

Original Article

The factors associated with the belief that vegetarian diets provide health benefits

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The aim of this paper is to examine the factors associated with the belief that vegetarian diets provide health benefits. A random population mail survey about food choice was conducted among a sample of 1000 South Australians. An additional (non-random) survey of 106 vegetarians and semi-vegetarians was also conducted, giving a total of 707 participants from both samples. The main predictors of the belief that vegetarian diets provide health benefits for all respondents were found to be the belief that meat is neither healthy nor necessary and frequent searching for information on healthy eating. However, there were differences between vegetarians, non-vegetarians and semi-vegetarians. In particular, health issues were relatively more important for semi-vegetarians and vegetarians, while knowledge and convenience issues were most important for non-vegetarians. The results have important implications for public health. Many South Australians perceive that health benefits are associated with eating a vegetarian diet, which may also apply to plant-based diets in general. However, if non-vegetarians are to obtain some of the health benefits associated with the consumption of a plant-based diet, they require information on the preparation of quick and easy plant-based meals.

Key Words: beliefs, vegetarian, plant-based diets, meat, health, survey, Australia

Introduction

Interest in vegetarian diets is increasing in countries such as the United States and Britain.¹⁻⁴ Some people adopt vegetarian diets because they believe them to provide health benefits over a diet that includes meat.⁵ For example, vegetarians may associate meat with food poisoning and diseases such as heart disease.⁶ Recent research has indicated that some non-vegetarians may also consider meat to be fattening or generally unhealthy.^{7,8} Indeed, a United States survey found that 56% of non-vegetarian respondents at least partially agreed that a vegetarian diet tends to be healthier than a diet that includes red meat.^{9,10} This paper will explore the factors associated with the belief (whether accurate or inaccurate) that vegetarian diets provide health benefits.

Researchers and organisations, such as the American Dietetic Association¹¹ and Sanders,¹² have shown that, at all stages of the lifecycle, it is entirely possible to obtain all necessary nutrients from a vegetarian diet, including adequate amounts of essential amino acids, iron, vitamin B-12, calcium, vitamin D and zinc. However, vegetarian diets must be well planned.¹¹ They should include satisfactory quantities of a variety of grains, vegetables, legumes, fruits, nuts and seeds.^{12,13} Poorly planned vegetarian diets may increase the risk of not meeting the needs for some nutrients, especially vitamin B-12, zinc and iron.^{14,15} This is because the bioavailability of iron and zinc from plant foods is lower than it is for meat, and the primary dietary sources of vitamin B-12 are animal products (meat, eggs and milk).¹⁶⁻¹⁸ Although mean serum ferritin levels are lower in vegetarians than they are in non-vegetarians, clinical anaemia does not appear to be more common among vegetarians,^{15,19} in Western

countries at least.²⁰ In addition, lacto-ovo-vegetarians do not appear to have a significantly greater risk of low zinc status than omnivores, despite lower daily zinc intakes in female (but not male) vegetarians compared to female omnivores.²¹

Well-planned vegetarian diets provide some important health and nutrition benefits. They are lower than meat-centred diets in cholesterol, saturated fat and animal protein, and higher in antioxidants (such as vitamins C and E), folate, fibre, phytochemicals and carotenoids.¹¹ A number of studies have shown that, compared to non-vegetarians, vegetarians have a lower mean body mass index, plasma total cholesterol concentration, low-density lipoprotein cholesterol level, and blood pressure.²²⁻²⁷ Mortality from ischaemic heart disease appears to be moderately decreased in vegetarians compared to non-vegetarians.^{24,28}

The high saturated fat content of meat (with the associations between saturated fat and coronary heart disease and obesity risk) and the higher intake of protective factors such as fruits, vegetables, nuts and wholegrains by vegetarians, rather than meat per se, may be the main reason for the lower incidence of some diseases in vegetarians.^{29,30} Indeed, both vegetarian plant-based diets that contain some meat offer health benefits.³¹ For example, as fruit and vegetable intake is increased, the

