



The Difference in Depression and Anxiety Rate between Vegetarians and Non-Vegetarians: A National Study among Icelandic Adolescents.

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Abstract - English

Previous studies on vegetarianism have shown various health benefits of a vegetarian diet but the aim of this study was to examine the effects of a vegetarian diet on mental health, namely on depression and anxiety. Results from studies in this field vary a lot; some researches indicate that a vegetarian diet decreases the likelihood of depression and anxiety while others suggest that it can increase their likelihood. The data used in this study was collected by the Icelandic Centre for Social Research and Analysis (ICSRA) in 2013. Participants were 2150 Icelandic high school students between the ages of 16 and 24. Results suggested that there was no significant difference in depression and anxiety between vegetarians and non-vegetarians when both meat and fish consumption were examined. However there was a difference between the groups when meat consumption was looked at separately. Those who did not eat meat had significantly higher scores on the depression scale than those who ate meat. There was not a difference on the anxiety scale. These results lead to the conclusion that excluding meat from your diet can increase the likelihood of depression.

Key words: depression, anxiety, vegetarianism.

Abstract – Icelandic

Fyrri rannsóknir á grænmetisfæði hafa sýnt ýmis jákvæð áhrif á líkamlega heilsu fólks en markmið þessarar rannsóknar var að skoða áhrif grænmetisfæðis á andlega heilsu, aðallega þunglyndi og kvíða. Niðurstöður rannsókna á þessu sviði eru mjög ólíkar; sumar rannsóknir gefa til kynna að grænmetisfæði geti minnkað líkurnar á þunglyndi og kvíða en aðrar rannsóknir benda til þess að það geti aukið líkurnar. Gögnin sem notast var við í rannsókninni komu úr framhaldsskólakönnun Rannsókna og greiningar frá árinu 2013. Þátttakendur voru 2150 íslenskir framhaldsskólanemendur á aldrinum 16-24 ára. Niðurstöður voru þær að enginn marktækur munur var á þunglyndi og kvíða milli grænmetisæta og kjötæta þegar bæði kjöt- og fiskneysla var skoðuð. Þegar kjötneysla var skoðuð sér, kom í ljós að þeir þátttakendur sem ekki borðuðu kjöt fengu fleiri stig á þunglyndisskalanum heldur en þeir sem borðuðu kjöt. Ekki var munur milli hópanna á kvíðaskalanum. Af þessum niðurstöðum má álykta að þeir sem borða ekki kjöt séu líklegri en aðrir til þess að verða þunglyndir.

Lykilorð: þunglyndi, kvíði, grænmetisætur.

Foreword

Submitted in partial fulfillment of the requirements of the BSc Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

Difference in Anxiety and Depression Rate between Vegetarians and Non-Vegetarians: A National Study among Icelandic Adolescents.

Vegetarianism is becoming increasingly popular and more accepted by the public every year (Bobić, Cvijetić, Colić Barić & Šatalić, 2012). People are choosing this lifestyle for many different reasons, for example; ethical-, environmental- and physical health reasons (Craig, 2010; Leitzmann, 2005), and some people don't eat meat because of their religion (Bobić et al., 2012). Most researchers have studied the effects of a vegetarian diet on physical health and found that they were mostly positive (Anderson, 1990; Craig & Mangels, 2009; Fraser, 2009; Key et al., 1999). However, it is just as important to study what effects the diet can have on mental health, especially depression and anxiety because those are one of the most common mental disorders among adolescents (Alonso et al., 2004; Cohen et al., 1993; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003).

What is Vegetarianism?

Vegetarianism is most commonly described as excluding all animal flesh (meat, fish and poultry) from one's diet (Fraser, 2009). There are various subtypes of vegetarians and they are; vegans, lacto-ovo-vegetarians, pesco-vegetarians, semi-vegetarians and non-vegetarians. Vegans don't eat any animal products, no meat, no dairy and no eggs. Lacto-ovo-vegetarians don't eat any meat but they consume dairy and eggs. Pesco-vegetarians eat fish but no other meats, semi-vegetarians eat meat less than once a week and non-vegetarians eat meat more than once a week (Fraser, 2009).

