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Investigating the Relationship Between Diet and PTSD Symptoms

College Honors Thesis

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Abstract

Dietary intake is strongly associated with physical and mental health. Diets that stray from standard nutrient recommendations have been connected to disease, depression, and related illnesses. Although there is a clear relationship between stress and diet, the connection between dietary intake and Post Traumatic Stress Disorder (PTSD) is unclear. PTSD is a trauma-related disorder that has a lifetime prevalence of 7.8 percent within the general population. This observational study examined a 24-hour recall diet in 20 trauma-exposed individuals. Results supported a negative correlation between calorie consumption, carbohydrates, protein and PTSD symptoms. These results support the hypothesis that those with more severe PTSD symptoms have altered and poorer diets than those with less severe symptoms.

Investigating the Relationship Between Diet and PTSD Symptoms

Posttraumatic Stress Disorder (PTSD) is a chronic mental health problem that occurs after an exposure to a traumatic event. The illness is characterized in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) by intrusive symptoms, avoidance, negative alterations in cognitions and mood, and alterations in arousal and reactivity (APA, 2013). Prior research has shown that similar symptoms and diet are related such that those with elevated symptoms have diets high in empty calories.

There are several proposed mechanisms for the association between diet and stress. When exposed to stress, elevated glucocorticoids and insulin stimulate the drive for “comfort foods”. This neurobiological process explains in part why comfort foods can result in immediate relief of stress (Dallman, M.F., Pecoraro, N.C., & la Fleur, S.E., 2005). The finding is consistent with a study that administered surveys to undergraduates on their eating habits (Oliver & Wardle, 1999). The results demonstrated a relation between increased intake of snacks instead of full meals and consumption of cakes and biscuits, sweets and chocolate, and savory snacks during times of stress. These results suggest that under stress, students reported to have a change in eating habits and possibly craved more palatable foods. Further research reported found that elevated levels of stress-induced cortisol in women led to eating larger quantities of food and more sweets (Epel, E., Lapidus, R., McEwen, B., & Brownell, K., 2001).

Prior research has focused on the relationship between stress and a whole-food versus processed-food diet. For example, predominately processed food diets are frequently followed by depressed mood states. A recent longitudinal study assessed depression in women five years after the participants were given a dietary assessment. Those who engaged in a predominantly whole foods diet had lower rates of depression than those who ate a processed food diet

(Akbaraly, T.N., Brunner, E.J., Marmot, M.G., & Kivimaki, M., 2009). A cross-sectional analysis that focused on the Mediterranean diet and depression found comparable results (Sanchez-Villegas, A., Henriquez, P., Bes-Rastollo, M., & Doreste, J., 2006). Data analyzed from 9670 patients found that increased intake of Folate (especially within men) and B12 (within women) resulted in lower levels of depression. These nutrients are prominent in whole-foods found in the Mediterranean such as fruits, nuts, vegetables, cereals, legumes, and fish. A study that first assessed diet in young adults and then examined mood two days later found that those who ate more calories, saturated fat, and sodium were more likely to report negative mood (Hendy, 2011). It is important to note that these macronutrients are often high in processed foods.

Only a handful of experimental studies have examined the relation between diet and stress. A study that manipulated the diets and exercise routines of mice found a synergistic effect between the two factors (Hutton et al., 2015). That is, diet and exercise combined were more beneficial than each of the two by themselves. A complex dietary supplement and exposure to a running wheel showed neurological benefits related to coping with stress such as increased hippocampal BDNF (regulator of hippocampus activity) and increased neurogenesis. The study noted that diet and exercise combined could potentially benefit those with chronic stress-related disorders. A separate experiment manipulated the diets of Wistar rats found an effect on stress hormones (Kitraki et al., 2004). Rats given a diet of polyunsaturated fat and decreased protein and carbohydrates showed decreased levels of glucocorticoid receptors while normally fed rats had increased receptors. The study illustrates that a change in diet can cause an imbalance in stress regulators. Although there is evidence that diet can influence stress response in rats, these findings have yet to be translated to humans.

The aforementioned studies focused on exposure to daily stress. PTSD is a chronic disorder that results from exposure to events that involve serious injury, loss of life, or sexual violence (APA, 2013). The chronicity of PTSD has been shown in a number of studies and those diagnosed with the condition experience vastly a diminished quality life (Miller & Rasmussen, 2010). There are relatively few studies on the association between diet and this illness. A cross-sectional study found a positive relationship between food addiction and prevalence of PTSD symptoms within a cohort of women nurses (Mason et al, 2014). Women in this study with the most symptoms were more than twice as likely to be addicted to food than those with no PTSD symptoms or no trauma history. A separate study found that increased PTSD symptoms were associated with more fast food and soda consumption than those with less or no symptoms in young women (Hirth, J.M., Rahman, M., & Berenson, A.B., 2011). Women in this study with PTSD were also more likely to engage in unhealthy dieting behaviors such as restriction and the use of diet pills. These results suggest that PTSD may alter eating habits.

