





BSc in Psychology

The association between the Mediterranean diet and mental well-being

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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.

Abstract

There are many aspects that may influence individual's mental well-being, but little is still known about the possible influence different dietary patterns may have. Previous researches show that there is a connection between adhering to the Mediterranean diet and mental health. The aim of this study was to analyze the association between self-perceived mental well-being and adherence to the Mediterranean diet among Icelandic men and women. The study had 213 participants collected from a convenience sample. Dietary intake was measured with the Mediterranean Diet score. The mental well-being of the participants was measured with the Short Warwick-Edinburgh Mental Well-being Scale and the Quality of participants lives was measured with the Quality of Life Scale. The results were analyzed using descriptive statistics and Spearman's correlation coefficient. The association between mental well-being and adherence to the Mediterranean diet was not found to be significant. The association between quality of life and the Mediterranean diet was not found to be significant either.

Keywords; mental well-being, diet, Mediterranean diet, quality of life.

Útdráttur

Það eru margir þættir sem hafa áhrif á geðheilsu einstaklinga, en ennþá liggur lítið fyrir af vitneskju um möguleg áhrif mismunandi mataræðis á andlega vellíðan. Fyrri rannsóknir sýna að það eru tengsl á milli þess að fylgja Miðjarðarhafsmataræði og andlegrar vellíðunar. Markmið þessarar rannsóknar var að rannsaka tengslin á milli eigin upplifunar fólks á andlegri vellíðan sinni og þess að fylgja Miðjarðarhafsmataræði á meðal íslenskra karla og kvenna. Þátttakendur í rannsókninni voru 213 valdir með hentugleikaúrtaki. Neysla matar var metin með kvarðanum Mediterranean Diet score. Andleg vellíðan þátttakenda var metin með Short Warwick-Edinburgh Mental Well-being kvarðanum og lífsgæði þátttakenda var metin með Quality of Life kvarðanum. Niðurstöðurnar voru greindar með því að nota lýsandi tölfræði og fylgnistuðul Spearman's. Tengslin á milli andlegrar vellíðunar og þess að fylgja Miðjarðarhafsmataræðinu voru ekki marktæk. Um tengslin á milli lífsgæða og þess að fylgja Miðjarðarhafsmataræðinu gildi það sama, það er tengslin voru ekki marktæk.

Lykilorð; andleg vellíðan, mataræði, Miðjarðarhafsmataræði, lífsgæði.

The association between diet and mental well-being

It is not merely to be free from a mental illness that defines mental well-being, there is a whole spectrum of states that can be used to describe an individual's mental well-being for example flourishing and languishing are two states at different places on that spectrum (Huppert, 2009). Flourishing is defined as when an individual flourishes in their life with great enthusiasm and is connected to others. That is referred to as the highest level of psychological well-being (Huppert, 2009). Languishing is then farther down the spectrum and describes a state where individuals feel stagnant in their lives. Although these individuals do not have mental illnesses they are at a much greater risk of depression (Huppert, 2009).

A lot has been studied about all kinds of different aspects that might influence individual's well-being but little is still known about the possible influence different diets may have (Blanchflower, Oswald & Stewart-Brown, 2013). There is a small group of studies that suggest that there is some association with depression and lack of healthy foods such as fruits and vegetables. There is a need to better understand the connection between dietary patterns and the effects they might have on mental well-being (Blanchflower, et al., 2013).

There is an increasing interest in the relationship existing between nutrition and mental health, primarily because researches show that there are some essential nutrients that directly influence our nervous systems ability to work at its best (Wang et al., 2018). Individual's nutrition is influenced by many factors they can have direct influence on their mental health, including: an individual's life stage, environmental factors, food access, as well as socioeconomic status (Wattick, Hagedorn & Olfert, 2018).

There are many aspects of dietary patterns that might be beneficial to be aware of. One of those is inflammatory foods and their effects on well-being. Diets that aim to reduce

inflammation have been shown to have positive influences on both mental and physical well-being (Tolkien, Bradburn & Murgatroyd, 2018).