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Accepted 24 January 2003

risk of ischaemic stroke is decreased.³² Cardiovascular and total mortality has been found to be significantly lower among those with a high fruit intake than among those with lower fruit consumption.³³ In addition, deaths from cancer can be reduced significantly if intake of fruit and vegetables increased to recommended levels.³⁴ The important health benefits provided by plant-based diets in general, such as those mentioned above, are increasingly being recognised by health organisations and researchers.^{11,31,35-38} Plant-based diets conform more closely to public health recommendations than do typical western diets.^{35,39,40}

In summary, the level of meat consumption of the population impacts on public health. It has been argued that there are clear benefits associated with vegetarian and other plant-based diets, although there are also some risks of deficiency in certain nutrients if these diets are not well planned. However, the population's beliefs about the healthiness of meat and vegetarianism are likely to differ to the nutrition and disease-risk research findings discussed above, and the focus of this paper is on the beliefs of the population.

This paper will examine the factors associated with the perceived health benefits of vegetarian diets, including disease prevention, decreased saturated fat intake, increased weight control, maintenance of one's health, and improved life expectancy (see Table 1). It is particularly important to examine such beliefs as many of these perceived benefits of vegetarian diets also pertain to broader plant-based diets (i.e. that may or may not contain some meat).

There is little published work on the social-cognitive origins of beliefs about vegetarian diets. However, previous work by the authors and other researchers has shown that a variety of factors are associated with meat consumption and with beliefs about meat,⁴¹⁻⁴⁵ which allows some hypotheses to be made. A number of possible factors that may be associated with beliefs that vegetarian diets provide health benefits were examined: beliefs about meat and nutrition, barriers and benefits of vegetarian diets, number of vegetarian significant others, use and trust in information sources, personal values and demography. It was predicted that the perceived health benefits of vegetarian diets would be positively associated with non-health related benefits of such diets (e.g. environmental and animal welfare benefits), with negative beliefs about meat (e.g. meat is unhealthy), and holding universal values. Factors that were predicted to be negatively associated with perceived health benefits of vegetarian diets were positive beliefs about meat (e.g. red meat appreciation and the belief that meat is necessary in the diet), perceived barriers to vegetarian diets (e.g. health and social concerns), and holding more traditional and power-oriented values. These are discussed in more depth below.

Richardson *et al.*,⁴⁴ found that the perceived healthiness of meat was a positive predictor of red meat consumption. Zey and McIntosh⁴⁶ observed similar relationships for the intention to eat beef. Thus, it was hypothesised that the healthiness, or necessity, of meat would be a negative predictor of the belief that vegetarian diets provide health benefits.

People may face barriers to altering their behaviour, such as when attempting to eat a healthier diet.^{47,48} It has been argued that it is only when the benefits outweigh the barriers that behavioural change occurs.⁴⁹⁻⁵¹ The influence of these factors on the belief that vegetarian diets are healthy was therefore examined. This is particularly important as it is likely to have wider implications for the adoption of plant-based diets in general. It was hypothesised that the perceived non-health related benefits of vegetarian diets (e.g. environmental and animal welfare) would be positive predictors of the belief that vegetarian diets provide health benefits, but that perceived barriers to vegetarian diets would be negative predictors.

Personal values may influence meat and vegetarianism beliefs and level of meat consumption.⁵²⁻⁵⁶ Vegetarians are more likely to hold universal values such as concern about environmental issues and gender equity than non-vegetarians.^{52,56,57} Therefore, it was predicted that universalism would be a positive predictor of the belief that vegetarian diets provide health benefits. It was expected that power and tradition were likely to be negative predictors of the belief that vegetarian diets provide health benefits, after Adams,⁵⁸ Dietz *et al.*,⁵² and Allen.⁵⁷ There is one existing study, from the United States, that directly pertains to the examination of the factors linked to the perception that there are health benefits associated with vegetarian diets. Kalof and others¹⁰ examined the demographic and personal value predictors of the statement: "I believe a vegetarian diet is generally more healthy than a diet that includes red meat". They found that being a black American and holding universal values were positive predictors of this belief, while holding traditional values was a negative predictor. This study therefore strengthened the expectation that the hypothesis would be fulfilled with regard to traditional and universal values.

Methods

Procedure

One thousand individuals were randomly selected from the South Australian population by using the software package Marketing Pro (April 1999 version, Desktop Marketing Systems Pty Ltd), which contains a complete list of residences from the phone directory.

