

## Social support and dietary change among older adults

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### **ABSTRACT**

After a review of current conceptual models used in nutrition studies, we develop and test a ‘Dietary Change Model’ based on a sample of older rural adults. Predictor variables include socio-demographic, social network, and nutritional risk/support constructs; mediating variables include number of dietary changes attempted and whether the changes are successfully made; and criterion variables focus on psychosocial outcomes. The model is tested on a sample of 298 randomly selected respondents aged 60 years or more residing in five rural communities in Oregon. We find that those most likely to make dietary changes are women, married, and living in smaller households. The social network factors of density, range, and frequency of interaction negatively impact healthy dietary change. Among the most important nutritional support factors to have positive effects on dietary change are having a physician recommend changes in diet, and participating in a community food programme (women only). Successfully changing diet most clearly related to life satisfaction; results of other criterion variables were often complicated by marked gender differences.

**KEY WORDS** – dietary change, social support, social networks, life satisfaction, rural North America.

### **Introduction**

In recent years there has been a convergence of interest within anthropology and sociology regarding the importance of food and nutrition in people’s lives. The production, distribution, and consumption of food have been long-standing concerns in anthropology, especially stimulated by the early works of Audrey Richards (1932, 1939) among the Bemba of Zambia (then Northern Rhodesia). More recently, the growing importance of the sub-field of the sociology of

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culture has included, among other topics previously ignored or neglected, greater attention to food habits and their relationship to social life (Mennell, Murcott and Otterloo 1992). These authors also point out that this interest was further developed by the rise of a feminist perspective in sociology (one could also include a parallel development in anthropology), which stimulated a more intense examination of the domestic division of labour and, inevitably, the preparation and consumption of food. In the hope of further encouraging this convergence, the present study of changes in dietary habits of older adults represents a collaboration between the two disciplines.

In spite of the surge of interest recently in preventive health care, inadequate nutrition remains a major problem for some segments of the older population (Maaravi, Ginsberg, Cohen and Stessman 1996; Quandt, Arcury and Bell 1998). Betts (1988) points out that as individuals age they become increasingly vulnerable to both physiological and psychosocial effects of inadequate nutrition. Indeed, there is increasing evidence that proper nutrition plays a key role 'in preventing or delaying the onset of chronic disease in later life' (Mirie 1997: 622). Of particular concern is the growing prevalence of obesity among older adults, described by Jensen and Rogers (1998) as a major public health crisis.

Although data on the dietary patterns of older adults and their sub-groups remain scarce, an increasing number of studies conclude that many still lack needed nutrients in their diet (Reid and Miles 1977; O'Hanlon and Kohrs 1978; Betts 1988; Davis *et al.* 1985; and Nickols-Richardson *et al.* 1996). A particularly striking finding from a United States national survey of 1,113 respondents aged 65 years or older was that approximately 17% were at nutritional risk (Howard *et al.* 1998). While providing older people with information on good dietary practice might seem straightforward, many studies of food habits (from various social sciences) suggest that it is nearly impossible to change an individual's eating habits just by telling them what they should eat. Any significant change in dietary intake is likely to encounter substantial resistance, precisely because it challenges many domains of meaning in everyday life (Douglas, 1982). A similar point is made by Hendricks, Calasanti and Turner (1988: 62–63): 'food preferences and eating behaviour become part of one's social identity and self-identity throughout life. Thus socially determined eating patterns cross the imaginary boundaries between social, psychological and physiological life experience'. To take these comments seriously requires that the personal, social and cultural values embedded in dietary habits must be

accounted for (Rappoport and Peters 1988; Rose and Oliveira 1997). This paper attempts to address many of these issues by developing a model of dietary change that emphasises social and psychosocial factors, an approach we refer to as sociocentric.

Rappoport and Peters (1988: 35) insist that the ‘theoretical task awaiting attention is the construction of a developmental theory of foodways’. They further point out that an understanding of the ageing process will not be complete until the food habits of older adults are incorporated into our theoretical frameworks. To this end, the purpose of this paper is to further our understanding of both the ways in which social patterns influence dietary changes, and their social psychological consequences, a necessary initial step in constructing a developmental theory of food habits. A sociocentric model is developed (see Figure 1) and tested with a randomly selected sample of older adults drawn from several rural communities in Oregon.

### **Existing conceptual models: a selective literature review**

Within the last decade several conceptual models have enriched nutritional studies of older adults, a field that was formerly criticised for the lack of theoretical development (Hendricks *et al.* 1988). The principal problematic for an adequate conceptual framework has been addressed only recently, in that the need to understand food habits as multi-determined and context-dependent, as Rozin (1980) pointed out over 20 years ago, has been incorporated in most recent conceptual models. This has opened up the possibility of adding a number of psychological, social, and cultural factors to the more typically studied physiological and biological factors relevant to food intake. Several of these recently developed models have been based on earlier conceptual formulations in the behavioural sciences, and some arguably incorporate too many variables through a ‘shotgun approach’ to ensure that nothing of relevance is overlooked.

For example, a Cornell University group used a constructivist approach to elaborate the ‘food choice process’ model. This includes life course factors of the individual’s social, cultural, and physical background, one’s beliefs and standards related to food choices, values, interpersonal relations, physiological factors, and personality characteristics (Falk, Bisogni and Sobal 1996; Furst *et al.* 1996). A very similar framework is employed by Quandt *et al.* (1998) who develop a ‘nutritional self-management’ model which is designed to predict which factors can put older people at the risk of undernourishment.

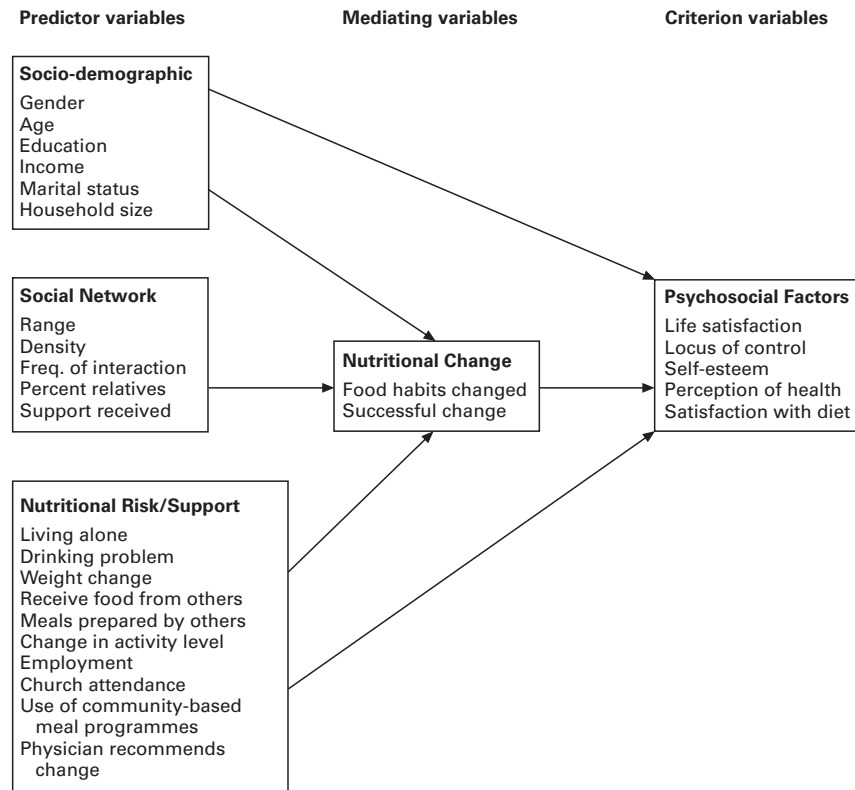


Figure 1. Dietary Change Model

Both of these efforts are designed for case study analysis, in which it is more likely that the richness of data available through qualitative techniques and intense exposure to individual lives are most likely to fulfill the requirements of the model.