Inflammation

Diets that are aimed at decreasing inflammation in the body or anti-inflammatory diets have been shown to have a beneficial impact on mood while eating a pro-inflammatory diet can have the opposite effect (Taylor & Holscher, 2018). An anti-inflammatory diet is meant to reduce and eliminate inflammation in the body by eating foods that don't cause inflammation and are easily digestible. A pro-inflammatory diet is the opposite where more heavy foods are consumed that can often cause inflammation (Tolkien et al., 2018).

Aside from the anti-inflammatory component other nutritional factors that might have an effect on mental well-being are, polyunsaturated fatty acids (PUFAs), especially omega-3 FAs, phospholipids, cholesterol, niacin, folate, vitamin D, as well as B6 and B12 vitamins (Lim et al., 2016). Consumption of both pre- and probiotics including fiber and prebiotic fibers might also be beneficial because they impact the gut flora which has been found to have a positive impact on moods (Taylor & Holscher, 2018). The gut flora is important for our overall general health and well-being. When it gets disrupted it often leads to negative effects on mental health. Fiber is beneficial for the gut flora because it enriches its diversity and with that reduces inflammation in the body (Taylor & Holscher, 2018).

In addition to pro-inflammatory foods other types of foods that can be harmful for mental well-being are saturated fats and simple sugars. Those types of food often contain little fiber and the sugar can have harmful effects on the gut flora (Lim et al., 2016).

Omega-3 fatty acids

There are two omega-3 fatty acids that have a specific function in supporting health (Rogers et al., 2008). They are also the ones that have been most studied. These omega-3 fatty acids are called eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These

omega-3 fatty acids can be found in fish and other seafood or as supplements in often in the form of fish oil.

A study about the relationship between fish consumption and mental health showed that the participants who increased their fish consumption reported significantly better mental health status then at the start of the study (Silvers & Scott, 2001). Another study with two groups where one consumed a lot more seafood than the other resulted in that group having higher EPA, DHA and n-3 LCPUFA levels and much lower levels of n-6 LCPUFAs and much lower levels of depression then the other group not consuming as much seafood (Berger et al., 2018). These studies support the hypothesis that omega-3 fatty acids may aid in mood stability (Silvers & Scott, 2001; Berger et al., 2018). In addition to that this shows the importance of the balance between omega-3 and omega-6 fatty acids. Omega-6 is usually never lacking in modern diets and is found in most fast foods for example. When the ratio of n-6 with n-3 is imbalanced, with the n-6 being higher, that was significantly associated with depression (Berger et al., 2018).

Omega-6 is usually never lacking in our modern diets and is found in most fast foods for example. When the ratio of n-6 with n-3 was imbalanced, with more of the n-6, that was significantly associated with depression (Berger et al., 2018).

While many studies show a relationship between low levels of LCPUFAs and depression there are still some differences in this field.

Mediterranean diet

Studies are leading us to the conclusion that it could be valuable to study not only single nutrients but overall dietary patterns as a whole (Panagiotakos, Pitsavos, & Stefanadis, 2006). The Mediterranean diet is a diet with minimal inflammation and has been shown to have a positive effect on mental health (Parletta et al., 2017). A study about the adherence to

the Mediterranean diet found that it was associated with better both mental and physical health (Muñoz, Fíto, Marrugat, Covas, & Schröder, 2009).

The food patterns of the Mediterranean diet originate in Greece and Southern Italy (Willet et al., 1995). The diet consists of abundant plant foods such as vegetables, fruits, whole cereals such as brown rice, nuts, seeds, legumes, low to moderate amounts of wine and mainly consumed with food, low to moderate consumption of poultry and fish and very low consumption of red meat, olive oil is the main source of fat and there is very low consumption of dairy products such as margarine but some amounts of pure full fat youghurt and cheeses (Willet et al., 1995). It is designed to maximize dietary fiber intake and in addition to that it is minimally processed, or sugary foods and it aims to keep the saturated fats low. That is the reason why Panagiotakos et al came up with a diet score that would measure the dietary pattern of the Mediterranean diet (2006).

The aim of the present study was to analyze the association between self-perceived mental well-being and adherence to the Mediterranean diet on a convenience sample of Icelandic men and women.

The hypotheses of this study are 1) That those adhering to a Mediterranean diet score report higher mental well-being, 2) That those adhering to a Mediterranean diet score report higher quality of life and 3) That those consuming fish oil and therefore more likely to consume recommended omega-3 report higher mental well-being.