A twelve-page questionnaire in booklet form entitled Food Choice, Information and Your Attitudes, cover letter and reply-paid envelope were mailed to each individual in the sample in mid-1999. Dillman's⁵⁹ suggested methods for mail surveys were used as the basis for design and administration of the questionnaire. A number of follow-ups to the original mailing were conducted in order to increase the response rate. These have been documented in Lea and Worsley.⁴¹

Only nine vegetarians were present in the random sample, so in order to ensure comparisons could be made between people with high meat consumption and people with low or nil meat consumption, a small non-random sample (N=106) of vegetarians and semi-vegetarians was included in the survey. This sample was selected by giving out questionnaires at an environmental event; by placing advertisements in vegetarian cafés and restaurants, health food stores, and at Adelaide University; and by utilising the "snowballing" technique. The study met

the guidelines of the Adelaide University Human Ethics Committee for survey research.

The questionnaire

The pilot questionnaire was formulated through an examination of the following data: interviews by the first author with 15 vegetarians about their food choices, information use and lifestyle; the literature;^{44,60,61-63} and three existing food choice questionnaires. The latter were Australian and New Zealand surveys of food concerns,⁶⁴ an Australian survey on meat consumption and attitudes,⁵⁶ and the Institute of European Food Studies (IEFS) European Union survey on food, health and nutrition attitudes.⁶⁵

After pre-testing (described in Lea and Worsley⁴³) the final version of the questionnaire included sections on food supply concerns, use of and trust in sources of information about food, health and nutrition, recall of the promotion of meat and vegetarianism by information sources, general nutrition beliefs and behaviours, beliefs about meat and vegetarianism, frequency of consumption of animal products, items about vegetarianism in general, and personal values. The sections of the questionnaire specifically relevant to this paper are:

- (1) Perceived *benefits of vegetarian diets*, including personal benefits and those with wider implications (24 items). Some parts were modelled on the above-mentioned IEFS survey.⁶⁵ A five-point scale was used to indicate level of agreement or disagreement for this section and the following three sections.
- (2) Personal *barriers to vegetarian diets* (25 items), some of which were modelled on the Institute of European Food Studies (IEFS) European Union survey on attitudes to food, nutrition and health.⁶⁵
- (3) Four items about *general nutrition beliefs and behaviours* (three of which were based on the IEFS European Union survey on attitudes to food, nutrition and health⁶⁵), including "I frequently look for information on healthy eating" and "Diet is important in preventing illness and disease".
- (4) *Beliefs about meat* (20 items, some of which were based on Worsley *et al.*,⁵⁶ questionnaire).
- (5) *Personal values* (23 items). These were modelled on the values elucidated by Schwartz⁶³; a short version of his inventory of over 50 values was used in the questionnaire. Each respondent was asked to indicate how important each value was as a guiding principle in their life.
- (6) *Demographic variables* (13 items) including sex, age, and occupation.

Data analysis

Principal components analysis with varimax rotation was performed on the 24 benefits of vegetarianism items. Three factors emerged, which were named: (1) *Peace and Contentment Benefits of Vegetarianism* (with the dominant items on this factor, along with their factor loadings, being: "Help the feminist cause" (71), "Be less aggressive" (70), "Be more content with myself" (69), "Help create a more peaceful world" (67), and "Satisfy my religious and/or spiritual needs" (66)); (2) *Health Benefits of Vegetarianism* (discussed below); and (3) *Animal Welfare, Environmental and Hunger Benefits of*

Vegetarianism (with the dominant items being: "Help animal welfare/rights" (79), "Increase the efficiency of food production" (75), "Help the environment" (75), and "Decrease hunger in the Third World" (75). The factor *Health Benefits of Vegetarianism*, the focus of this paper, included the prevention of disease, decreased saturated fat intake, weight control and staying healthy in general (Table 1). Measures of internal reliability (Cronbach's Alpha) indicated that this factor had high internal consistency (Table 1). Frequency of participants' responses to the items was measured, and cross-tabulations by dietary group (self-identified as non-vegetarian, semi-vegetarian, or vegetarian) were performed for each of the items incorporated in the *Health Benefits of Vegetarianism* factor. (See Lea and Worsley⁴² for a full description of these factors and for details of the reasons why self-classification into dietary groups was utilised.)

