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Jessica Bayes , Dr Janet Schloss , Prof David Sibbritt

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Highlights

- Diet quality among young men with depression is relatively poor
- Depressed young men perceive healthy eating to be both expensive and time consuming
- Depressed young men feel that their diet has an impact on their mental health
- Depressed young men will consider changing their diets if it helps their symptoms

Journal Pre-proof

An Investigation into The Diets and Nutritional Knowledge of Young Men with Depression (The “MENDDS” survey).

Jessica Bayes^a, Dr Janet Schloss^b and Prof David Sibbritt^a

^a Australian Research Centre in Complementary and Integrative Medicine, Faculty of Health, University of Technology Sydney, 35 Jones Street, Ultimo, NSW, 2007, Australia

^b Office of Research, Endeavour College of Natural Health, 2/269 Wickham St, Brisbane City, QLD, 4006, Australia

Corresponding author details: Jessica Bayes

Email: Jessica.bayes@yahoo.com

6 Pamela court, Thomastown, Vic, 3074

Phone: 0401962947

ORCID ID: 0000-0003-0601-6129

Dr Janet Schloss

Email: janet.schloss@endeavour.edu.au

ORCID ID: 0000-0003-1643-6215

Prof David Sibbritt

Email: david.sibbritt@uts.edu.au

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Data described in the manuscript, code book, and analytic code will be made available upon request pending approval.

ABSTRACT

Background: Currently 1 million Australians are living with depression each year, with an average of one in eight men experiencing the disorder. Studies have shown that individual nutrients, fruit and vegetable intake, polyphenols and whole dietary patterns can have a positive impact on depressive symptoms. In particular, the Mediterranean diet has shown promising preliminary findings.

Objectives: To assess the diet quality and knowledge of young men in relation to depressive symptoms.

Design: A cross-sectional online survey collected data from 384 young Australian men aged between 18-25 with diagnosed depression. Pearson's chi-square test was used for ordinal categorical variables.

Results: Dietary intake amongst this demographic was poor. Discretionary foods were consumed 2-3 times per week, including pizza (41%), fried potato such as French fries or hash browns (29%) and chocolate (25%). Roughly half of participants (47%) report never consuming wholegrains or legumes and only 9% consume vegetables twice or more per day. Healthy eating is perceived as both time consuming (82%) and expensive (70%). One third (32%) of participants perceive diet to have a big impact and 29% a slight impact on their mental health with only 5% reporting that diet has no impact on their mental health. However, the majority of participants (84%) believe it is 'important' or 'very important' to eat an overall healthy diet and 77% reported being willing to change their diet if it improved their depression symptoms.

Conclusions: These results highlight the relatively poor diets of this demographic who would greatly benefit from a quality diet such as the Mediterranean diet. The reported willingness to change their diets is encouraging and supports the viability of dietary

intervention trials in this demographic. The dietary data presented in this study can be used to develop targeted interventions aimed at improving the diets of depressed young men.

Keywords: Depression; major depressive disorder; diet; Mediterranean diet; young adults; men

1.1 INTRODUCTION & BACKGROUND

Currently 1 million Australians are living with depression each year¹. Depression is one of the most common mental health problems experienced by young people. Approximately 1 in 8 men experience depression each year and at least one third of young people have had an episode of mental illness by the age of 25 years². Additionally, only 13% of young men aged 15-24 seek help for their mental health³ and mental disorders are the largest contributor to disability in young Australians aged 10-24 and cause more prevalent years lived with disability (PYLD) than any other disorder⁴. Depression also presents a significant economic burden with the cost of productivity loss due to sickness absence being nearly double for a person with mild depression and nearly triple for a person with moderate depression compared to individuals without depression⁵. The annual financial burden placed on businesses due to depressed workers is estimated just under \$8 billion Australian dollars (AUD)⁵.