Method

Participants

This study was conducted on a convenience sample of 213 participants, 141 (66.5%) females and 71 (33.5%) males. One participant did not state his or her gender. Participants age varied from 18 years to older than 60 years. The study was done in Icelandic therefore,

only individuals that spoke Icelandic could participate. Participants took part at their own interest and did not receive any payment or compensation for their participation.

Measures

The online questionnaire that participants were asked to answer was made at SurveyMonkey.com, and available through the social media network Facebook. The questionnaire included 50 questions. There were 8 background questions (gender, age, education, marital status, parental status, childrens age, alcohol consumption, tobacco consumption) and 3 questions about exercise habits. Then there was a question about dietary patterns (vegan, vegetarian, pescatarian, paleo, Mediterranean, keto, gluten free and dairy free). There was a translated version of the *Mediterranean Diet score* (MeDi) which contains 12 questions about food consumption of specific food groups, one question about fish oil was added to further see into participants omega-3 consumption. Also, a translated version of the *Short Warwick-Edinburgh Mental Well-being Scale*, which is a total of 7 questions, as well as, two additional questions about how well participants perceived both their mental and physical well-being. Finally, there was a translated version of the *Quality of Life Scale* which is 16 questions.

MeDi (The Mediterranean Diet Score)

The Mediterranean diet score was designed as a useful tool for getting a better understanding of a the relationship with the Mediterranean diet and with different aspects of health (Panagiotakos et al., 2006). The score uses eleven main components of the diet (non-refined cereals, fruits, vegetables, potatoes, legumes, olive oil, fish, red meat, poultry, full fat dairy products and alcohol). Scores are assigned; 0, 1, 2, 3, 4 and 5 for how much individuals estimate they consume of each category. Those categories that are thought to resemble the diet they get a higher score with increased consumption and the scores are given in reverse

for those foods that do resemble the diet such as alcohol. Total score of the scale ranges from 0 to 55.

SWEMWBS (The Short Warwick-Edinburgh Mental Well-being Scale)

The Short Warwick-Edinburgh Mental Well-being scale (SWEMWBS) was used to measure participants self perceived mental well-being. The Icelandic version of the *SWEMWBS* has acceptable internal reliability ($\alpha = .87$) (Guðmundsdóttir, 2009).

The scale includes seven statements about thoughts and feelings where participants are asked to choose one answer that best describes their experience of how they have felt over the last two weeks, with the possible answers. The statements are on a five point Likert scale, ranging from 1: “Never“ to 5: „, Always“. Examples of the statements are: (“I have been relaxed.”) and (“I have felt close to others.”) Participants mental well-being was defined as their total score on the *SWEMWBS*.

The lowest possible score from the scale is 7 and the highest possible score from the scale is 35.

QOLS (Quality of Life Scale)

The Quality of Life Scale (QOLS) was used to measure participants self perceived quality of life. It was originally fifteen questions and was designed by John Flanagan in 1970 to measure global quality of life (Burckhardt & Anderson, 2003). Since then there has been added the sixteenth question and that is the version that was used for this study. The *QOLS* has acceptable validity and reliability (Burckhardt & Anderson, 2003). Participants‘ quality of life was defined as their total score on the *QOLS*. The questions were on a seven point Likert scale, ranging from 7: “Delighted“ to 1: “Terrible“. Example of the questions are: (e.g., “Material comforts home, food, conveniences, financial security.”) and (“Having and rearing children.”) as well as (“Health – being physically fit and vigorous.”) participants were asked to answer how they percieve different categories of their live, only choosing one option

for each question. The scale has sixteen items therefore the lowest possible score is 16 and the highest possible score is 112.

Procedure

The link to the questionnaire was posted on the social network Facebook asking for participation. The questionnaire was available online from May 3rd to May 9th 2019. The link lead to SurveyMonkey.com where the questionnaire was conducted. The participants started by reading a short introduction where it was stated that the questionnaire was for a study for a BSc project in pshychology, at Reykjavík University that aimed to study the relation between diet and well-being. In the introduction it was made clear that the answers were anonymous and took about 5-10 minutes. Participants were informed that answering the questionnaire they were giving consent for their participation and that their answers could not be traced back to them. The answers from the questionnaire online at Surveymonkey.com were then collected and the data entered into the statistics program SPSS Statistics version 25.0.0.0.