Stepwise multiple regression analyses of *Health Benefits of Vegetarianism* were run with factor scores derived from the principal component analyses, the demographic variables, the respondents' recall of the promotion of meat and vegetarianism, beliefs about nutrition, and numbers or proportion of vegetarian family and friends. Regression analyses were conducted for all respondents in total and within each dietary group. Analyses were conducted with SPSS for Windows statistical software (version 10.0.05, 1999, SPSS Inc.). All statistical tests used an alpha level of 0.05.

Results

Of the randomly selected subjects who could be contacted, 70.6% filled out the questionnaire (N=603), with two questionnaires being unusable. Approximately 15% (N=146) of the sample could not be reached because their addresses were incomplete or had changed since the Marketing Pro data were collected, or they could not be contacted by phone. With the 106 vegetarians and semi-vegetarians selected by non-random methods, the total number of usable questionnaires was 707.

The demographic characteristics of the random population sample, the non-randomly selected sample and the general South Australian population, as obtained from the Basic Community Profile of the 1996 Census of Population and Housing⁶⁶ have been reported elsewhere.⁴² In summary, the main biases in the random population sample were under-representation of 19-24 year olds and over-representation of 45-64 year olds and married people, compared with the Census data. The non-random group was younger than both the Census and random groups, and fewer of the non-random sample were employed full-time, married or widowed/divorced.

Many respondents believed that there are health benefits associated with vegetarian diets, particularly eating greater quantities of fruit and vegetables and consuming less saturated fat, but also with regard to disease prevention, weight control and staying healthy in general (Table 1). About a third of the variance of *Health Benefits of Vegetarianism* was predicted by a variety of factors (Table 2). *Meat is Not Healthy* was the most important (positive) predictor. This factor is predominantly comprised of beliefs that meat causes

Table 1. Description of the *Health Benefits of Vegetarianism* factor and percentage of agreement with items by dietary group

FACTOR & ITEMS	Factor loading	Non-vegetarian	Semi-vegetarian		Vegetarian	P value
			% Agree	(% Unsure)		
<i>Health benefits of vegetarianism</i>						
Eigen value: 1.65						
Cronbach Alpha: 0.95						
Percent of Variance: 6.9%						
Prevent disease in general (e.g. heart disease, cancer)	74	31 (41)	85 (11)		89 (10)	***
Decrease saturated fat intake in my diet	74	64 (22)	81 (9)		89 (9)	***
Control my weight	71	38 (30)	53 (21)		56 (23)	**
Stay healthy	67	25 (38)	72 (17)		94 (6)	***
Live longer	67	15 (49)	46 (46)		73 (25)	***
Increase my control over my own health	61	19 (39)	59 (34)		89 (8)	***
Be fit	58	17 (33)	60 (26)		72 (21)	***
Have a better quality of life	57	12 (38)	56 (30)		88 (11)	***
Have plenty of energy	57	16 (47)	52 (35)		80 (19)	***
Eat more fruit and vegetables	54	73 (11)	85 (7)		94 (2)	***
Eat a greater variety of interesting foods	48	22 (33)	63 (24)		88 (8)	***
Be healthier by decreasing my intake of chemicals, steroids and antibiotics which are found in meat	46	27 (44)	78 (17)		93 (6)	***
Have a tastier diet	45	7 (34)	51 (25)		90 (8)	***
Be more content with myself	41	8 (36)	43 (33)		85 (12)	***
Lower my chances of getting food poisoning	36	16 (34)	59 (20)		76 (17)	***

Factor loadings are in one-hundredth units and are based on the rotated solution. *** $P < 0.001$, ** $P < 0.01$