Standard treatments for depression include psychological therapies such as cognitive behavioural therapy (CBT) and pharmaceutical medications⁶. These standard therapies are effective for the many patients, however, treatment resistant depression (TRD) commonly occurs in clinical practice, with up to 60% of patients not achieving adequate response following antidepressant treatment⁷. Additionally, it is common for patients to report one or

more side effects from selective serotonin reuptake inhibitor (SSRI) medications, with the most common complains being sexual dysfunction, sleepiness and weight gain⁸.

Furthermore, men are less likely to seek out medical care than women¹. Additionally, men who sought help for depression were likely to engage in self-blame and held a fear of being seen as weak, thus causing many to hide their illness in order to minimise damage to their masculine self-image⁹. This can lead to self-medicating and other negative coping mechanisms which further impact health and quality of life.

The combination of reluctance to seek out standard therapies, high treatment resistance and the numerous reported side effects of standard antidepressant medications demands a need for additional treatment options. Recently, several studies have shown that diet can have a positive impact on the symptoms of depression¹⁰⁻¹³. Several recent literature reviews have explored diets for mental health including papers on individual nutrients¹⁴⁻¹⁸, fruit and vegetable intake^{19,20}, polyphenols²¹ and whole dietary patterns^{12,22,23}. In particular, the Mediterranean diet (MD) has shown some promising preliminary findings^{11,24,25}.

Gender specific research on dietary patterns consistently shows differences in the food choices and behaviours of men and women²⁶⁻²⁸. Numerous studies have reported that men eat fewer fruits and vegetables and other high-fibre foods, eat fewer low-fat foods, and consume more high sugar drinks and alcohol than women²⁹. A study of young adults found that men are more than twice as likely to consume takeaway food twice a week or more compared to women³⁰, a survey of young adults found that men were significantly less likely to engage in food preparation behaviours compared to women³¹ and a survey of undergraduate students found that young men are less likely than young women to believe they need to lose weight

or try a weight loss diet²⁸. It is clear that several differences exist in the eating habit between men and women with men generally displaying poorer food choices, however, studies assessing the diet quality of young men in relation to depressive symptoms is lacking.

Understanding the nutrition knowledge of this demographic will be important in developing experimental studies to test dietary interventions. Further, investigating the observations made by young men between certain foods and dietary patterns and their symptoms of depression could provide valuable insights for future research. This project aimed to investigate the diets and nutritional education of young men with depression, specifically the current dietary patterns of young men with depression, the knowledge and attitudes young men with depression have about nutrition, and if young men with depression notice any associations between certain foods and the severity of their symptoms.

2.1 METHODOLOGY

2.2 Design and Data Collection

The study used a cross-sectional design, collecting data via an online questionnaire. Advertising and recruitment for the survey was via several online social media platforms including Facebook, twitter and LinkedIn. Several mental health service and support organisations such as Gotcha4life and Beyond Blue were invited to share the link on their social media and email lists. The survey was open for 4 months between August and November 2019. The inclusion criteria consisted of young men aged between 18-25 with self-reported general practitioner or psychologist diagnosed depression and living in Australia.

2.3 Questionnaire

The questionnaire consisted of 62 items, and included a 26-item validated dietary screener questionnaire (DSQ)³², the 10-item Center for Epidemiologic Studies Depression Scale (CES-D-10)³³, nutrition knowledge and food/symptom association questions. The survey was piloted by three subjects who fit the inclusion criteria, but did not participate in the main study, to assess language clarity, the time required and relevance, with corrections made accordingly.

2.4 Ethics

Ethical approval was granted by the University of Technology Sydney (UTS) Human Research and Ethics Committee (HREC) on 2nd August 2019. UTS HREC REF NO. ETH19-3828. Informed consent was obtained electronically from participants before the commencement of the survey.