Design and data analysis/ Statistical analysis

SPSS Statistics version 25.0.0.0. was used for all statistical analysis. Descriptive statistics were calculated to for information about how participants scored on each scale (MeDi, SWEMWBS and QOLS). The independent variable was diet and the dependent variable was self percieved mental well-being and quality of life. Spearman's correlation was then used to examine the correlation between the MeDi score, MeDi score with added omega-3mental well-being and quality of life.

Results

Descriptive Statistics

The gender distribution was quite uneven with 141 females and 71 males. There were 47 participants under 30 years old, from 30 to 41 years old there were 23 and from 48 to 59

there were 16 that were 60 years and older 18-23 years old; $N = 25$ (11.7%), 24-29 years old; $N = 22$ (10.3%), 30-35 years old; $N = 11$ (5.2%), 36-41 years old; $N = 12$ (5.6%), 42-47 years old; $N = 25$ (11.7%), 48-53 years old; $N = 57$ (26.8%), 54-59 years old; $N = 45$ (21.1%) and 60 years and older; $N = 16$ (7.5%).

Participants were asked about their completed education $N = 13$ (6.1%) had completed elementary school, $N = 40$ (18.8%) high school, $N = 13$ (6.1%) had completed industrial education, $N = 3$ (1.4%) had completed nutritional education, $N = 73$ (34.3%) had completed a bachelor's degree or similar, $N = 64$ (30%) had completed a master's degree, $N = 1$ (0.5%) had completed a doctor's degree and $N = 6$ (2.8%) had completed other types of education. Marital status was asked $N = 37$ (17.4%) was single, $N = 23$ (10.8%) were in a relationship, $N = 151$ (70.9%) were married or living with their partner and $N = 2$ (0.9%) were widowed. $N = 145$ (68.1%) did have children, $N = 65$ (30.5%) did not have children and $N = 3$ (1.4%) did not answer. It was asked if participants smoked $N = 32$ (15%) did smoke, $N = 176$ (82.6%) did not smoke and $N = 2$ did not answer. When asked if they consumed alcohol $N = 158$ (74.2%) did consume alcohol and $N = 54$ (25.4%) did not consume alcohol, $N = 1$ (0.5%) did not answer.

Table 1 shows participants answers for following any kind of specific diets. One participant did not answer that question.

Table 1.

Descriptive Statistics for Dietary Patterns.

	N	%
No specific diet	175	82.2
Vegan	3	1.4
Vegetarian	3	1.4
Pescatarian	9	4.2
Mediterranean	1	0.5
Ketogenic	13	6.1
Gluten free	1	0.5
Dairy free	2	0.9
Gluten and Dairy free	3	1.4
Low carb	2	0.9
Total	212	99.5

Table 2 shows descriptive statistics for the participants scores on the MeDi score, the Medi score with added omega-3, the SWEMWBS scale and QOLS

Table 2.

Descriptive Statistics for MeDi Score, SWEMWBS and QOLS

	Minimum score	Maximum score	Mean	Std. Deviation
MeDi	21	63	41.8	7.2
MeDi with Omega-3	22	68	44.3	7.6
SWEMWBS	16	68	28.9	5.8
QOLS	71	112	91.8	8.3

The Mediterranean Diet Score ($N = 201$). The MeDi plus the additional question about fish oil consumption. The females had a slightly higher mean score at 42.1 than the males with 41.2. The males minimum score on the MeDi was 27 and the maximum score was 61 ($SD = 6,4$) while the minimum scores of the females was 21 and the maximum score 63 ($SD = 7,5$).

The scores from the *SWEMWBS* ($N = 209$). The minimum score amongst males was 19 and the maximum was 68 while the mean score was 28.9 ($SD = 5.8$). The minimum score amongst the females was 16, the maximum was 35 and the mean was 27.5 ($SD = 3.6$).

The scores from the *QOLS* ($N = 183$). The males had a minum score of 77 and the maximum score of 112 while the mean score was 91.6 ($SD = 8.9$). The females had a minimum score of 71, the maximum score of 110 and the mean score 91.9 ($SD = 8.1$).