disease and other health problems. The dominant items on this factor, along with their factor loadings, were: "Meat causes heart disease" (77), "Meat causes cancer" (74), "Red meat such as beef or lamb is fattening" (73), and "Meat such as beef and lamb is unhealthy to eat" (66). (See Lea and Worsley⁴¹ for a full description of this factor and Lea and Worsley⁴² for an examination of the factors associated with this belief factor.) This predictor was followed by *Meat is a Necessary Dietary Component* (negative), which focuses on the beliefs that meat is necessary in human diets and an important strength-giver (the dominant items and factor loadings being "Meat is important for the health of babies and toddlers" (86), "Meat is necessary in children's diets" (85), "Meat is necessary in the adult human diet" (73), and "Meat is important for building strength" (66), and the statement: "I frequently look for information on healthy eating" (positive). Non-health-related benefits of vegetarianism were also (negative) predictors, as were *Red Meat Appreciation* (negative) - enjoy eating meat (the dominant items, together with factor loadings, being "I prefer to eat red meat more than fruit or vegetables" (80), "Nothing satisfies my appetite like a thick juicy steak" (80), "When I eat out to celebrate a social occasion, I usually eat some kind of red meat" (72), and "I love to eat red meat such as beef, veal or lamb" (68)) - and *Lack of Knowledge and Convenience re Vegetarianism* (positive): a factor that includes items such as not knowing what to eat instead of meat and lacking appropriate cooking skills (the dominant items and their loadings being: "I don't know what to eat instead of meat" (72), "I need more information about vegetarian diets" (69), "I lack the right cooking skills" (68), "I don't have enough willpower" (59), "There is too

limited a choice when I eat out" (57), and "It is inconvenient" (54)). The strongest predictors of *Health Benefits of Vegetarianism* for the random population sample only were *Against Dietary Change* and *Appreciates Meat* (negative predictor) and *Lack of Knowledge and Convenience re Vegetarianism* (positive predictor). Further details of the random sample only regression are available from the first author.

There were strong differences in the predictors between the three dietary groups, although the strongest predictor for semi-vegetarians and for vegetarians was the same (Table 2). *Lack of Knowledge and Convenience re Vegetarianism* (positive predictor) was most important for non-vegetarians, followed by the statements "I do not need to make any changes to the food I eat as it is already healthy enough" (negative) and "I frequently look for information on healthy eating" (positive). In total, about 25% of the variance of *Health Benefits of Vegetarianism* was accounted for among non-vegetarians. In contrast, almost 40% of variance was accounted for among semi-vegetarians and over 50% for vegetarians. *Meat is Not Healthy* (positive) ranked first for semi-vegetarians and vegetarians. Moderate and Successful values (positive) ranked second for semi-vegetarians (dominated by "Moderate (avoiding extremes of feeling and action)" (63), "Successful (achieving goals)" (55), and "Independent (self-reliant, self-sufficient)" (54)), and, finally, being Anglo-Australian (positive). *Vegetarianism Health Concerns* and *Appreciates Meat* was the second strongest (negative) predictor - for vegetarians (dominated by "There is not enough protein in vegetarian diets" (78), "There is not enough iron in vegetarian diets" (76), "I like eating meat" (70), "I think humans are meant to eat meat"

(70), "I would be (or am) worried about my health (other than lack of iron or protein)" (67), "Vegetarian diets are boring" (67), and "I wouldn't (or don't) get enough energy or strength from the food" (66), followed by "Diet is important in preventing illness and disease" (positive).

Discussion

For all respondents, the belief that meat is neither healthy nor necessary and frequent searching for information on healthy eating were the main predictors of *Health Benefits of Vegetarianism*. However, there were differences between the dietary groups, as discussed below. In particular, health issues (whether accurate or inaccurate) were relatively more important for semi-vegetarians and vegetarians, while knowledge and convenience issues were most important for non-vegetarians. There were unexpected differences in the direction of some of the predictors. These were: (1) the perceived non-health

benefits of vegetarianism (*Peace and Contentment Benefits of Vegetarianism* and *Animal Welfare, Environmental and Hunger Benefits of Vegetarianism*) were negative predictors of *Health Benefits of Vegetarianism*, while (2) the barrier to vegetarianism, *Lack of Knowledge and Convenience re Vegetarianism*, was a positive predictor.