Two other models are more pertinent to this study, since they are designed for survey type research. Hendy, Nelson and Greco (1998) developed a 'nutrition risk' model based on social cognitive theory from the work of Bandura (1986; 1995). They employ no less than three composite measures of nutritional risk as criterion variables, all of which deal with behaviour related to food consumption, a mediating variable of 'nutritional barriers', and a selection of predictor variables that range from nutrition habits, physiological factors, social support factors, and negative affect measures. They faced several difficulties when discriminating mediating and criterion variables which detracted from their effort; for example, the nutritional barriers variable includes an item regarding the cost of food that is essentially the same as a

nutritional risk measure included in the 'Nutritional Screening Initiative'. Nevertheless, several of their findings are suggestive as we note in presenting our model, and their data analysis is similar to ours. Although the Hendy team's data are also based on a sample of rural older adults, they use telephone interviews whereas we use a combined face-to-face interview supplemented by a questionnaire (see details in the Methods section), and their sample is rather small (154 respondents, 72 per cent of whom are women).

The second model was not designed specifically for dietary research, but one of its components includes nutrition as a key element (Martin *et al.* 1996). This approach highlights adaptive processes important to the well-being of older people as part of the Georgia Centenarian Study discussed in detail by Poon *et al.* (1992). The primary purpose in this study was to test elements of their 'Georgia Adaptational Model' against the three older adult age cohorts represented in their sample, one for which random selection procedures were not possible. The model includes measures of 'mental health resources', such as life satisfaction and perceptions of feeling useful, activities as measured by ADLs, income resources, education level, both objective and perceived health measures, household composition, and 'social resources' which cover several items relating to supportive behaviour from family and friends. We will refer to this work several times, as our conceptual model covers many of the same constructs while using different measuring devices.

### **A sociocentric model of dietary change**

Turning to the present study, we have developed a model specifically to explain the nutritional changes individuals are likely to make for the purpose of improving their health and/or responding to illnesses they suffer from. We call this the 'Dietary Change Model' (DCM; see Figure 1). It builds on models that were developed to understand life satisfaction among Chinese and American older adults (Silverman, Hecht, and McMillin 2000), and to elucidate the influence of pets on well-being (Hecht, McMillin and Silverman 2001). It differs from previous models discussed here in that our emphasis is on the sociocultural context and the social transactions within which food habits are embedded. The model incorporates several hypotheses, which will be specified as the argument develops. Following the insights of McIntosh, Shifflet and Picou (1989), our starting point is the assumption that nutritional adequacy is in large measure dependent

upon supportive social relations, and that this particularly applies to older people. We employ several different measures of social support, but focus on the primary social network.

#### *Nutritional change variables*

The DCM treats the nutritional changes that people make in their diets as mediating variables between three distinct sets of potential predictor variables, and a set of psychosocial factors treated as criterion variables. The nutritional changes encompass two components: the number of changes made, and the respondent's perception of how successful those changes have been. Our nutritional change measure is similar to that used by Quinn *et al.* (1997), although they included four elements that we omit (cholesterol, vitamins/minerals, calcium, and caffeine). Many respondents are likely to find it difficult to assess the first three of these, and arguably they overlap with other elements that were included, *e.g.* avoiding cholesterol is obviously related to avoiding fat. Finally, we include one element not included by Quinn *et al.* (1997), whether there was an attempt to drink less alcohol. Nevertheless, their work is of considerable relevance given that in developing their 'nutritional health-seeking behaviour' model they used several similar measures. We ask respondents if in the last five years they attempted to eat more fibre, less sodium, sugar, fat, or food overall, or drink less alcohol.

#### *Socio-demographic variables*

One set of predictors in the DCM includes six socio-demographic variables. These have been selected for their relevance to nutritional behaviour, and reflect our particular concern with gender differences. The effect of such differences on nutritional behaviour has been noted not only in the United States (Rawson *et al.* 1978; Betts, 1988), but also in diverse cultural settings, such as the United Arab Emirates (Musaiger and Abuirmeileh 1998), Hong Kong (Woo *et al.* 1998), Great Britain (Johnson *et al.* 1998; Fraser *et al.* 2000), and India (Wadhwa, Sabharwal and Sharma 1997). Among the several US studies that have shown a marked difference between men and women, Hendricks *et al.* (1988: 69) found that gender 'influences not only what one eats, but also the social patterns that can influence nutritional practices'.

The data on diet and gender are not, however, entirely consistent. One investigation observed no significant overall difference between the dietary patterns of men and women (Ryan, Craig, and Finn 1992). And Fanelli and Abernethy (1986) observed no differences in the mean

scores of women and men on a questionnaire developed as a research tool for needs assessment of the nutritional knowledge and eating behaviours of older people. Further, some studies have found that older women are at greater nutritional risk than older men. In rural Pennsylvania, Hendy *et al.* (1998) found greater nutritional risk for older women, as determined by the 'Nutritional Screening Initiative', a measure that has drawn various criticisms. Despite this finding, we are convinced that in the United States men are more vulnerable to nutritional deficiencies, partly because they are less likely to make a change than women. The first formal hypothesis is therefore:

H1: Women are more likely than men to make a healthy change in their diet in recent years.

The rationale for this hypothesis has three elements. First, the bulk of the research literature on gender and nutrition indicates that one should anticipate a difference between women and men. Second, in American society women more than men are socialised to be more concerned with body image and remaining 'youthful'. Third, women are known to seek medical care more readily than men, and perhaps for this reason are more likely to be 'health conscious'. Therefore, we can anticipate women will be more concerned about their diet than men, and more likely to have tried to make some change within the previous few years.

Age is another socio-demographic variable that has been shown to be related to diet. Rawson *et al.* (1978: 26) noted that 'a commonly reported phenomenon is a ... tendency in which the adequacy of diets decrease with age'. In a sample ranging from the young-old to the oldest-old, researchers found the nutritional risk measure to be negatively related to centenarians, but found no relationship with sexagenarians and octogenarians (Nickols-Richardson *et al.* 1996). Since our sample ranges only from 60 to 95 years of age, with very few respondents over 85, we cannot address issues relating to the oldest-old, but our second formal hypothesis is that as an individual ages they will experience more health-related problems, some of which will necessitate a change in eating patterns. Of course, this takes the rather pessimistic view that people are not likely to change until they are 'forced' by circumstances to do so.