Vegetarianism, Anxiety, and Depression

A lot of research has been done on the effects of a vegetarian diet on physical health (Anderson, 1990; Craig & Mangels, 2009; Fraser, 2009; Key et al., 1999). However there are not as many studies on vegetarian diets and mental health and the results from the ones that have been carried out, vary a lot. Results from many studies have indicated that excluding

meat from one's diet can result in a higher likelihood of anxiety (Jacka, Pasco, Williams, Mann, Hodge, Brazions & Berk, 2012; Michalak, Zhang & Jacobi, 2012, Jacka et al., 2010) and depression (Baines, Powers & Brown, 2006; Larsson, Klock, Åström, Haugejorden & Johansson, 2002; Michalak et al., 2012). Baines et al. (2006) conducted a large study on 9113 young women where they compared health and well-being between vegetarians, semi-vegetarians and non-vegetarians. Women who reported eating red meat were defined as non-vegetarians, those who reported eating no red meat were defined as semi-vegetarians and those who reported eating no meat, poultry, or fish were defined as vegetarians. Results showed that vegetarians and semi-vegetarians had lower body mass index and exercised more than the non-vegetarians. Women in both vegetarian groups were more likely to have low iron levels than the non-vegetarians; they were also more likely to have depression. Around 21-22% of the women in the vegetarian and semi-vegetarian groups reported having depression but only 15% of the non-vegetarians did.

Jacka et al. (2012) conducted a study to examine the prevalence of anxiety in women, in relation to vegetarianism. The study had 60 participants who were all women. Results showed that vegetarians were more likely than non-vegetarians to suffer from anxiety. Since the sample was quite small, the study should be repeated with a bigger sample of both genders to see if these results can be generalized to the population. Mochalak et al. (2012) supported Jacka et al.'s (2012) findings but they had over 4000 participants in their study. Those who were vegetarian were more likely to have depression disorders, anxiety disorders and somatoform disorders than non-vegetarian participants. Strengths of the study were that they had a big sample and also that they asked participants when they got diagnosed with their disorder and when they became vegetarian to see which one came first. More than half of the participants had adopted a vegetarian diet after they were diagnosed with a mental disorder. This leads to the conclusion that the diet itself was not the cause of their disorder. This also

raises the question if people who choose vegetarianism have certain traits that make them more vulnerable to mental disorders, such as anxiety and depression. This needs to be researched further in the future.

Other research have different results and indicate that a vegetarian diet has a positive effect on mood (Beezhold, Johnston & Daigle, 2010; Beezhold & Johnston, 2012) and can decrease anxiety and depression symptoms (Donaldson et al., 2001; Kahleova, Hrachovinova, Hill & Pelikanova, 2012; Weng et al., 2012). Beezhold et al. (2010) did a study on the relationship between mood states and vegetarianism. Participants were 138 adults from the Seventh Day Adventist Church and almost half of them were vegetarian. The vegetarian group reported significantly less negative emotion than the non-vegetarians. Their selection of participants is a limitation because it focused on such a specific group that is very religious and known for endorsing a vegetarian diet. Beezhold and Johnston conducted another study in 2012 where all of the participants were non-vegetarian (Beezhold & Johnston, 2012). Participants were split into three equal groups and had to follow different diets. One of the groups had to follow a vegetarian diet where participants were told to avoid all animal products except for dairy. All participants maintained their usual lifestyle habits and activity pattern. The mood scores of the vegetarian group improved significantly but the mood of the other two groups did not change. This study had a particularly strong method because all of their participants were non-vegetarian. This eliminates the possible third variable that vegetarians and non-vegetarians are in some way different from each other beforehand, therefor this difference in their mood is not caused by their difference but rather the diet itself.

The Present Study

Most of the previous studies in this field have only examined the relationship between either depression or anxiety and vegetarianism, and many of them only had female participants. Given the contrary results of previous studies and the different methods, the aim

of the present study was to examine the relationship between vegetarianism, depression, and anxiety in adolescent males and females. Since a larger proportion of studies have shown that vegetarianism can have a negative effect on mental health, it is hypothesized that vegetarian adolescents experience more symptoms of depression and anxiety.