2.5 Statistical Analysis

Descriptive statistics are reported in the text and tables. Bivariate analyses included Pearson's chi-square test for ordinal categorical variables such as Likert-type items. Statistical analysis was undertaken using STATA v16. To adjust for multiple testing, a Bonferroni correction was conducted, thus results were considered significant if $p < 0.002$.

2.6 Sample Size Calculation

Estimates from the *National Health Survey: First results - 2014-15 ABS* suggests the proportion of young men in Australia with depression to be roughly 150,000 individuals. With a 95% confidence interval and width of $\pm 5\%$ a sample size of 384 is needed.

3.1 RESULTS

A total of 384 participants completed the survey. Incomplete survey responses are not included in the results or statistical analysis. These include where the participant opened the survey link but did not proceed to answer any questions or where the participant did not meet the inclusion criteria, for example the participant indicated that they were female, had not been diagnosed with depression by a medical doctor or did not consent to participate. The most common income before tax was less than \$10,000 (n=131; 34%) and education level was Year 12 or equivalent (n=193; 50%). Participant demographics are displayed in Table 1.

3.2 Depression Scores

All participants indicated that they have been diagnosed with depression by their medical doctor or psychologist. The 10-item Center for Epidemiologic Studies Depression Scale (CES-D-10)³³ was used to measure current depressive symptoms, as participants may be utilising anti-depressive therapies in their current mental health care plan and have improved symptoms. A score of 10 or above is considered depressed with a maximum score of 30. The mean score of the survey participants was 21 (SD = 4.7)..

3.3 Nutrition Beliefs

Participants were asked to rate how important they believe it is to eat an overall healthy diet. A “healthy” diet being high in vegetables and fresh foods, low in processed and packaged foods which was outlined to them in the survey. A total of 322 (84%) participants believe it is *important* or *very important* to eat an overall healthy diet. When asked to rate how healthy their diets are on a typical day the majority of participants rated their current diets as only ‘fair’ (n=131).

Half of the participants (50%) think it is *important* to eat a large variety of different foods and when asked how often it is ok to consume “fast” or processed foods the most common response was *once per week* (39%). The majority of participants claim to *rarely* (27%) read the nutrition fact labels on food products. When asked what degree of impact diet has on their personal physical health 51% responded *a large impact* and 26% *a slight impact*. When asked what degree of impact diet has on their personal mental health 32% responded with *a large impact* and 29% with *a slight impact*.

A total of 70% of participants report that they perceive healthy eating to be expensive and 82% find healthy eating to be time consuming. When asked how likely they would be to change their diets if it improved their depressive symptoms 77% responded *very likely* or *likely* to change it. Table 2 displays these results.

Participants answer to the question “how healthy is your diet on a typical day?” was tested against various dietary components in the FFQ. Participants who rated their diets as healthier tended to eat healthy foods more frequently such as vegetables ($p=0.0001$) and fruit ($p=0.0001$) and consume discretionary foods less frequently such as fizzy or sugary drinks ($p=0.0001$) and chocolate, sweets and lollies ($p=0.001$).

A positive association for reported diet healthiness (poor, fair and good) was also found between several other variables, including frequency of reading nutrition fact labels ($p=0.0001$), importance of eating a healthy diet ($p=0.0001$), importance of eating a variety of foods ($p=0.0001$), finding healthy time consuming ($p=0.0001$) and the likeliness of changing their diet ($p=0.002$). A positive association for reported diet importance was found between importance of eating a variety of foods ($p=0.0001$), how often it is ok to eat processed foods

($p=0.0001$) and the impact of diet on their mental health (0.0001). These results are displayed in Table 3 and Table 4.