H2: Age will be positively associated with dietary change for both women and men.

Turning to socio-economic status, both education and income have been related to dietary practices, ranging from 'food preferences and habits to the ability to purchase what one wants to the likelihood of

having proper storage facilities. In short, ... [it] is the determinant of what might be called “access to opportunity”” (Calasanti and Hendricks 1986: 233). More recently, Quinn *et al.* (1997) found that education and income were among several factors that were positively associated with nutritional health-seeking behaviour. The relationship with education was also confirmed with a sample between the ages of 45 and 74 years in East Anglia (England), where the better educated ate less meat, more salads, and fewer cakes and sweet foods than those less educated (income was not included in the analysis) (Fraser *et al.* 2000).

There are however contradictory findings for the relationship with education level: some investigators find a positive relationship between either income or education and nutrition, while others find no relationship at all (Calasanti and Hendricks 1986; Hendricks *et al.* 1988). The latter have argued that education may be more strongly related to nutritional considerations than income, for ‘education can be expected to have a greater influence on familiarity with nutritional information’ (Hendricks *et al.* 1988: 67). In addition to greater access to information, it may be that individuals from the upper socio-economic levels are more likely to change their eating habits simply as a result of better medical care. Our third hypothesis is accordingly:

H<sub>3</sub>: Dietary change will be positively related to education and income, but will be more strongly correlated with education. This positive correlation will hold for both women and men.

Regarding marital status, Davis *et al.* (1985) indicated that their most consistent finding was the favourable diet of respondents who lived with a spouse. This dietary pattern was observed for both women and men, but was accentuated among men. Thus, the type of ‘living arrangement appears to have less influence on dietary intake for women than it does for men’ (p. 440). Similarly, Hendricks *et al.* (1988: 69) observed that ‘men with a spouse had better diets than their counterparts who lived alone or without a spouse’. Thus,

H<sub>4</sub>: Both women and men who are married are more likely than the unmarried to make healthy dietary changes, but this relationship will be stronger for men than for women.

It would follow that single people are more likely to have difficulty in achieving meaningful dietary change. By extension, the impact of size of the household must be considered. Although the nutritional literature has paid little attention to this factor, it can be argued that



the more people in the household, the less likely any given individual can successfully achieve a change in diet. Hendy *et al.* (1998) did find that the larger the household size, the greater the nutritional risk in a sample of older adults. Although they expressed surprise at this finding, it suggests that food habits are affected by the immediate social context in which meals are consumed, which leads to the fifth hypothesis:

H<sub>5</sub>: There is an inverse relationship between household size and healthy dietary changes.

#### *Social network variables*

We now turn our attention to an important structural characteristic that has received little attention in understanding dietary habits, the individual's social network. As noted in the discussion of conceptual models used in nutrition studies, some kind of social support factor is considered an essential component. Both Quinn *et al.* (1997) and Hendy *et al.* (1998) found a relationship between measures of social support and positive nutritional outcomes. However, neither of these studied the details of social support, but rather used only a limited set of inclusive items to represent the complex variations. A much more incisive approach is provided by social network analysis, which is considered the most systematic method for connecting individual behaviour to family and other primary group relations, as well as to community institutions. Once the underlying structure and content of social networks is specified, they can then be related to various personality, behavioural and cultural dimensions.

Scott and Roberto (1985: 624) define a social support network as 'a set or range of regular inter-personal transactions that assists the individual in meeting physical, psychological, and social needs'. Although a neglected variable before the 1980s, the character of social support for older people now receives sustained attention, and as a result studies have shown a complex interaction between social support, various stressful life events, and both physical and mental well-being. Our social network measure gave respondents the opportunity to list as many as ten individuals who were 'most important' in their lives. Social network analysis represents a 'middle range' of analysis in the social support literature. At one extreme are studies of individuals and their relationship with significant others, *i.e.* those who are in an intimate, confiding relationship with the respondent. By including such factors as marital status and household size, we recognise in some measure the importance of such relationships. At the other extreme are studies of the degree to which individuals are involved in a variety of

community-level organisations, such as voluntary associations, and even broader institutional frameworks. The inclusion of employment status, religious involvement, and the use of community food programmes are several indices that tap this broader dimension of support (see the discussion below under the Nutrition Support/Risk construct). By including social network analysis as an additional measure of social support, we add a dimension that is more difficult to isolate but which in our view is of critical theoretical importance.

Based on a social network approach to food habits, we start from the assumption that each individual (referred to as the focal person) is embedded in a network of relationships that varies in structure and content, and that this variability tells us something about the extent to which the network is likely to be resistant to changes in any area of a person's life. For example, dietary habits may be harder to change when they challenge the established values, behaviour patterns, and food preferences of a very close-knit network. A person who is embedded in a highly connected social network, *i.e.* a dense network,<sup>1</sup> will be less likely to adopt healthy changes in their food habits because of the shift in network relationships that such changes may require. A similar argument is made by McIntosh and Shifflett (1984*b*) when they conclude from their data on older adults in rural Virginia that a strong attachment to relatives and friends had a negative effect on dietary adequacy.

Other structural factors that detract from the possibility of making nutritional changes include those networks with higher percentages of relatives as well as those with higher frequencies of interaction among network members. Both of these factors are often related to density, but also have an independent effect that could mitigate efforts to change behaviour. High levels of interaction with members of the network, especially when those interactions are primarily with relatives, do not encourage the focal person to depart from their accustomed patterns. Put differently, the more intense the network interactions, the more difficult it is for any individual to change. We are not suggesting that others in the network deliberately try and sabotage attempts of the focal person to change their food habits, rather and more likely that the resistance is largely unconscious and subtle in effect. We can now set the preceding discussion within our set of hypotheses:

H6: The likelihood of making healthy dietary changes is inversely related to: (1) the density of the network, (2) the percentage of relatives in the network, and (3) the frequency of interaction with members of the network.

Network characteristics may also have a positive impact on dietary changes. Another structural element of considerable importance is the range, simply a measure of the number of people included in the network. Brunt, Schafer and Oakland (1999) report several studies' findings that adequate diet was associated with a more extensive social network. Using a more limited measure of social network than our own, McIntosh *et al.* (1989) also found that the variety of nutrients was positively related to a more extensive friendship network. A possible explanation is that the amount of information available to an individual is a function of network range. We assume that the larger the social network available, the more likely an individual has greater access to information, and is thus more likely to be in a position to make positive nutritional changes. This line of reasoning is consistent with our argument regarding the impact of employment and religious involvement discussed in the Nutritional Risk/Support construct that follows.

Another important feature of networks is the content of exchanges within the network. We have developed a protocol to elicit this information called the 'Inventory of Network Transactions' (INT). This covers 20 exchange domains, representing emotional, service, and material support<sup>2</sup> (see Hecht *et al.* 2001). Although we have data on the extent of both giving and receiving support in each of these domains, this analysis will deal only with support received, except for those domains that are concerned with food and the preparation of meals. Hendy *et al.* (1998) found that one of the better predictors of nutritional risk was the number of confidants. Whether or not one has confidants is only one of six emotional domains covered in the INT, which enables the impact of a much wider array of possible support behaviour on dietary change to be examined. This brings us to the final hypothesis relating social networks to dietary change:

- H7: The likelihood of making healthy dietary changes is positively related to (1) the range of the social network, and (2) the extent of support received by network members.