Method

Participants

The present study used data from the Icelandic Centre for Social Research and Analysis (ICSRA) (Hrefna Pálsdóttir, Margrét Lilja Guðmundsdóttir, Jón Sigfússon, Inga Dóra Sigfúsdóttir, Álfgeir Logi Kristjánsson, and Ingibjörg Eva Þórisdóttir, 2014).

Participants were Icelandic high school students from the 2013 population based *Youth in Iceland* surveys. Every high school in Iceland was a part of the study and the current sample included 75.5% of all students registered in the high schools at the time of the data collection. The survey had 11,116 participants; this study utilized a random sample of 2150 students. There were 1079 (50.8%) boys and 1047 (49.2%) girls but 24 students did not specify their gender. Participants were between the ages of 16 and 24 and they did not get any reward or payment for their participation in the study.

Procedure

Three days before data collection began, each school made sure that the proposed participants were sent home with an introductory letter to parents of children under the age of 18. Parents got the opportunity to withdraw their children from the study or to contact the research team with any questions they might have had. This approach to passive consent is consistent with local laws and the principle of passive consent.

The questionnaires were distributed by ICSRA to every high school in Iceland along with envelopes to put the completed questionnaires in. Teachers in each class handed them

out to students and supervised while they completed the questionnaire. Participants were instructed not to write their names or social security numbers on the questionnaire because the survey was completely anonymous. Students were also advised to answer all of the questions truthfully and ask their teacher for help if they needed any. When the students had finished they were told to put their questionnaire in an envelope, seal it and hand it to their teacher.

Measures

The questionnaires used are very detailed and have been developed for many years (see Appendix A). The questionnaire from 2013 was 35 pages long and had 95 questions. For the present study, four items from the questionnaire were used. One item measured depression, one measured anxiety, one measured vegetarianism and one measured mental health.

To measure depression, participants were asked to rate how often (from 1 = almost never, to 4 = often) in the last 30 days they felt the following distress or discomfort; you were sad or had little interest to do anything, you had a small appetite, you felt lonely, you cried easily or wanted to cry, you had a hard time falling asleep or to stay asleep, you were depressed or sad, you weren't excited to do anything, you felt slow or weak, you felt like the future was hopeless, you thought about committing suicide.

To measure anxiety, participants were asked how often (from 1 = seldom/almost never to 4 = almost always/always) in the past 30 days they showed the particular behavior; you felt like you were losing control of important factors of your life, you were insecure about the decisions you had to take to solve your personal problems, you felt like things were going your way, you felt like you had more and more problems that you couldn't handle. Participants were also asked how good (from 1 = very good to 4 = poor) their mental health was.

To measure if participants were vegetarian or not, participants were asked how often

(1 = more than once a day, 2 = once a day, 3 = every week, 4 = less than once a week, 5 = never) they ate meat and fish. Those who said they never ate meat or fish were considered vegetarian.

Data analysis

One-way ANOVA was used to evaluate the relationship between the independent variable, vegetarianism or non-vegetarianism, and the dependent variables, depression and anxiety.

Results

Table 1 shows descriptive statistics for the variables used in this study. It shows the number of participants, participants' age, as well as the mean score, minimum, maximum, and standard deviation for participants' symptoms of depression and anxiety.

Table 1

Descriptive Statistics for the Sample

	N	Minimum	Maximum	Mean	Std. Deviation
Age	2110	16	24	18.5	1.45
Anxiety	2083	0	12	3.8	2.53
Depression	2067	0	30	8.6	7.20

Participants were divided in to two groups depending on if they were vegetarian or not. Only 13 participants were vegetarian and 2048 were non-vegetarian. Table 2 shows the mean score of depression and anxiety symptoms for the two groups, and the standard deviation.