3.4 Food/symptom observations

Immediately after consuming high fat processed foods 22% noticed an *improvement* while 21% noticed a *worsening* of symptoms. Several hours after consuming these foods, roughly a third of participants (34%) noticed a *worsening of symptoms* and only 4% noticed an *improvement*. Immediately after consuming high sugar processed foods 37% noticed an *improvement* in symptoms while 15% noticed a *worsening* of symptoms. Several hours after consuming these foods 33% noticed a *worsening* of symptoms and only 6% noticed an *improvement*. Approximately a third of participants (34%) noticed an *improvement of symptoms* after consuming fruits and vegetables. Additionally, around two thirds of participants notice negative effects of alcohol on their depressive symptoms with 34% indicating a *worsening of symptoms* and 32% indicating a *significant worsening of symptoms* several hours after consuming alcohol (Table 5).

3.5 Dietary Analysis

The dietary analysis used a validated 26-item validated dietary screener questionnaire (DSQ)³² adapted for an Australian audience. In answering questionnaire items, participants were asked to reflect on foods and drinks they consumed in the last 30 days.

Wholegrain consumption was low with 47% reporting to consume cooked wholegrains 'never or once per month' and only 2% consuming cooked whole grains once or more per day. Whole grain bread consumption once or more per day was reported by 12% of

participants. Breakfast cereal consumption was low with 41% reporting to never eat cereal, while daily cereal consumption was reported by 12% of participants.

Participants reported low consumption for fruit and vegetables. Participants reported only consuming fruit and vegetables 2-3 times per week (20% and 29% respectively). Only 11% of participants reported consuming fruit twice or more per day and only 9% consume vegetables twice or more per day.

For protein, the participants reported consuming red meat 2-3 times per week (35%), followed by 23% consuming red meat 4-6 times per week, while 8% indicated that they never eat red meat. When asked about processed meats 23% of participants reported consuming these foods 2-3 times per week and 22% consumed these foods once per week, with 21% (n=79) reporting never or once per month.

Bean consumption was low with the majority stating to eat beans 'never or once per month' (47%). Only 3% consumed beans 4-6 times per week.

Participants reported consuming most discretionary foods 2-3 times per week such as pizza (41%), fried potato such as French fries or hash browns (29%) and chocolate (25%). The full Diet History can be found in Supplementary Table 1.

4.1 DISCUSSION

This research has presented a number of interesting results for this population group. Firstly, the majority of participants find that diet has a big impact on their mental health. The results also show that the participants who rate their diets as poor notice a bigger impact of diet on

mental health. This supports the findings of several systematic reviews which show that diet effects depression^{12,19,34}.

When asked about specific foods, participants had varied responses. When considering the instant effects of high sugar processed foods on their mental health some participants notice an improvement while others notice a worsening of symptoms. Several biological mechanisms may explain these effects. Mood may be worsened in some people due to the increased inflammatory response from high carbohydrate intake while mood may be temporarily improved in others due to the addiction-like effects of sugar affecting dopaminergic neurotransmission³⁵. The delayed effect of high sugar processed foods was more commonly reported to worsen symptoms than to improve them, suggesting that the initial improvement is only temporary. Several theories have been postulated to explain the link between high sugar intake and low mood including the effect on brain derived neurotrophic factor (BDNF), inflammation and insulin response³⁵.

A similar finding was presented when comparing the instant versus delayed effects of alcohol on depressive symptoms. Many participants notice an improvement instantly after consuming alcohol, however two thirds notice a worsening of symptoms several hours after consuming alcohol. Epidemiological studies indicate that heavy alcohol use and depression are strongly linked, however the responsible mechanism remains unclear³⁶. The use of alcohol to relieve affective symptoms is common among individuals with mood disorders, however it is associated with substantial psychiatric comorbidity³⁷. Studies examining male coping behaviours regularly report alcohol being used to “numb” or “escape from” emotional distress³⁸. However alcohol abuse is also a major risk factor for suicide³⁹. Educational

campaigns which directly target young adults with depression to reduce alcohol consumption as part of their mental health care plan could be useful in improving depression outcomes.