#### *Nutritional risk/support variables*

The final set of predictor variables is necessarily an essential element in any study of nutrition, but it has been difficult to define and there is little agreement on the adequacy of measures (McIntosh and Shifflet 1984*b*; for a convincing attempt, see Nickols-Richardson *et al.* 1996). There have been numerous attempts to develop a composite measure of nutritional risk, but without much theoretical guidance in assigning

varying weights to each of the components. Since this construct could involve biological, psychological and socio-cultural factors, some theoretical perspective is needed in selecting appropriate dimensions. Building on the social network approach, we focus on ten variables that give primary emphasis to the social context in which food habits are formed. Five have a negative impact and are likely to increase the probability of nutritional risk; and the remaining five have a positive impact and are likely to decrease risk by providing nutritional support.

The first component, living alone, is of course the extreme of household size as covered under the socio-demographic variables. In effect, the impact of household size is bi-modal in that at both extremes it has a negative impact on dietary change. Our concern here is with households in which the older person lives alone. In a review of previous studies, Brunt *et al.* (1999) report that older adults living alone have reduced food intake and suffer from 'poor social resources', although this may be less true of women than men. McIntosh and Shifflet (1984a) found that, in a non-representative sample of older respondents who visit nutritional sites in rural Virginia, people who live alone have less adequate diets. Wadhwa *et al.* (1997) came to a similar conclusion based on a sample of rural and urban slum dwellers in India. It is likely that living alone for many older adults, regardless of the cultural context, leads to increased social isolation, which can have a number of negative effects, including dietary inadequacy.

The next two are directly concerned with nutritional intake, but in both cases are significantly conditioned by the social settings in which food and drink are consumed. There is no need to dwell here on the well-documented consequences of excessive alcohol consumption, especially for older adults (McMillin and Silverman 1990). We assume that if drinking has been a problem, it will be more difficult for a person to make healthy changes in their diet. In fact, one of the six items we combine to measure the extent of dietary change is a decision to drink less alcohol, which should increase the probability that we find an inverse relationship with this variable. The next variable involves significant changes in weight over the past year. We examine this independently for significant changes in either weight gain or weight loss. Our assumption is that a dramatic change in either direction is potentially harmful, and thus associated with the absence of any attempts at nutritional changes, but it may well be that gaining weight is less likely to be associated with dietary changes for obvious reasons.

Finally, we include two variables that have been extracted from our 'Inventory of Network Transactions' (INT) which are directly related to food consumption. McIntosh and Shifflett (1984a) have argued that

dependency on others for food, either its acquisition or preparation, can have negative consequences for nutrition. In addition, having someone else cook for dependent older adults may lead to eating disliked food (McIntosh *et al.* 1989). Based on this analysis the two variables included from the INT are (1) receiving food from others in the network, and (2) having someone prepare one's meals. Although we make no prediction regarding their effect, we also include in the analysis the reciprocal of these two variables, (1) giving food to network members, and (2) preparing meals for others in the network. The effect of these five variables of nutritional risk are summarised in the eighth hypothesis:

H8: The likelihood of making health dietary changes is inversely related to: (1) living alone, (2) alcohol consumption considered a problem, (3) either significantly gaining or losing weight in the past year, (4) receiving food from others, and (5) having others prepare meals.

We turn now to the nutritional support factors whose presence could have positive consequences for dietary change. This extends the number of social support factors that were previously covered in this model under the social network construct. Several studies have shown that those who are physically active will not only experience positive nutritional consequences (Chatard *et al.* 1998; Woo *et al.* 1998; Misra, Quandt and Aguilon 1999), but also positive effects on psychological well-being, cognitive functioning (McAuley and Katula 1998), and survivability (Sihvonen, Rantanen and Heikkinen 1998). The measure of physical activity selected for our model focuses on whether or not the respondent has increased their level of activity overall in the past year.

Active involvement in various social settings is measured by the next three variables in this construct. They represent potential supportive frameworks through which food and information about food are accessible. To the extent the one is employed, regularly attends a religious service, or participates in a community-based meal programme, this broadens the diversity of social contacts and the potential access to information that can have a positive impact on health and nutrition. In a study of older adults (65+ years) in several Midwestern rural counties, Misra *et al.* (1999) found that those who were employed and attended church regularly had higher scores on a measure of 'positive nutritional status'. In one of the very first studies to focus on the relationship between diet and religiosity, McIntosh and Shifflett (1984b) found that a stronger religious commitment was to some extent related to dietary adequacy, but this varied depending on the measure

of dietary intake used and the particular religious affiliation of their respondents. They plead for further studies with more representative samples than they had available. With respect to the use of community-based meal programmes, Hendy *et al.* (1998) were surprised to find no discernible effect of these programmes on nutritional status. Since such programmes are extremely widespread, and it has been assumed they have a positive impact on the nutrition of older people, it is important to assess this factor carefully in our analysis.

Finally, we examine the role of the respondent's physician in motivating a change in diet. Food habits have been described as among the most conservative aspects of a person's behaviour. Change probably becomes more difficult the longer one has become accustomed to a particular style of eating, so we can expect older adults to have greater resistance. In order to overcome this resistance the recommendation of a physician to make dietary changes should be a strong motivating factor to do so. Based on these various considerations, we posit that:

H<sub>9</sub>: The likelihood of making healthy dietary changes is positively related to: (1) increasing level of activity in past year, (2) having employment, (3) attending church regularly, (4) using community-based meal programmes, and (5) physician-recommended dietary changes.

#### *Psychosocial variables*

In the attempt to measure successful adaptation to old age in the Georgia Centenarian Study, Poon *et al.* (1992) treat nutrition and dietary patterns in their model as influencing such outcomes as life satisfaction as well as physical and mental health. The final construct in our model, the psychosocial component, attempts to deal in similar fashion with dietary change, however expanding the analysis so that three distinct measures of psychological well-being – life satisfaction, locus of control, and self-esteem – are considered at least partially dependent on making successful dietary changes. In a previous study (Silverman *et al.* 2000) we found life satisfaction to be related to various components of social network structure and content as well as several socio-demographic variables. Here we add in the mediating variables of dietary change to examine what effect they have on this key element of psychological well-being. However, life satisfaction has proven to be a complex variable with often contradictory results. For example, in the Georgia Centenarian study researchers found that religiosity was

related to physical health, but not to life satisfaction (Courtney *et al.* 1992). Although the measures used for these three variables differ, our model will allow us to re-examine the relationship between all of them.

In looking at the dietary differences between older exercisers and non-exercisers in several Midwestern counties, Misra *et al.* (1999) found that exercisers had higher scores on internal locus of control and self-esteem, but the relationships were not statistically significant. Since successful accomplishments are frequently related to higher scores on both internal locus of control and self-esteem, successful dietary changes can be expected to have a similar impact. In fact, Trudeau *et al.* (1998), using a measure similar to internal locus of control, found that 'intrinsic motives', referring to a desire to be driven by internal rewards, was related to adopting a more healthful diet. We can summarise the discussion of psychological well-being by the following hypothesis:

H<sub>10</sub>: Success in making dietary changes is positively related to higher scores on the scales of life satisfaction, internal locus of control, and self-esteem.