Table 3 shows correlation and p for the total score of the MeDi scale and the MeDi scale with added omega-3 with the *QOLS* and *SWEMWBS*.

Table 3.

Spearman's Correlation Coefficient

	Spearman's correlation coefficient	<i>p</i>
MeDi1 and QOLS	-0.17	.823
MeDi1 and SWEMWBS	.085	.231
Medi with Omega-3 and QOLS	.015	.843
MeDi with Omega-3 and SWEMWBS	.107	.133

Spearman's correlation coefficient showed negative relationship (-.017) between MeDi score with the *QOLS* though the relationship was not statistically significant ($p = .823$)

Spearman's correlation coefficient showed positive relationship (.085) between the MeDi diet and the mental well-being scale. The relationship was not statistically significant ($p = .231$).

When the question about fish oil assumption was added to the MeDi score the correlation

coefficient showed a more positive relationship with *QOLS* (.015) and the relationship with *SWEMWBS* was also more positive (.107). However, both correlation coefficients were not statistically significant, *QOLS* ($p = .843$) and *SWEMWBS* ($p = .133$)

Discussion

There can be various benefits that could come from researching this relationship between mental well-being and dietary patterns further. The better we understand this possible relationship between foods that we eat and how they might impact our well-being the more likely we are to use that knowledge that to our advantage and make changes that may lead to higher mental well-being. Although there are many alternatives that are known to impact our mental health such as various medications there are aspects of this that can be desirable to many for the reason that alternating dietary patterns is a natural way to effect one's mental well-being and comes without side effects that most often accompany prescribed medication.

The intent of this study was to examine the association between diet, mental well-being and quality of life. The current study gives insight into mental well-being and quality of life in relation to the Mediterranean diet. This is the first study that examines the Mediterranean Diet and its correlation with mental well-being among Icelandic men and women. However, that does not mean that it should be generalized on the Icelandic public.

The study had three hypotheses. The first hypothesis was that those adhering to the Mediterranean diet report higher mental well-being. The second hypothesis was that those adhering to the Mediterranean diet report higher quality of life. The third hypothesis was that those consuming fish oil and are therefore more likely to consume the recommended omega-3 report higher mental well-being.

There was not a significant correlation with any of the three hypotheses of this study and therefore they were not supported.

The Mediterranean diet was hypothesized to be positively associated with mental well-being. This hypothesis was not supported. There was a slight negative connection between the two, though it was not significant.

The Mediterranean diet was hypothesized to be positively associated with quality of life. This hypothesis was not supported. There was a slight positive correlation though it was not significant.

Fish oil consumption was hypothesized to be positively associated with quality of life. This hypothesis was not supported. Though there was a more positive correlation with mental well-being with the MeDi with the additional omega-3 than the original MeDi it was not significant.

The higher the score from the scale the better is their perceived well-being this is true for all three of the scales used in this study. A higher score always stands for a more positive outcome. The scales were looked at as a whole therefore all of the results are from the total scores of the scales and not individual questions. The farther along the questionnaire the fewer answers were collected per question. That could explain why there is a higher response rate for the *SWEMWBS* then the *QOLS*.

The strengths of this study are that the population of participants is quite large especially considering the few days that it was available for participation, based on that it can be said that it was rather well received.

The weaknesses of this study were that there was quite a large gender gap among participants and uneven age distribution of the participants as well which makes it hard to generalize these results on to the general population. Only one participant claimed to follow the Mediterranean diet. The results might be different if the participants pool were all following that diet and might give a more clear result of it's correlation with mental well-being and quality of life. Another factor that might weaken the results are that all of three

scales, The MeDi, QOLS and SWEMWBS were all self-reported and might be more accurate and less biased. Those are some of the aspects that could be done differently in further studies on this topic and might explain why none of the hypotheses were supported.

The well-being literature remains small and there is a need for further studies to be done on the topic of mental well-being to understand better different factors that might impact it. Future studies on this relationship should have larger group of participants and it is important that it should be a controlled randomized trial where there is a better gender and age distribution and different variations of individuals from all classes that might reflect the society in a more realistic way. In addition to those factors there could be a control group and one that follows the Mediterranean diet.

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