The primary goal of the present research project was to examine the relation between PTSD and dietary choice. Whereas prior studies have found specific relationships between PTSD and unhealthy dieting behavior, it is not evident whether focusing on consumption of calories and specific macronutrients plays a role in this specific disorder. Previous research has found a relationship between altered eating habits and other related mental health issues, so it is may be that these specific aspects of diet can influence the way one copes with a traumatic event. An altered eating habit is considering one that strays from nationally recommended guidelines (Otten, J.J., Hellwig, J.P., & Meyers, L.D., 2006). The current study investigated the relationship between Posttraumatic Stress Disorder and dietary intake. It was hypothesized that individuals

who have experienced a traumatic event would show fewer PTSD symptoms if they engaged in a well-balanced diet of adequate calories and macronutrients.

Method

Participants

This study recruited people (N=20) who have experienced a traumatic event. Exclusion criteria included the following—younger than 21 or older than 80, current psychosis or mania, engaged in any type weight-loss treatment in past month, have made major dietary changes in the past month, have used antidepressants in the past month, or who have abused substances in the past month. Participants were recruited with flyers posted in the locations that had higher density of trauma-exposed adults (e.g., Salvation Army, food banks, homeless shelters), Internet advertisements (e.g., Craigslist, Front Porch Forum, FAHC listserv), and word-of-mouth referrals.

Materials

The Structured Interview for the DSM – PTSD Module (SCID, First, M.B., Spitzer, R.L., Gibbon, M., & Williams, J.W., 2002) was verbally administered. The SCID is a comprehensive diagnostic interview used to determine if an individual meets criteria for a specific psychological diagnosis. For the purposes of the present study, only the PTSD module was employed to determine if the individual met criteria for current PTSD. This module entails 21 questions that are asked in a semi-structured interview format.

The United States Department of Agriculture Multiple-Pass Method (Blanton, C.A., Moshfegh, A.J., Baer, D.J., & Kretsch, M.J., 2006) was also verbally conducted via a guided

computer program. The Multiple-Pass Method is a five-step, 24-hour diet recall method used for dietary data assessment. The method involves asking participants to recall their total consumption, including specific foods eaten and portion sizes, from the past 24 hours. The participant is then asked to go through the process an additional four times to ensure all foods have been recorded.

A series of written measures were also administered to the participants. The Life Events Checklist-5 (LEC-5; Blake et al., 1995) is a 17 item self-report measure that assesses exposure to potentially traumatic events across the life span. The Patient Health Questionnaire-8 (PHQ-8, Kroenke & Spitzer, 2002) is a 10 item self-report measure that assesses presence of depression and degree of depression. The PTSD Checklist-5 (PCL-5; Weathers, F.W, Litz, B.T., Herman, D.S., Huska, J.A., & Keane, T.M., 1993) is a 20-item self-report measure that assesses PTSD symptoms according to the DSM-5 criteria in the last month. The International Physical Activity Questionnaire (IPAQ; Hagstromer, M., Oja, P., & Sjostrom, M., 2006) is a 7-item self-report questionnaire used to obtain universal health-related physical activity. The questionnaire refers to physical activity completed within the past seven days. The Household Food Insecurity Access Scale (HFIAS; Coates, J., Swindale, A., & Bilinsky, P., 2007) is a 9-item self-report questionnaire used to assess access to food within the household. The General Nutrition Knowledge Questionnaire (Parmenter & Wardle, 1999) is a 57-item questionnaire that assesses the participant's knowledge about the basic nutritional content of various food items.

Procedure

Participants were contacted and screened via telephone interview. Presence of traumatic event was determined using the Life Events Checklist-5 (Blake et al., 1995). Upon appointment, participants were assessed for PTSD symptoms using the Structured Interview for the DSM-

PTSD Module (Blanton et al., 2006). The participant was to complete the series of written measures including the PTSD Checklist-5 (Weathers et al. 1993), Patient Health Questionnaire-9 (Kroenke & Spitzer, 2002), International Physical Activity Questionnaire (Hagstromer et al., 2006), Household Food Insecurity Access Scale (Coates et al., 2007), and the General Nutritional Knowledge Questionnaire for Adults (Parmenter & Wardle, 1999). The participant was then asked to perform a 24-hour diet recall using the USDA multi-pass method (Blanton et al., 2006). Participant waist circumference, weight, and height were measured.

Results

The distribution of each variable was examined to determine if they conformed to the assumptions of normality. PTSD symptoms were normally distributed with a $M = 30.89$, $SD = 17.46$. These scores suggest the sample had moderate to severe PTSD symptoms. Dietary data conformed to the assumptions of the normal distribution for all variables (Calories, Protein, Fat, Carbohydrates, Sugar, Table 1).