The two final variables in this construct relate to the respondents' satisfaction with their physical well-being. We expect that success in making healthful dietary changes should result in a more positive perception of one's physical health and greater satisfaction with their diet. Although we include perception of health as a criterion variable, we have excluded any direct measures of our respondents' health status, primarily because it is very difficult to determine whether or not health status is a cause or an effect of poor nutrition, especially in a cross-sectional study. This conundrum is one reason why the Nutritional Risk Index used by Hendy *et al.* (1998) and others has been criticised. But we do expect that, if respondents believe their attempts at dietary change have been successful, they will have a more positive perception of their health and greater satisfaction with their present diet, the assertion of the eleventh hypothesis:

H<sub>11</sub>: Success in healthy dietary change is related to: (1) a more positive perception of health, and (2) greater satisfaction with one's diet.

## **Methods**

The largest of the five rural communities in the study had a population of approximately 10,000, while the other four ranged from approxi-

mately 1,000 to just over 2,500 population. Three of the communities border the Columbia River, while the other two are further inland. This region of northeastern Oregon has a semi-arid climate and historically possessed small farms, but recently water has been pumped from the Columbia to irrigate large crops of alfalfa, potatoes and corn. At the time of the research, there were several potato and onion processing plants and a vegetable packing plant in the area. Another economic resource is a large dam across the Columbia which produces hydroelectric power. This rather weak economic base is reflected in the low median household income, which stood at \$21,406 in 1989. Older people were economically more vulnerable, for 50 per cent of those aged 65–75 years and 62 per cent of those aged 75 or more years had an annual income of less than \$15,000. Education levels are similar to many rural populations in the United States: a little over two-thirds of the population aged 25+ years has high school education, and only about 10 per cent a college degree.

Stratified probability sampling proportionate to the number of people 60 years of age and older in each community and its surrounding area was used. The response rate was 68 per cent and the final sample 298 people, and two-thirds (67 per cent) were women. Table 1 indicates the significant differences between men and women in the sample. For a more complete discussion of the sampling plan see Hecht *et al.* (2001). We used a combined interview and questionnaire technique for purposes of data collection. The respondent was first interviewed to obtain the more complex data items relevant to the social network and basic socio-demographic data. Following the interview, a questionnaire covering a broader range of variables was left, and arrangements made to collect within the following two days. Prior to retrieving the questionnaire, the interviewer was debriefed by one of the principal investigators. Any omissions or irregularities found in the interview schedule were corrected at the time the interviewer returned for the questionnaire. This subsequent contact also provided an opportunity to determine if participation in the study had resulted in any ill effects, which the interviewer could then help resolve. By using this procedure, we found that the data quality was greatly enhanced.

#### *Sample characteristics*

With respect to social network characteristics, the density scores suggest that respondents have, on average, a less connected network than might be expected. This is particularly striking given that an average



of 76 per cent of network members are relatives. It is also apparent from the results that, of the three types of measured support, 'emotional' support is received more often from network members than 'service' or 'material' support. We did find some significant differences between the females and males in some social network characteristics. The range of the network is smaller for women, and women's networks are also less dense. However, women interact with network members more frequently than do the men. It is also worth noting that there are no significant differences between women and men in terms of the emotional, services, or material support received from network members.

Regarding the nutritional risk/support factors, the data presented in Table 1 indicate further significant differences between men and women. Women are more likely to live alone, to report having gained weight, to have given food to and receive food from network members, and to have provided meals to members of their social networks. It is also the case that women attend church more often than men, and are more likely to have received a doctor's recommendation to make a dietary change. All of these findings are consistent with previous studies. When it comes to nutritional change, 19 per cent of respondents attempted no change, 63 per cent attempted a change in their dietary pattern and were successful at doing so, and 18 per cent attempted a change and failed. The mean number of food habit changes that respondents attempted is 2.79, which represents a fairly substantial level of effort. Finally, we note that the psychosocial measures are excluded from this table, as there are no significant differences between females and males on any of these criterion variables.

## **Results**

We used linear regression analysis to test the 'Dietary Change Model' (DCM), and the backward stepwise method in order to isolate those variables having significant associations with each outcome analyzed ( $p \leq 0.05$ ). We first estimate the effects of socio-demographic, social network, and nutritional risk/support variables on the likelihood of healthy dietary change. This procedure is followed by analyses which measure the effects of the full DCM model, including the nutritional change variables, on the psychosocial criterion variables, including life satisfaction, perception of health, and satisfaction with diet. In these analyses, as well as in the analysis of total number of changes attempted, we present results by gender as well as for the full sample.

TABLE 1. Descriptive Statistics ( $N = 298$ )

	Total (n = 298)			Females (n = 197)		Males (n = 101)	
	mean	s.d.	range	mean	s.d.	mean	s.d.
<b>Socio-demographic</b>							
Gender (1 = female)	.67	.47	1	—	—	—	—
Age	71.10	7.41	35	71.27	7.70	70.77	6.85
Education (years)	11.00	3.60	21	11.26	3.09	10.40	4.37
Income <sup>a</sup>	4.44	2.83	15	3.99	2.58	5.32	3.09***
Married (1 = yes)	.53	.50	1	.41	.49	.76	.43***
Household Size	1.81	.85	5	1.65	.77	2.11	.91***
<b>Social Network</b>							
Range	6.77	2.72	10	3.99	2.64	6.34	2.84*
Density	53.88	28.09	100	50.44	26.86	60.97	29.36**
Frequency of Interaction	64.70	28.51	145	67.15	28.25	59.94	28.55*
Percent relatives	76.08	27.00	100	77.00	25.51	75.73	31.42
Emotional Support Received	3.55	1.59	6	3.64	1.53	3.36	1.68
Service Support Received	2.01	1.78	10	1.93	1.69	2.18	1.93
Material Support Received	.97	.55	2	.96	.52	.99	.62
<b>Nutritional Risk/Support</b>							
Lives Alone (1 = yes)	.37	.48	1	.47	.50	.17	.38***
Alcohol or Drug Problem (1 = yes)	.03	.17	1	.01	.10	.07	.26
Gained Weight	.17	.38	1	.22	.41	.08	.27**
Lost Weight	.30	.46	1	.33	.47	.24	.43
Food Received from Network	2.22	2.19	10	2.49	2.36	1.70	1.73**
Food Given to Network	2.50	2.65	10	2.75	2.88	2.01	2.07*
Meals Received from Network	1.88	1.92	10	1.90	2.03	1.84	1.71
Meals Provided to Network	1.86	2.31	10	2.18	2.48	1.25	1.81***
Change in Activity Level	2.82	.88	4	2.79	.87	2.87	.90
Employed (1 = yes)	.13	.34	1	.09	.29	.20	.40*
Church Attendance	1.69	1.49	4	1.81	1.49	1.44	1.46*
Community Food Programmes (1 = yes)	.24	.43	1	.27	.44	.19	.39
Doctor Recommended Change	.41	.49	1	.46	.50	.31	.46*
<b>Nutritional Change</b>							
Number of Food Changes Attempted	2.79	2.02	7	3.15	1.92	2.10	2.04***
Attempted Change, Succeeded	.63	.48	1	.67	.47	.55	.50
Attempted Change, Failed	.18	.38	1	.21	.41	.11	.32*

Notes: Significance of gender differences: \* $p \leq 0.05$ , \*\* $p \leq 0.01$ , \*\*\* $p \leq 0.001$ .

a: Income is measured as 16 discrete categories, beginning with \$0–4,999, and ending with \$75,000+.