Further, the majority of respondents think it is *important* or *very important* to eat an overall healthy diet, however a large proportion only rate their diet as either fair or poor, with only 15% describing their diets as *very good*. This shows an important disconnect between knowing and doing. It has been suggested that individuals are prevented from acting on their positive intentions by the so-called obesogenic environment. The obesogenic environment is characterized by the high availability and accessibility of palatable energy-dense foods, coupled with the ability to avoid physical activity⁴⁰. The participants who rated the importance of a healthy diet higher were more likely to have a healthier diet and read nutrition fact labels indicating that an education strategy that focuses more on the *importance* of healthy eating rather than the individual components could be a useful strategy.

Other possible barriers to diet change included time and money. The majority of respondents perceived healthy eating to be expensive and time consuming. This was more likely to be reported in the participants who also rated their current diets poorly. This belief that healthy eating is expensive and time consuming supports the findings of a similar study which investigated the perceived barriers to healthy eating in middle aged Australian men⁴¹. The authors suggest that finding more time will not be the solution and that the focus should be on educating people on how to prioritise their time instead. Health professionals should focus on developing strategies in which food preparation and cooking fit into the context of daily living⁴¹.

In regards to cost, our results agree with similar findings which report a public perception that healthy foods are expensive⁴²⁻⁴⁴. In Australia data suggests that the cost of healthy food is still a particular burden to welfare dependant families⁴⁵. Further, it has been reported that a high proportion in Australia will spend their money on discretionary items with around 14% spent on alcoholic drinks, and 15% on take-away foods⁴⁶. Our survey also reported a high intake of discretionary and fast food consumption among depressed young men. Providing information around low cost healthy food options could be a key strategy when promoting healthy eating to this demographic.

It is therefore encouraging that despite these perceived challenges the majority of participants reported that they would be likely to change their diet if it improved their depressive symptoms. The current dietary patterns of this demographic were relatively poor with the majority of participants reporting that they only consume fruits and vegetables 2-3 times per week. Almost half report never or rarely consuming beans and over half never or rarely eat cooked wholegrains such as brown rice. Fruits, vegetables, wholegrains and beans are staple foods included in a Mediterranean dietary pattern which has frequently been linked to reduced depression risk⁴⁷. Participants intake of discretionary foods were high with participants reporting consuming pizza, chocolate and fried potato such as French fries and hash browns 2-3 times per week. Unhealthy 'Western' dietary patterns high in fast foods, processed meats, salty snacks, sweets and desserts has been linked to increased depression risk⁴⁸.

4.2 Limitations

This survey has limitations which must be acknowledged. Firstly, the study sample may not be representative of all young adult males with diagnosed depression in Australia, in

particular, only young men who have access to the internet and social media accounts were able to take part, so caution is needed when generalising our findings to the wider population. In addition, the information reported by participants is self-reported. Hence, there may be biases in our study data caused by social desirability bias as well as recall bias and measurement error. However, when comparing reported diet healthiness and the results from the FFQ, participants responses appeared to be fairly accurate; with the participants who describe their usual diets as good consuming healthy foods such as fruits and vegetables more frequently and discretionary foods such as chocolate and sugary drinks less frequently.

5.1 CONCLUSION

Understanding the nutrition opinions and beliefs of young men with depression is crucial for developing experimental trials testing dietary interventions in this population. Additionally, examining the current diets of this demographic highlights areas for clinicians, health promotion policy and researchers to focus. The results of this survey have demonstrated that dietary intake amongst this demographic was poor, while healthy eating is perceived as both time consuming and expensive. More research is needed to fully understand the implications of cost and time restraints on this demographic in order to overcome these barriers. The majority of participants perceive diet to have a big impact on their mental health and would be willing to change their diet if it improved their depression symptoms. The willingness reported to change their diets is encouraging and supports the viability of dietary intervention trials in this demographic.

6.1 CONFLICTS OF INTEREST

There are no conflicts of interest and no competing financial interests exist.

