly different ($P \leq 0.05$).
‡ Adjusted for age, sex, race and income.
§ Only *P*-values less than 0.05 are shown.

motivation scales and diet measures ranged from 0.04 to 0.06 for fruit and vegetable intake and from 0.01 to 0.14 for fat-related behaviour, after adjustment for participant characteristics (most $P < 0.05$). The personal health scale was not significantly associated with these diet measures.

Participant demographic characteristics alone explained 5% of the variance in fruit and vegetable intake and 11% for fat-related diet habits (data not shown). The social pressure scale explained significant additional variation in the diet measures: 1.3% in fat-related diet habits and 1% in fruit and vegetable intake ($P < 0.05$), while the self-image scale explained an additional 1.5% variation in fat-related diet habits ($P < 0.001$). Together, the three motivation scales explained 1% and 3.2% of the variation in fruit and vegetable intake and fat-related diet habits, respectively ($P < 0.01$).

We also examined associations of the diet motivation scales at baseline with dietary change at 12 months post-intervention (data not shown). Participants motivated by social pressure had a statistically significant larger decrease in fat intake compared with those who were less motivated by social pressure. For every unit increase in the social pressure scale, the fat-related diet habits score decreased by 0.04 (corresponding to a 0.32% decrease in energy from fat) over the 12-month period ($P = 0.04$). Similarly, respondents who were motivated by self-image also significantly decreased fat intake post-intervention compared with those less motivated by self-image. For each unit increase in the self-image scale, the fat-related diet habits score decreased by 0.03 (corresponding to a 0.24% decrease in energy from fat), $P < 0.01$. There was a significant interaction of motivation by self-image and treatment: the association of the self-image scale with fat reduction was stronger among participants receiving the dietary intervention than among controls ($P < 0.05$). The personal health scale was not significantly associated with change in fat intake at 12 months. None of the motivation scales significantly predicted change in fruit and vegetable intake; however, there was a trend for larger effects of all motivation scales in the intervention compared with the control group. Stratifying these analyses by gender, intention to change diet and stage of change did not change these results appreciably.

Discussion

In this randomised, self-help dietary intervention trial, the intrinsic and extrinsic motivation scales showed fair internal consistency reliability and construct validity. In general, the motivation scales were statistically significantly associated with demographic characteristics and were weakly correlated with baseline diet. The self-image and social pressure scales also predicted statistically significant reductions in fat intake 12 months post-intervention, but none of the motivation scales predicted changes in fruit and vegetable intake.

The desire for a better self-image was more important to women, and was associated with lower-fat dietary habits in the entire sample. These results are not surprising, as women are more likely to be concerned with physical appearance than men, and individuals

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concerned about body image usually have healthier diets[19–21]. For example, in a cross-sectional study of 332 Australians, Turrell reported that respondents who were concerned about their appearance were more likely to purchase healthy food when shopping[22]. These findings suggest that those persons who are concerned about self-image and physical appearance may be more likely to make healthful dietary choices.

As has been reported by other investigators, we found that older persons and men were more motivated to change their diets for personal health reasons[22–24]. Interestingly, however, concerns about personal health were not significantly associated with dietary behaviour. This result differs from a number of other studies that have reported that health-related factors are important determinants of healthful dietary behaviour and dietary change[22,25,26]. One possible explanation for this discrepant finding may be differences in the items asked. Specifically, while other studies have addressed more general health issues (e.g. 'importance of concerns about health when buying food'[22]), our questions were more specific (e.g. 'to control an existing medical problem'). It may be easier for respondents to identify with a general notion of the importance of health than to a more specific health-related issue. Another possible explanation may be that we had a sample of generally healthy participants, so few would have relevant health concerns.

Extrinsic motivation, represented here by social pressure or 'nagging', was higher in men than in women and was associated with less healthful dietary habits at baseline. These findings are not entirely unexpected, as men may be more likely to be pressured to change their diet[27]. As in our research, other studies have reported a negative effect of social pressure on healthful behaviour. For example, Nagasawa *et al.* found that a negative social environment was correlated with poor compliance to diabetic regimens[28].

Although the extrinsic items we studied measured social pressure, there is substantial data showing that individuals with support from their spouses and other social referents are more likely to attain their dietary goals that those with weak or no social support[29,30]. For example, Bovbjerg *et al.* reported that, among 254 hypercholesterolemic men, those with a high level of social support were more likely to adhere to lipid-lowering diets compared to those with less social support[31]. Therefore, nutrition interventions and education programmes incorporating the social environment should emphasise positive, supportive messages.

Motivation by social pressure and better self-image predicted more fat reduction post-intervention. These effects were larger in the intervention than the control group, which suggests that those motivated to change will better respond to a dietary intervention. However, it is important to note that high social pressure at baseline predicted higher fat intake, demonstrating differences between cross-sectional and longitudinal analyses.

This study has a number of limitations. First, the sample was composed largely of white adults; therefore, results may not be generalisable to minority populations. Second, we had a sample of relatively healthy individuals who may not have been very motivated to make dietary changes. Third, outcome data are based on self-report, so we cannot rule out the possibility of social desirability bias[32,33], which would result in a specious association of the motivation scales with healthful diet. Finally, the motivation scales were not a very broad sampling of possible intrinsic and extrinsic motives for changing diet. A wider domain of motivational items may have enabled us to observe stronger associations between motivation and diet. In addition, it is possible that these motivation scales did not include the most salient motives for this population.

In conclusion, the intrinsic and extrinsic motivation scales had fair internal consistency, were statistically significantly associated with demographic characteristics, and were weakly associated with dietary behaviour. Although the associations of the motivation scales with diet were very modest, the intrinsic–extrinsic motivation framework may still be applicable in dietary interventions and education programmes. Researchers using this framework to study dietary change may benefit from including a wider array of motivation items, paying careful attention to the wording and phrasing of the questions asked, and testing their instrument in different populations. More research is needed to better characterise and measure motives for dietary change, and to test whether tailoring interventions based on individuals' motives for dietary change would improve intervention effects.

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