### Dietary change

Regression analyses of the effects of socio-demographic, social network, and nutritional risk/support variables on the total number of dietary

TABLE 2. Stepwise regression of total number of dietary changes on socio-demographic, social network, and nutritional risk/support variables, by gender

	Total (n = 293)		Females (n = 193)		Males (n = 100)	
	b	t	b	t	b	t
<b>Socio-demographic</b>						
Gender (1 = female)	.98	3.68***	–	–	–	–
Married (1 = yes)	.78	2.94**	.97	2.97**	–	–
Household Size	–.35	–2.26*	–.47	–2.14*	–	–
<b>Social Network</b>						
Range	–	–	–	–	–.27	–2.51*
Density	–.01	–2.06*	–.01	–2.37*	–.03	–3.35***
Frequency of Interaction	–.01	–2.75**	–	–	–	–
Percent relatives	–	–	1.97	3.00**	–	–
Service Support Received	–	–	–	–	–.37	–2.61*
Emotional Support Received	–	–	–	–	.26	2.17*
Material Support Received	–	–	–	–	1.29	3.62***
<b>Nutritional Risk/Support</b>						
Meals provided to network	–	–	–	–	–.33	–3.20***
Community food programmes	–	–	.69	2.32*	–	–
Doctor recommended change	1.15	5.08***	1.37	5.17***	.96	2.41*
Constant	2.60	4.02***	1.30	1.56	–.21	–.09
R <sup>2</sup> (adjusted)	0.25		0.20		0.35	

Note: \*p ≤ 0.05, \*\*p ≤ 0.01, \*\*\*p ≤ 0.001.

changes attempted are reported in Table 2. The results show that on average, women attempted one more change than men ( $p \leq 0.001$ ), a finding consistent with Hypothesis 1. Hypothesis 2, which predicted that age is positively associated with change, was not supported, nor Hypothesis 3 on the effects of income and education. On the other hand, being married is positively associated with the number of changes attempted (Hypothesis 4;  $p \leq 0.01$ ), although the relationship holds only for women ( $p \leq 0.01$ ), and contrary to our prediction of the interaction between gender and marriage, marriage is clearly more important for women. As hypothesised, household size is related negatively with the number of change attempts (Hypothesis 5;  $p \leq 0.05$ ), but the effect holds only for women ( $p \leq 0.05$ ).

Turning to the next category of variables, we find that several characteristics of the social network predict dietary change attempts, with some variation by gender. In the full sample, we find negative associations between dietary change and both network density and the frequency of interactions (supporting Hypothesis 6). The effect of density holds for both women ( $p \leq 0.05$ ) and men ( $p \leq 0.001$ ), and the coefficient for men is larger. Although not significant in the full sample, the gender analyses shows that range is negatively associated with

change for men (Hypothesis 7;  $p \leq 0.05$ ), but not for women. Similarly, the percentage of the network who are relatives positively associates with change attempts for women ( $p \leq 0.01$ ), the inverse of the prediction in Hypothesis 6. Finally, the gender analyses show that social support variables are important for men but not women. For men, the number of services received is negatively associated with change attempts ( $p \leq 0.05$ ). In contrast, receiving emotional support ( $p \leq 0.05$ ) and material support ( $p \leq 0.001$ ) are positively associated with change attempts, which is consistent with Hypothesis 7.

There are also gender differences in the effects of the nutritional risk/support variables on the number of change attempts. Among men, as the number of meals that respondents prepare for network members increases, the likelihood of a change attempt decreases ( $p \leq 0.01$ ). Among women, using community food sources is positively related to change attempts ( $p \leq 0.05$ ). Having had a doctor recommend dietary change is positively associated with the number of change attempts for both genders. Thus, our predictions in Hypothesis 8 are not supported, and Hypothesis 9 is partially supported.

#### *Psychosocial effects of dietary changes*

In this section, we discuss the analyses that estimate the effects of the variables in the ‘Dietary Change Model’ on the criterion variables, including the measures of psychological well-being, perceptions of health, and respondents’ satisfaction with their diet. We add the mediating variables, including the total number of dietary changes attempted, and the success or failure of change attempts, to the sets of predictor variables modeled in the preceding analyses (socio-demographic, social network, and nutritional risk/support).

*Psychological well-being:* We conducted analyses of the effects of the DCM on three measures of well-being: life satisfaction, locus of control, and self-esteem. Of the three, life satisfaction (Neugarten, Havighurst and Tobin 1961) shows the clearest relationship with both predictor and mediating variables (see Table 3).<sup>3</sup> Providing food to network members enhances life satisfaction ( $p \leq 0.001$ ), and the relationship holds for both women and men. Providing meals also enhanced self-esteem for women (scale from Rosenberg 1965), but it has a negative effect on the sense of control for men (scale from Robinson and Shaver 1965). Using community food sources also increases life satisfaction (and self-esteem), but only for men ( $p \leq 0.05$ ). Successful attempts at dietary change are also associated with increased life satisfaction ( $p \leq 0.01$ ), but this variable is not statistically significant in the gender

TABLE 3. Stepwise regression of life satisfaction on socio-demographic, social network, nutritional risk/support, and nutritional change variables, by gender

	Total (n = 293)		Females (n = 193)		Males (n = 100)	
	b	t	b	t	b	t
<b>Socio-demographic</b>						
Gender (1 = female)			–	–	–	–
Age			.08	2.70**		
Income	.21	3.22***	.30	3.64***		
Household Size					.70	2.22*
<b>Social Network</b>						
Density	.02	3.04**			.04	3.76***
Percent relatives					–2.39	–2.26*
Emotional Support Received	.17	1.99*			.39	2.49*
<b>Nutritional Risk/Support</b>						
Alcohol or Drug Problem <sup>1</sup>	–2.66	–2.60**	–4.95	–2.64**	–2.80	–2.37*
Gained Weight					–2.71	–2.22*
Lost Weight			–.88	–2.00*		
Food Given to Network	.26	3.43***	.35	4.08***	.32	2.04*
Meals Received from Network					–.89	–4.52***
Change in Activity Level	.70	3.46***	.87	3.52***		
Community Food Programmes <sup>1</sup>	.87	2.09*			1.52	2.17*
<b>Mediating Variables</b>						
Succeeded in Change Attempt <sup>1</sup>	1.05	2.67**				
Failed in Change Attempt <sup>1</sup>	–1.29	–2.94**	–1.35	–2.69**		
Constant	.72	.36	1.41	.57	6.59	6.38***
R <sup>2</sup> (adj)	.25		.28		.33	

Notes: 1. I = yes. \*p ≤ 0.05, \*\*p ≤ 0.01, \*\*\*p ≤ 0.001.

analyses. Those who tried and failed, however, had lower life satisfaction scores compared to those who did not attempt any change, but this relationship holds only for women ( $p \leq 0.01$ ). In Hypothesis 8, we predicted an inverse relationship between living alone and life satisfaction. Surprisingly, this was not supported, and instead there was a clear inverse relationship with self-esteem and sense of control.