6.2 FUNDING

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Credit Author Statement

All authors contributed to the design of the questionnaire. JB was responsible for collecting data, statistical analysis and drafting the manuscript with edits from JS and DS. All authors have read and approved the final manuscript.

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Table 1. Demographic Characteristics of Study Participants

Item	Number of Participants (n=384)	% of Participants
Age (in years)		
18	34	8.9
19	38	9.9
20	58	15.1
21	37	9.6
22	53	13.8
23	53	13.8
24	62	16.1
25	49	12.8
	<i>SD = 2.2</i>	<i>Mean = 21.7</i>
Income		
less than \$10,000	131	34.2
\$10,000-\$29,999	114	29.8
\$30,000-\$40,999	62	16.2
\$50,000-\$60,999	49	12.8
\$70,000-\$80,999	18	4.7
\$90,000-\$109,999	4	1.0
\$110,000 or more	5	1.3
Education		
Less than Year 12 or equivalent	42	10.9%
Year 12 or equivalent	193	50.3%
Diploma or Vocational Certificate	71	18.5
Bachelor degree (including honours)	72	18.8
Master's degree	5	1.3%
Doctorate	1	0.3

Table 2. Nutrition Beliefs of study participants

Question	Number of Responses (% of respondents)				
	Poor	Fair	Good	Very Good	Excellent
How healthy is your overall diet on a typical day? ¹	73 (19.0%)	131 (34.1%)	111 (28.9%)	56 (14.6%)	13 (3.4%)
How often do you read the Nutrition Facts labels?	Never	Rarely	Sometimes	Most of the time	
	94 (24.5%)	105 (27.3%)	95 (24.7%)	90 (23.4%)	
How important is it to eat an overall healthy diet? ¹	Not important	Low importance	Unsure	Important	Very important
	1 (0.3%)	29 (7.6%)	32 (8.3%)	164 (42.7%)	158 (41.1%)
How important is it to eat a large variety of different foods?	9 (2.3%)	31 (8.1%)	51 (13.3%)	193 (50.3%)	100 (26.0%)
How often is it ok to eat fast foods/processed foods?	<once per month	2-3/month	1/week	2-3/week	2-3/day
	32 (8.3%)	78 (20.3%)	148 (38.5%)	122 (31.8%)	4 (1.0%)
In your personal experience:	No impact	Low impact	Unsure	Slight impact	Big impact
What degree of impact does a healthy diet have on your physical health ?	8 (2.1%)	19 (4.9%)	63 (16.4%)	98 (25.5%)	196 (51.0%)
What degree of impact does a healthy diet have on your mental health ?	19 (4.9%)	30 (7.8%)	99 (25.8%)	112 (29.2%)	124 (32.3%)
Do you find:	Yes	No			
Healthy eating to be expensive?	268 (69.8%)	116 (30.2%)			
Healthy eating to be time-consuming?	313 (81.5%)	71 (18.5%)			
How likely would you be to change your diet if it improved your symptoms of depression?	Very unlikely	Unlikely	Unsure	Likely	Very likely
	7 (1.8%)	19 (4.9%)	61 (15.9%)	161 (41.9%)	136 (35.4%)

¹ Healthy: high in vegetables and fresh foods, low in processed and packaged foods