These are discussed below. Health beliefs were the strongest predictors of *Health Benefits of Vegetarianism* for all respondents, semi-vegetarians and vegetarians, particularly the belief that meat is unhealthy. The latter included items about meat causing cancer and heart disease, being fattening, and generally unhealthy, while the perceived health benefits consisted predominantly of disease prevention, decreased fat intake, weight control and being healthy in general. Therefore, this association is logical, as is the negative association with the belief that meat is necessary for health in the diet (an important predictor for all respondents and a weak predictor for

Table 2. Multiple regression analysis of *Health Benefits of Vegetarianism*

	B	SE	P	R sq.
ALL RESPONDENTS				
Meat is not healthy	0.51	0.04	***	7.4%
Meat is a necessary dietary component	-0.46	0.04	***	11.0%
"I frequently look for information on healthy eating"	0.17	0.03	***	14.0%
Peace and contentment benefits of vegetarianism	-0.38	0.05	***	17.8%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.44	0.05	***	23.9%
Red meat appreciation	-0.30	0.04	***	29.5%
Lack of knowledge and convenience re vegetarianism	0.14	0.04	***	31.2%
Constant	-0.62	0.13	***	
Final R square				31.2%
NON-VEGETARIANS				
Lack of knowledge and convenience re vegetarianism	0.19	0.05	***	6.2%
"I do not need to make any changes to the food I eat as it is already healthy enough"	-0.14	0.04	***	8.6%
"I frequently look for information on healthy eating"	0.22	0.04	***	11.5%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.35	0.06	***	14.3%
Peace and contentment benefits of vegetarianism	-0.30	0.05	***	17.3%
Meat is not healthy	0.32	0.06	***	21.1%
Meat is a necessary dietary component	-0.24	0.06	***	24.2%
Constant	-0.54	0.19	**	
Final R square				24.2%
SEMI-VEGETARIANS				
Meat is not healthy	0.47	0.13	***	19.7%
Moderate and successful values	0.41	0.14	**	29.4%
Anglo-Australian	0.63	0.28	*	38.2%
Constant	-0.23	0.23	NS	
Final R square				38.2%
VEGETARIANS				
Meat is not healthy	0.32	0.07	***	15.9%
Vegetarianism health concerns and appreciates meat	-0.42	0.12	***	22.4%
"Diet is important in preventing illness and disease"	0.32	0.12	**	28.3%
"I do not need to make any changes to the food I eat as it is already healthy enough"	0.16	0.06	**	32.8%
Peace and contentment benefits of vegetarianism	-0.40	0.09	***	39.1%
Animal welfare, environmental and hunger benefits of vegetarianism	-0.37	0.11	***	45.8%
Traditional values	0.19	0.07	**	50.9%
Constant	-1.56	0.70	*	
Final R square				50.9%

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$

non-vegetarians) and with health concerns about vegetarianism (a strong negative predictor for vegetarians). For non-vegetarians, the strongest predictors were a lack of knowledge about vegetarian diets and a perception that they are inconvenient, and the belief that they needed to improve the healthiness of their diet. Although there are some non-vegetarians who believe there are health benefits associated with the consumption of vegetarian diets, they have not yet engaged with vegetarian diets. Thus, the provision of information about how to prepare easy, fast and healthy meat-free meals may help them to achieve a more plant-based diet. Specific meal plans and grocery lists could be provided, as a way to increase the effectiveness of the information. One study, with the aim of achieving weight loss through diet, found that this method was as effective as providing subjects with low-fat meals.⁶⁷ Meal plans provided structure and reduced the perceived difficulty of planning healthy meals, while grocery lists ensured more appropriate purchases were made at the supermarket.⁶⁷ Providing such information is particularly likely to be effective, as the non-vegetarians who believe vegetarian diets have health benefits already search for information on healthy eating and believe that their diet needs to change.

The finding that non-health related benefits of vegetarianism were negatively (albeit relatively weakly) associated with perceived health benefits for all groups except semi-vegetarians is interesting. At first, this seems to contradict the previous finding reported by Lea and Worsley⁴² that non-health related issues and benefits of vegetarianism were positively associated with the *Meat is Unhealthy* score (i.e. a score made by summing responses to the first four items to load on the *Meat is Not Healthy* factor) for all respondents and non-vegetarians. However, because the perception that there are health benefits associated with vegetarianism is not necessarily anti-meat - that is, some of these benefits could be obtained from a plant-based diet that contains some meat - this could make sense. It may mean that people can see health benefits associated with vegetarianism but not necessarily think meat is ethically "bad" (e.g. with respect to the environment or animal welfare), whereas those who believe that meat itself is unhealthy are likely to hold ethical concerns about this food. However, *Meat is Not Healthy* is a positive predictor of *Health Benefits of Vegetarianism* for non-vegetarians and vegetarians (and also semi-vegetarians), so this explanation may not hold. The cross-sectional quantitative data we have are not adequate to examine this issue further. Clearly, this finding would benefit from discussion of its meaning among vegetarians and non-vegetarians.