Several other of the nutritional risk/support variables have significant effects on life satisfaction. Having an alcohol or drug problem undermines life satisfaction ( $p \leq 0.01$ ), and the relationship is significant for both women and men. Unexpectedly, women who lost weight report lower life satisfaction compared to women who had no weight change ( $p \leq 0.05$ ). Among older people, however, weight loss may have negative causes, such as illness. In contrast, men who gained weight had lower life satisfaction than men with no change in weight ( $p \leq 0.05$ ). Increases in activity level is associated positively with life satisfaction, but the relationship holds only for women ( $p \leq 0.001$ ).

TABLE 4. Stepwise regression of perception of health on socio-demographic, social network, nutritional risk/support, and nutritional change variables, by gender

	Total (n = 293)		Females (n = 193)		Males (n = 100)	
	b	t	b	t	b	t
<b>Socio-demographic</b>						
Age	.01	2.10*				
Education			.05	2.80**		
Income	.06	4.33***			.07	3.00**
Married <sup>1</sup>					-.38	-2.20*
<b>Social Network</b>						
Density	.01	2.49*				
Frequency of Interaction					.01	2.80**
Percent relatives			.61	3.09**		
Service Support Received	-.07	-2.66**				
Material Support Received			-.25	-2.69**		
<b>Nutritional Risk/Support</b>						
Lost Weight					-.45	-2.77**
Food Given to Network	.04	2.66**	.05	3.17**		
Change in Activity Level	.33	7.43***	.32	6.00***	.37	4.72***
Dr. Recommended Change	-.35	-4.25***	-.35	-3.98***		
<b>Mediating Variables</b>						
Succeeded in Change Attempt <sup>1</sup>	.25	2.32*				
Failed in Change Attempt <sup>1</sup>					.56	2.45*
Constant	.54	1.20	.87	2.94**	1.23	4.32***
R <sup>2</sup> (adj)	.36		.38		.40	

Notes: 1. I = yes. \*p ≤ 0.05, \*\*p ≤ 0.01, \*\*\*p ≤ 0.001.

*Perceptions of health:* Dietary variables had significant effects on respondents' perceptions of their general health (Table 4). Women who give more food to network members reported more positive self-assessments of health than women who give less ( $p \leq 0.01$ ). Doctors' recommendations to make dietary changes, a measure of nutritional support, are associated with poorer perceptions of health, but only among women ( $p \leq 0.001$ ). The relationships between health and the success or failure in making change attempts are interesting. In the analysis of the full sample, those who succeeded in a change attempt had better perceptions of health than those who made no attempt to change ( $p \leq 0.05$ ), but the relationship did not hold in the gender analyses. Instead, among men, failure in the attempt to change has the positive effect ( $p \leq 0.05$ ), compared to those who did not attempt a dietary change. The meaning of this pattern is not readily discerned. Perhaps it is simply the attempt to change that imparts benefits, whether successful or not. At any rate, success and failure as regards dietary change apparently means different things to women and men.

TABLE 5. Stepwise regression of satisfaction with diet on socio-demographic, social network, nutritional risk/support, and nutritional change variables, by gender

	Total (n = 293)		Females (n = 193)		Males (n = 100)	
	b	t	b	t	b	t
<b>Socio-demographic</b>						
Gender (1 = female)			–	–	–	–
Age	.01	2.71**			.02	2.58*
Income			.05	2.84**		
Married <sup>1</sup>			–.40	–2.98*		
<b>Social Network</b>						
Range	.05	3.55***				
Frequency of Interaction					.01	2.92**
Service Support Received					–.08	–2.77**
Emotional Support Received					.11	4.01***
Material Support Received			–.19	–2.34*		
<b>Nutritional Risk/Support</b>						
Alcohol or Drug Problem <sup>1</sup>			–1.05	–2.92**		
Gained Weight			–.26	–2.42*		
Lost Weight	.20	2.67**	.26	2.97**		
Meals Provided to Network					–.07	–2.64**
Change in Activity Level	.09	2.32*				
Dr. Recommended Change					–.25	–2.02*
<b>Mediating Variables</b>						
Succeeded in Change Attempt <sup>1</sup>	–.29	–3.26***			–.28	–2.20*
Failed in Change Attempt <sup>1</sup>	–.64	–5.67***	–.46	–4.47***	–.62	–3.67***
Constant	2.04	5.58***	3.48	24.62***	1.69	2.80**
R <sup>2</sup> (adj)	.25		.29		.48	

Notes: 1. I = yes. \*p ≤ 0.05, \*\*p ≤ 0.01, \*\*\*p ≤ 0.001.

The explanation may be as simple as the notion that those with better perceptions of health just don't try as hard; more research is needed to specify the causal direction.

Of the social network variables, density is associated positively with health in the full sample ( $p \leq 0.05$ ), but not in the gender analyses. Receiving supportive services undermines health in the analysis of the full sample ( $p \leq 0.01$ ) but not in the gender analyses, although receiving material supports has a similar effect for women ( $p \leq 0.01$ ). Two other network variables have effects for one gender, but not the other. Increased interaction is related to better perceptions of health among men ( $p \leq 0.01$ ), and higher percentages of relatives in the network benefit women ( $p \leq 0.01$ ). The effects of some of the nutritional risk variables that are not directly related to food or diet also had gender differentiated effects. Change in activity level did not, however, for becoming more active is associated with better perceptions

of health for both women ( $p \leq 0.001$ ) and men ( $p \leq 0.001$ ). Having lost weight undermines men's perception of health ( $p \leq 0.01$ ).

*Satisfaction with diet:* Our final analysis estimates the effects of the 'Dietary Change Model' on respondents' levels of satisfaction with their current diet (Table 5). Of the food and diet-related variables in the nutritional risk/support category, those that remain in the analyses have significant effects only for men. Providing meals to network members is negatively associated with men's satisfaction with their diet ( $p \leq 0.01$ ), as is having had a doctor recommend dietary change ( $p \leq 0.05$ ). An interesting finding is that both success and failure in attempts to make dietary changes are inversely associated with satisfaction with diet ( $p \leq 0.001$ ), compared to those who attempted no change. The relationship between success and satisfaction remains significant only for men ( $p \leq 0.01$ ), while the relationship between failure and satisfaction with diet is significant for women ( $p \leq 0.001$ ) and men ( $p \leq 0.05$ ). Again, this finding suggests that attempting a change at all, regardless of one's success, has negative meaning for the respondents in this sample, in that they may resent having to change their long established eating habits.