Table 2

Anxiety and Depression Scores

	Vegetarians				Non-Vegetarians			
	Min	Max	Mean	SD	Min	Max	Mean	SD
Anxiety	0	9	4.3	2.8	0	12	3.8	2.5
Depression	0	14	10.9	7.9	0	30	8.6	7.2

As can be seen in Table 2, vegetarians got a slightly higher mean score on both the anxiety and depression measures. The vegetarian group got a 2.3 higher score on average on the depression scale than the non-vegetarians but the difference between the two groups was not significant $F(1, 2027) = 1.35, p = .245$. The difference between the groups was very small on the anxiety scale but the vegetarian group got a .5 higher score than the non-vegetarian group on average. The difference between the groups was not significant $F(1, 2042) = .487, p = .485$. There was also not a difference between the groups on how they evaluated their mental health, both groups considered their mental health to be good.

When participants were not divided into the two groups, vegetarian and non-vegetarian, there was a significant difference between their depression and anxiety scores and how many times a week they ate meat and fish. The more often participants ate meat and fish, the lower their depression ($F(4, 2020) = 3.5, p < .00$) and anxiety ($F(4, 2035) = 2.57, p < .01$) scores were.

Meat consumption and depression and anxiety

Meat consumption was examined separately from fish consumption in relation to depression and anxiety. There were 27 participants who said they never ate meat and 2056 who said they ate meat. Table 3 shows the mean score of depression and anxiety for the two groups, meat-eaters and non-meat-eaters.

Table 3

Anxiety and Depression Scores

	Non-Meat-Eaters				Meat-Eaters			
	Min	Max	Mean	SD	Min	Max	Mean	SD
Anxiety	0	11	4.5	2.9	0	12	3.8	2.5
Depression	0	28	12.1	8.2	0	30	8.6	7.2

The difference between the groups was grater on the depression scale than the anxiety scale.

Participants who did not eat meat got on average a 3.5 higher score on the depression scale than the meat-eaters and the difference was significant $F(1, 2032) = 6.49, p < .05$. Figure 1 shows participants' depression scores depending on how often they ate meat.

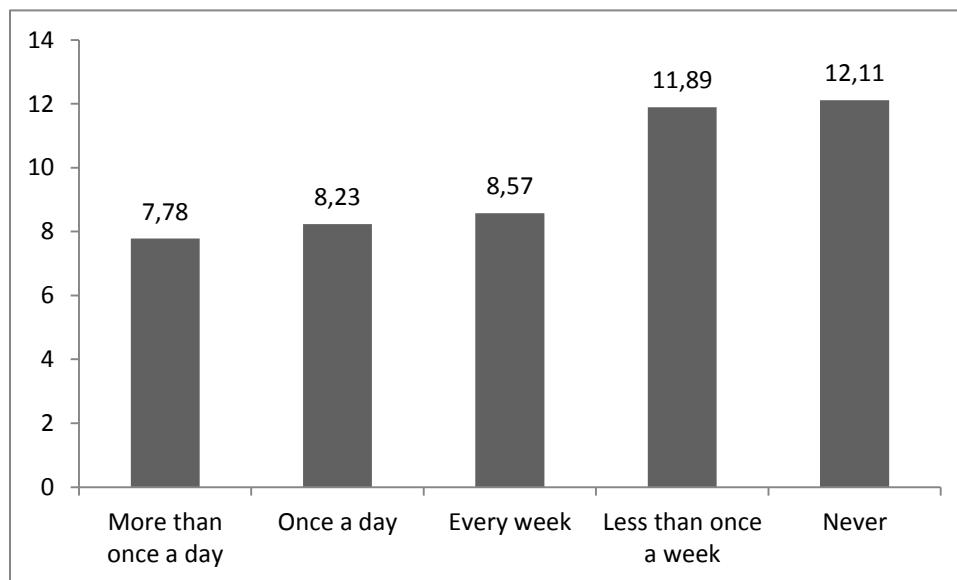


Figure 1. Depression scores and frequency of meat consumption

As can be seen in Figure 1, the less often participants ate meat, the higher their depression score was $F(4, 2029) = 6.1, p < .00$.

The difference between the groups was not as large on the anxiety scale but the group that did not eat meat got a .7 higher score on average than the meat-eating group but the difference was not significant $F(1, 2048) = 2.1, p = .146$. Figure 2 shows participant's anxiety scores depending on how often they ate meat.