Table 3. Association Between Participants' Belief of Diet Healthiness and Diet

	How Healthy is Your Diet?			p-value
	Poor n (e)	Fair n (e)	Good n (e)	
Vegetable Consumption				
1/week or less	46 (24)	49 (43)	32 (60)	0.0001
2-6 times/week	25 (35)	71 (63)	89 (87)	
1/day or more	2 (14)	11 (25)	59 (34)	
Fruit Consumption				
1/week or less	55 (33)	67 (59)	51 (81)	0.0001
2-6 times/week	16 (25)	44 (44)	69 (61)	
1/day or more	2 (16)	20 (28)	60 (38)	
Sugary/fizzy drinks				
4/week or more	33 (18)	43 (33)	20 (45)	0.0001
1-3/week	23 (24)	40 (43)	63 (59)	
3/month or less	17 (31)	48 (55)	97 (76)	
Chocolate and Sweets/lollies				
4/week or more	21 (19)	46 (33)	31 (46)	0.001
1-3/week	30 (34)	62 (60)	84 (83)	
3/month or less	22 (21)	23 (38)	65 (52)	
Reading of Nutrition Fact Labels				
Rarely/Never	56 (38)	81 (68)	62 (93)	0.0001
Sometimes	13 (18)	32 (33)	51 (45)	
Most of the time	4 (17)	18 (30)	67 (42)	
Healthy Diet Importance				
Not Important	9 (6)	17 (10)	4 (14)	0.0001
Unsure	13 (6)	9 (11)	9 (15)	
Important	51 (61)	105 (110)	167 (151)	
Importance to Eat a Variety of Foods				
Not Important	13 (8)	15 (14)	12 (19)	0.0001
Unsure	14 (10)	26 (17)	9 (24)	
Important	46 (56)	88 (100)	159 (138)	
How Often Can You Eat Processed Foods				
2-3 times/week or more	23 (24)	57 (43)	46 (59)	0.015
Once Per Week	26 (28)	46 (51)	76 (69)	
2-3 times/month or less	24 (21)	28 (38)	58 (52)	
Impact of Diet on Mental Health				
No Impact	9 (9)	20 (17)	20 (23)	0.005
Unsure	29 (19)	36 (34)	34 (46)	
An Impact	35 (45)	75 (81)	126 (111)	
Is Healthy Eating Expensive				
No	20 (22)	30 (40)	66 (54)	0.028
Yes	53 (51)	101 (91)	114 (126)	
Is Healthy Eating Time				

Consuming							
No	7	(14)	15	(24)	49	(33)	0.0001
Yes	66	(60)	116	(107)	131	(147)	
Likeliness to Change Diet							
Unlikely	11	(5)	6	(9)	8	(12)	0.002
Unsure	15	(12)	25	(21)	21	(29)	
Likely	47	(57)	100	(102)	151	(140)	
Depression Score Severity							
Mild	6	(12)	22	(22)	35	(30)	0.003
Moderate	27	(35)	69	(63)	89	(87)	
High	40	(26)	40	(46)	56	(64)	
Yearly Income							
\$29 999 or less	54	(47)	81	(83)	110	(115)	0.166
\$30 000 - \$69 999	14	(21)	37	(38)	60	(52)	
\$70 000 or more	5	(5)	12	(9)	10	(13)	
Education Level							
Year 12 or less	52	(45)	78	(80)	105	(110)	0.398
Diploma or Vocational Certificate	9	(14)	26	(24)	36	(33)	
Bachelor Degree or above	12	(15)	27	(27)	39	(37)	

Pearson's chi-square test. Results considered significant when $p < 0.0002$

n = number of observations

(e) = expected number of observations under chi-square distribution

Table 4 Associations Between Participants' Belief of Diet Importance and other Nutrition Beliefs