## Discussion

In the search for an understanding of food habits, two major theoretical perspectives have most commonly been used in anthropology, and both have influenced work in sociology; namely structuralism, as in the work of Lévi-Strauss (1966) in France, and of Douglas (1966) in Great Britain, which emphasises the symbolic relevance of food; and materialism, represented among others by Harris (1986) and Mintz (1985) in the United States, in which the practical requirement of satisfying bodily needs dominates the understanding. Both of these perspectives have been ably summarised and critically evaluated by Murcott (1988). The conceptual model articulated here represents a third sociocentric perspective, which gives primary emphasis to interpersonal transactions and the availability of social support. A crucial element of social support is operationalised by social network analysis and informed mainly by the insights of social exchange theory (Emerson 1992). The sociocentric view is presented as a complement to structuralism, with its search for the embedded meaning behind food, and materialism, with its Marxist sensibility that gives priority to the broader economic and political forces that control decision making.



This third approach fills an empirical gap, insofar as it adds to our understanding of the daily and long-term decisions individuals must make regarding food choices and the management of their diet. Only by accounting for the social support contexts in which people are embedded is this possible, and that requires taking account of personal networks as well as their position in broader institutional frames.

To the materialist insistence that food is, as Harris (1986) would have it, 'good to eat', and the structuralist counter proposal that food is 'good to think', we add a third consideration to the understanding of food habits that deserves equally serious attention: that food is 'good for relating'. It remains necessary to specify more precisely where this sociocentric perspective fits within the context of contemporary nutrition studies. As mentioned, the growing interest in food and its relation to society can be attributed to work in both sociology (Mennell 1985; McIntosh 1996) and anthropology (Goody 1982). Mennell's conceptual approach is of particular relevance to the 'Dietary Change Model' employed in this study. He bases his argument on the work of Norbert Elias (1978 [1939]) whose sweeping history of European manners has become a classic of historical sociology. Whereas Elias's formulation has been referred to as 'process sociology', or a 'figurational' approach, Mennell prefers to call his adapted approach developmentalist, which can be briefly characterised as a concern with the 'broad social, political and economic changes [that] shape the expression of emotion, manners, taste and lifestyle, and he [Elias] applies this in accounting for changing food preferences and emerging cuisines' (Mennell *et al.* 1992: 17).

Thus, the approach relates individual behaviour to the social, political and economic forces as well as the cultural values that determine beliefs in general and preferences of taste in particular. Whereas Mennell, Elias and Goody attempted to understand how social processes affect food habits at the macro-level, given that they were all concerned with changes in cuisine and manners over several centuries, our micro-level analysis identifies the social structures and processes which bear on individual lives at different stages of the life cycle and, more specifically, those processes that can affect changes in food choice. Individuals are constrained by the structures within which they choose preferred courses of action. It is this interplay, between social constraint and individual choice that is negotiated in everyday life, which is the core assumption in our conceptual model. Rather than the historical sweep of the 'figurational approach', our research concern is situated in the immediate social contexts within which individuals behave.

The Dietary Change Model has used constructs that can be found in many other nutritional studies, *i.e.* nutritional risk/support behaviour, social network, psychosocial, and socio-demographic variables. But the specific variables used for each construct, especially in the elaboration of the social network variables, differ from those used in the studies with alternative conceptual models. Using different instruments to measure the same or similar constructs should provide the opportunity to evaluate more effectively the robustness of the findings (*cf.* Poon *et al.* 1992). With these considerations in mind, we conclude with a summary and evaluation of the detailed model findings about dietary change in an older population.

Beginning with the socio-demographic variables, we found strong support for three of the five hypotheses relating to dietary change. The most significant findings are the strong differences between older men and older women, which support previous findings, although our analyses show that gender differences are much more complex than has been recognised in much of the literature. For example, it is not only that women are more likely to make healthful dietary change, but even in those cases where we expected men to be equally motivated to change (as among the more educated), or even more likely to change (as among married men), only women with these characteristics yielded significant relationships with dietary change.

With regard to the social network construct, the most important finding was the negative impact on dietary change of social network density and, to a lesser extent, the frequency of interaction with network members. We also expected a high percentage of relatives in the network to lower the likelihood of dietary change, but in fact it had the opposite effect for women. Nevertheless, the role of density lends support to the 'strong ties' argument of Granovetter (1982), that such ties are likely to lead to a lesser variety of information and novel ideas in a network. We extend the argument (in agreement with McIntosh *et al.* 1989), and suggest that in social contexts that have excessive solidarity, whether they are families, personal networks or broader social frameworks, there is more likely to be considerable control over the individual members' behaviour, and this will make it more difficult to effect a nutritional change, or perhaps even lead to lower dietary intake in general (see also McIntosh and Shifflett 1984*a*). Clearly, the inter-connectedness of relations in a dense network, bolstered by frequent interaction with network members, represents a credible example of the dampening impact of strong ties on attempts to change dietary habits.

Turning now to nutritional risk/support, that most fickle and

controversial of constructs in the nutritional literature, only three of the five variables in Hypothesis 9 were positively related to dietary change: church attendance, using community-based meal programmes (but only for women), and physician-recommended change of diet. Although we made no prediction regarding the effect of the respondent's provision of food or meals for network members, we found this to be positively related to dietary change for women, but negatively related for men – another example of the nature of network relations producing opposite consequences for men and women.

The final element of the model associates both the predictor and mediating variables with the psychosocial variables, and again finds striking differences between women and men. Women who support others with food or the preparation of meals enjoy higher levels of life satisfaction and self-esteem, but if they are the recipients of these provisions score low on locus of control. On the other hand, men have low locus of control scores when they are providing meals for others in the network, and seem more accepting of receiving provisions from either network members or community food programmes. We refrain from hasty conclusions about the greater generosity and lesser dependency needs of women, but clearly these gender differences invite greater scrutiny. Considering this and the other findings of quite contradictory gender effects, a useful principle of social exchange theory is demonstrated, that a factor which produces benefit for one segment of society may be a cost for another.

We cannot ignore some of the limitations of this study. Our data are not longitudinal, thus our measures of change are based on the respondents' retrospective accounts. The analysis presented here does not determine cause-effect relationships, but instead presents a series of correlations. Only carefully designed longitudinal studies can determine if the hypothesised causal relations are valid. Finally, there are many other important elements that define one's nutritional status beyond the dietary changes covered here. A more extensive study would be required to account for these. The model we have presented allows for incorporating these additional elements, but this must be left to future research. Almost 60 years ago, the distinguished psychologist Kurt Lewin (1943) noted that family dynamics were a major force in determining food habits. We can now confirm this insight and state more precisely how that dynamic, and that of other relationships important in the lifecourse of an individual, is connected to the often joyous, at times frustrating, but always inevitable task of eating.

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### NOTES

- 1 See Neimeijer (1973) for details on measuring density.
- 2 Two of the support items involving food were removed from this set of variables, one from material support (providing food), and one from service support (preparing meals), and reframed as nutritional risk variables. In much of the literature, both material and service support in our formulation are typically referred to as instrumental support, and our emotional domains as expressive support.
- 3 Tables are not included for the locus of control and self-esteem variables due to space limitations, however we do discuss the more important findings from these two variables.

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