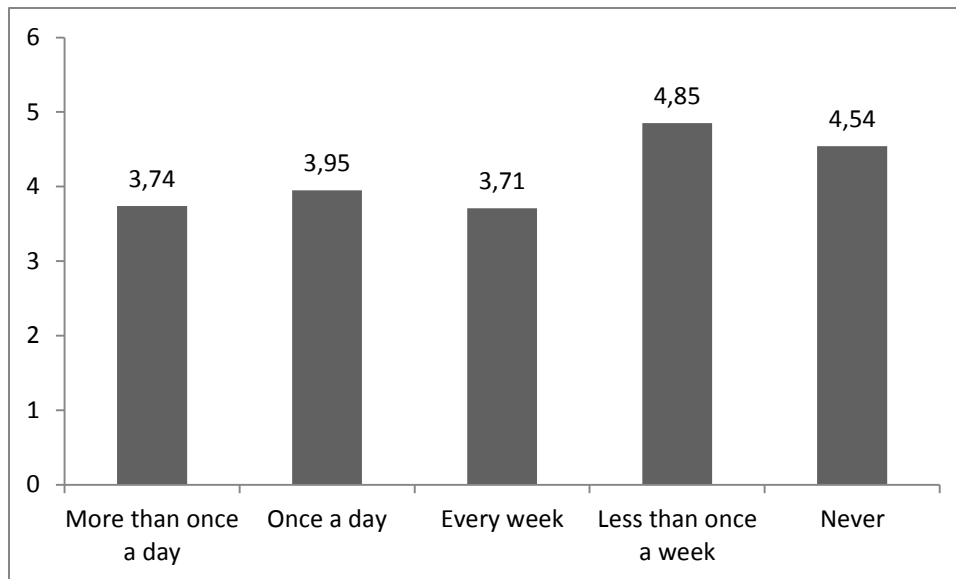


Figure 2. Anxiety scores and frequency of meat consumption

As can be seen in Figure 2, participants who never ate meat or ate meat less than once a week got the highest scores on the anxiety scale. The difference between the five answer groups was significant $F(4, 2045) = 4.47, p < .01$.

Discussion

The current study had the aim to examine the relationship between vegetarianism, depression, and anxiety in adolescents. Participants were 2150 Icelandic adolescents between the ages of 16 and 24, of both genders, attending high school in 2013. Participants who said they never ate meat or fish were considered vegetarian. The sample had 13 (0.6%) vegetarians and the rest were non-vegetarian (99.4%). Based on previous research it was hypothesized that vegetarians would experience more symptoms of depression and anxiety. The results of the present study partially supported the hypothesis. Vegetarian participants did experience slightly more symptoms of both depression and anxiety than non-vegetarian participants but the difference between the groups was not significant. These findings are not consistent with the majority of previous studies who have suggested that vegetarians are more likely than

non-vegetarians to have anxiety (Jacka et al., 2012; Michalak et al., 2012; Jacka et al., 2010) and depression (Baines et al., 2006; Larsson et al., 2002; Michalak et al., 2012).

When meat consumption was examined separately without fish consumption, a difference was found between the groups. Participants who said they never ate meat had significantly higher scores on the depression scale than those who said they ate meat. These results support previous findings (Baines et al., 2006; Michalak et al., 2012). This indicates that excluding meat from your diet can result in depressive symptoms. Participants who said they never ate meat had higher scores on the anxiety scale than those who did not eat meat but the difference was not significant. This is not consistent with previous findings which have indicated that vegetarians are more likely than non-vegetarians to have anxiety (Jacka et al., 2012; Michalak et al., 2012).

The strengths of the present study were that the sample was big and included both genders. Many of the previous studies have focused only on women but it is important to have both genders to see if vegetarianism has the same effect on men and women. The sample also had both vegetarians and non-vegetarians but many of the previous studies only had vegetarian participants and others just had non-vegetarian participants. Most of the previous studies examined either depression or anxiety but the present study examined both at the same time.