		Healthy Diet Importance			p-value
		Not Important	Unsure	Important	
		n (e)	n (e)	n (e)	
Reading of Nutrition Fact Labels					
	Rarely/Never	22 (16)	23 (16)	154 (167)	0.007
	Sometimes	4 (8)	5 (8)	87 (80)	
	Most of the time	4 (7)	3 (7)	82 (75)	
Importance to Eat a Variety of Foods					
	Not Important	21 (3)	6 (3)	13 (34)	0.0001
	Unsure	4 (4)	13 (4)	34 (43)	
	Important	5 (23)	12 (24)	276 (247)	
How Often Can You Eat Processed Foods					
	2-3 time/week or more	20 (10)	13 (10)	93 (106)	0.0001
	Once Per Week	9 (12)	13 (12)	126 (125)	
	2-3 times/month or less	1 (9)	5 (9)	104 (93)	
Impact of Diet on Mental Health					
	No Impact	11 (4)	8 (4)	30 (41)	0.0001
	Unsure	10 (8)	13 (8)	76 (83)	
	An Impact	9 (18)	10 (19)	217 (199)	
Is Healthy Eating Expensive					
	No	7 (9)	7 (9)	102 (98)	0.404
	Yes	23 (21)	24 (22)	221 (225)	
Is Healthy Eating Time Consuming					
	No	3 (6)	2 (6)	66 (60)	0.073
	Yes	27 (24)	29 (25)	257 (263)	
Likeliness to Change Diet					
	Unlikely	5 (2)	3 (2)	17 (21)	0.093
	Unsure	6 (5)	3 (5)	52 (51)	
	Likely	19 (23)	25 (24)	254 (251)	
Yearly Income					
	\$29 999 or less	23 (19)	23 (20)	199 (206)	0.361
	\$30 000 - \$69 999	6 (9)	6 (9)	99 (93)	
	\$70 000 or more	1 (2)	2 (2)	24 (23)	
Education Level					
	Year 12 or less	19 (18)	23 (19)	193 (198)	0.631
	Diploma or Vocational Certificate	5 (6)	4 (6)	62 (60)	
	Bachelor Degree or above	6 (6)	4 (6)	68 (66)	
					P-value
Yearly Income					
	\$29 999 or less	15 (16)	49 (39)	181 (190)	0.018
	\$30 000 - \$69 999	6 (7)	9 (18)	96 (86)	

\$70 000 or more

4 (2)

3 (4)

20 (21)

Pearson's chi-square test. Results considered significant when $p < 0.0002$

n = number of observations

(e) = expected number of observations under chi-square distribution

Table 5. Participant Food/Symptom Observation

Question	Participant observations				
	Significant worsening of symptoms	Worsening of symptoms	No difference in symptoms	Improvement of symptoms	Significant improvement of symptoms
Instant differences: When you eat high fat processed foods (Cheese burgers/pizza/fried chicken) do you notice any instant differences in your depression symptoms?	1 (0.3%)	79 (20.6%)	203 (52.9%)	85 (22.1%)	16 (4.2%)
Delayed differences: When you eat high fat processed foods (Cheese burgers/pizza/fried chicken) do you notice any delayed differences (several hours later) in your depression symptoms?	10 (2.6%)	132 (34.4%)	224 (58.3%)	17 (4.4%)	1 (0.3%)
Instant differences: When you eat high sugar processed foods (chocolate/cookies/cake) do you notice any instant differences in your depression symptoms?	13 (3.4%)	57 (14.8%)	148 (38.5%)	141 (36.7%)	25 (6.5%)
Delayed differences: When you eat high sugar processed foods (chocolate/cookies/cake) do you notice any delayed differences (several hours later) in your depression symptoms?	28 (7.3%)	125 (32.6%)	204 (53.1%)	23 (6.0%)	4 (1.0%)
Instant differences: When you eat fruits and vegetables do you notice any instant differences in your depression symptoms?	0 (0%)	2 (0.5%)	241 (62.8%)	131 (34.1%)	10 (2.6%)
Delayed differences: When you eat fruits and vegetables do you notice any delayed differences (several hours later) in your depression symptoms?	0 (0%)	2 (0.5%)	233 (60.7%)	132 (34.4%)	17 (4.4%)
Instant differences: When you consume alcohol do you notice any instant differences in your depression symptoms?	47 (12.2%)	72 (18.8%)	79 (20.6%)	188 (30.7%)	68 (17.7%)
Delayed differences: When you consume alcohol do you notice any delayed differences (several hours later) in your depression symptoms?	121 (31.5%)	130 (33.9%)	104 (27.1%)	22 (5.7%)	7 (1.8%)

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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