Values were important only for semi-vegetarians, although they were weak predictors for vegetarians. *Moderate and Successful* values were positively associated with perceived health benefits of vegetarian diets for semi-vegetarians. It is possible that this group is not vegetarian, despite their belief in the health benefits of such diets, because they extend their avoidance of "extreme" feelings and actions into their dietary behaviour (i.e. vegetarianism may be seen as extreme, while semi-vegetarianism may be viewed as a more

moderate compromise that obtains some of the health benefits associated with vegetarian diets). Semi-vegetarians may feel they have achieved one of their personal goals to improve the healthiness of their diet by their decreased (moderate) meat consumption.

The finding that traditional values were a positive (albeit weak) predictor of the belief among vegetarians that meat is unhealthy was unexpected. Tradition had been hypothesised to be a negative predictor of positive beliefs about vegetarianism/negative beliefs about meat. Certainly, this was found to be so in the study of Kalof and others,¹⁰ although the study was based on one health benefit item only for a randomly selected sample. These differences may also be due to the greater number of tradition-oriented items used in Kalof's study; there were nine items on the tradition-oriented factor, whereas there were four in the current study ("Honouring of parents and elders (showing respect)" (70), "Devout (holding to religious faith and belief)" (69), "Respect for tradition (preservation of time-honoured customs)" (68), and "Helpful (working for the welfare of others)" (38)).

The personal values measured by the current survey were a shortened version of Schwartz's⁶³ inventory of values. Thus, it is possible that the values results are an artefact of this. Alternatively, the finding that tradition-oriented values were (weakly) linked to *Health Benefits of Vegetarianism* for vegetarians suggests that these vegetarians may belong to a background or culture of vegetarianism where such a diet is considered to be traditional. That is, tradition-oriented values are not always related to patriarchal, hierarchical, meat-eating cultures, but to more egalitarian, vegetarian cultures. These personal value findings clearly require further investigation.

This study has important implications for public health. Without an understanding of the psychosocial and socio-demographic factors associated with meat consumption and beliefs, it is not possible to begin to develop strategies to enable the public to obtain any of the possible benefits of vegetarian and other plant-based diets, or to minimise the associated risks.

Many people perceive that there are health benefits associated with the consumption of a vegetarian diet. With regard to non-vegetarians, we found that increased consumption of fruit and vegetables, decreased saturated fat intake and weight control are considered most important. It should also be noted that there is a high level of uncertainty among non-vegetarians about whether some posited benefits are actually associated with vegetarian diets or not (e.g. disease prevention). This suggests a lack of information (or a lack of accurate information) about the benefits associated with consumption of a vegetarian diet, such as decreased risk of mortality from ischaemic heart disease. This is particularly important as this may carry over to plant-based diets in general. Conversely, it may be important to educate vegetarians and semi-vegetarians about the actual benefits of consumption of a vegetarian diet. For example: do vegetarian diets per se really decrease mortality from cancer? Concurrently, education about the risks (e.g. nutrient deficiencies) associated with low or nil meat consumption if the diet is poorly planned may also be appropriate,

particularly as those who believe vegetarian diets have health benefits also tend to believe that meat is unhealthy.

If non-vegetarians who already hold beliefs that vegetarian diets have health benefits are to obtain some of these benefits - perhaps from increased consumption of plant foods and plant-based meals - they will need information on how to prepare the components of meat-free meals (e.g. legumes and other meat alternatives), and on the foods that should be part of a healthy vegetarian or other plant-based diet. The targeting of these individuals by health professionals could potentially increase their consumption of plant foods and improve public health.

Conclusion

Many South Australians perceive that health benefits are associated with eating a vegetarian diet, which may also apply to plant-based diets in general. However, if non-vegetarians are to obtain some of the health benefits associated with the consumption of a plant-based diet, they require information on the preparation of quick and easy plant-based meals.

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