The study also had several limitations. There are a lot of things that can contribute to depression and anxiety so it would have been better to include more variables and see what had the most impact. For example it would have been good to ask participants about exercise, self-esteem, and their bond with family and friends. Also, the sample only consisted of adolescents but it would be interesting to conduct a similar study on different age groups to see if they would have the same results since depression and anxiety can occur at any age. It would also be good to find out when participants started having symptoms of depression or

anxiety and when they became vegetarian to see that came first. In a previous study where vegetarians were more likely to have depression and anxiety, more than half of the participants had adopted a vegetarian diet after they were diagnosed with a mental disorder (Mochalak et al., 2012). This leads to the conclusion that the vegetarian diet itself was not the cause of their mental disorder but the relationship is definitely there and it is important to find out why.

People choose to go vegetarian for many different reasons and it would be interesting for future studies to examine if there is any difference between vegetarians who don't eat meat because of their religion and those who don't eat meat because of moral reasons for example. Also, since there are many subtypes of vegetarianism, it would be interesting to see if there is any difference in depression and anxiety between each subtype. That would make us more able to target what exactly causes this difference.

Future studies in this field need to find out why this difference between vegetarians and non-vegetarians occurs. Both vegetarian and non-vegetarian participants should be included to see if vegetarians have any specific personality traits that make them different from non-vegetarians and perhaps more vulnerable to specific mental disorders.

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Appendix A

1. Ert þú strákur eða stelpa? ☐ Strákur ☐ Stelpa

2. Hvaða ár ert þú fædd(ur)?

☐ 1990 ☐ 1991 ☐ 1992 ☐ 1993 ☐ 1994 ☐ 1995 ☐ 1996 ☐ 1997

☐ 1998 Annað, árið _____

33. Hversu oft varðst þú var/vör við eftirfarandi vanlíðan eða óþægindi síðastliðna 30 daga?
(Merktu í EINN reit í HVERJUM lið).

	Nær aldrei	Sjaldan	Stundum	Oft
a) Höfuðverk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Verk í maga	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Þú varst uppspennt(ur)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Þú varst leið(ur) eða hafðir lítinn áhuga á að gera hluti	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Þú hafðir litla matarlyst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Þér fannst þú einmana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Þú grést auðveldlega eða langaði til að gráta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Þú áttir erfitt með að sofna eða halda þér sofandi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Þú varst niðurdregin(n) eða dapur/döpur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Þú varst ekki spennt(ur) fyrir að gera nokkurn hlut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) Þér fannst þú vera hægfara eða hafa lítinn mátt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l) Þér fannst framtíðin vonlaus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m) Þú hugsaðir um að stytta þér aldur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

35. Merktu í þann reit sem lýsir best hegðun þinni. Merktu í EINN reit í HVERJUM lið. Hve oft varst þú var/vör við eftirfarandi síðastliðna 30 daga?

	Sjaldan/nær aldrei	Stundum/einstaka sinnum	Nokkuð oft/oft	Næstum alltaf/alltaf
a) Þér fannst þú vera að missa tök á mikilvægum þáttum í lífi þínu?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Þú varst óörugg(ur) með þær ákvarðanir sem þú þurftir að taka til að leysa úr persónulegum vandamálum?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Þér fannst að hlutirnir gengju þér í hag?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Þú upplifðir að vandamálin hrönnuðust upp án þess að þú réðir við þau?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

43. Hversu góð er andleg heilsa þín? Merktu aðeins í EINN reit.

Mjög góð

☐

Góð

☐

Sæmileg

☐

Léleg

☐

53. Hversu oft neytir þú eftirfarandi? (Merktu í EINN reit í HVERJUM lið).

	Oftar en 1 sinni á dag	Einn sinni á dag	Í hverri viku	Sjaldnar en 1 sinni í viku	Aldrei
a) Ávaxta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Sælgætis/sætt kek	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Grænmetis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Kjötmáltíðar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Fiskmáltíðar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Pasta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Grænmetismáltíðar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Mjólkur eða mjólkurvara	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Sykraðra gosdrykkja	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Sykurlausra gosdrykkja	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) Vatns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l) Fæðubótarefna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>