The relation between PTSD symptom severity and macronutrients, calories, and health were determined with a series of bivariate correlations (Table 2). The results suggested that PTSD symptoms were negatively correlated with total calories eaten ($r = -.50$, $p = 0.03$), protein ($r = -.54$, $p = 0.01$), and carbohydrates ($r = -.44$, $p = 0.04$). The association between PTSD symptoms and fat approached significance, $r = -.41$, $p = 0.07$. PTSD symptoms were not correlated with sugar consumption, food insecurity, perceived overall health, and income level. These relations were maintained when using regression to control for food insecurity, income, and perceived health. These results provide additional support for the associations.

Discussion

The results of this study supported a negative correlation between PTSD symptoms and the consumption of calories and macronutrients. Specifically, more severe PTSD symptoms were associated with consumption of less calories, protein, and carbohydrates. PTSD symptoms were also negatively correlated with sugar and fat, although the relationships did not reach statistical significance. Perceptions of overall physical health, food insecurity and income level were not correlated with PTSD symptoms.

The negative correlation between calorie consumption and PTSD symptoms suggests that patients who struggled with PTSD had less dietary intake compared to healthy individuals. The finding was further supported by a negative correlation found between PTSD symptoms and specific macronutrients, such as protein and carbohydrates. Some participants additionally reported that they ate large amounts of food towards the end of the day, claiming that they had forgotten to eat during the daytime. Lack of food consumption could be related to the patients' preoccupation with PTSD symptoms and therefore result in neglecting dietary health. It is possible that participants with PTSD who are not consuming a healthy amount of food are not actively concerned with getting satisfactory nutrition or eating well-balanced meals throughout the day. The findings of the current study are consistent with previous research that proposed that an unhealthy diet and altered eating habits are related to PTSD and other mental health issues (Hirth et al., 2011; Hendy et al., 2011; Akbaraly et al., 2009).

These findings conflict with previous studies that suggested stress-related symptoms increased the consumption of food (Hendy et al., 2011; Epel et al., 2001). The dissimilarity in eating habit conclusions could be a result of sample differences. Hendy and colleague's research on the effects of food and mood used a sample of college students. College students may have

different eating patterns due to their method of obtaining food through meal plans and dining halls. Specifically, college students may have fewer options available to them or restricted options each day. The current study of adults was not restricted in the types or amounts of food they consume, which may have led to important differences. Similarly, college students typically consume more food in college. A recent study reported that college students typically increase their consumption of high calorie, fat and sodium foods, irrespective of mood and anxiety symptoms (Hoffman et al., 2006). The differences in food access between this sample and the sample in the current study may have resulted in the disparate results. In addition, Epel and colleague's study on stress-induced eating was restricted to adult women. Women have been previously found to have different eating habits than men, such as levels of carbohydrate consumption (Hendy et al., 2011). The current study included approximately half males and females, which could account for the differences in results. It is hypothesized that the discrepancies in eating habits could be due to differences between the general population and specific subgroups.

When reviewing the types of food that participants reported consuming, a majority could be classified as "fast food." The consumption of fast food items with low overall calorie consumption is potentially paradoxical because such food items are typically high in calories. Prior work has shown that adults with elevated PTSD also consumed high amounts of fast food and soda (Hirth et al., 2011). These findings would suggest that those with PTSD, despite eating lower overall calories in the current study, ate foods that would be classified as unhealthy or low in nutrient quality. Consumption of such foods may exacerbate overall poor health as well as elevate anxiety symptoms (Gonzalez & Miranda-Massari, 2014; Shin et al., 2010). The precise mechanism, by which this occurs, however, is unknown. Additional research is necessary to

understand why consumption of this type of food specifically is associated with poorer mental health in addition to poorer physical health.

The negative relationship between carbohydrate consumption and PTSD symptoms is consistent with previous research. High levels of carbohydrates have been shown to increase uptake of tryptophan in the brain (Fernstrom & Wurtman, 1971). The research indicates that increased concentrations of tryptophan will lead to an increase in serotonin—an important regulator for mood and behavior. The mechanism has led the assumption that some individuals learn to overindulge in carbohydrates due to the rewarding effects of serotonin (Wurtman & Wurtman, 1995). The results of the present study are consistent with this hypothesis in that those with more severe symptoms ate fewer carbohydrates. Future research should examine why some individuals under cognitive stress engage in this overeating behavior whereas others do not.

Although the negative relationship between fat consumption and PTSD symptoms was nonsignificant, the macronutrient's importance for mental health should still be further considered. Previous research has found that healthy fats, such as the omega-3 found in fish, can help reduce depression and other mood disorder symptoms (Tanskanen et al., 2001; Stoll et al., 1999). Consumption of healthy fats is imperative for brain development and depressed patients and rodents have been known to have depletions of fat levels in various brain areas (Levant et al., 2007). The relationship between positive mental health and fat consumption does not apply to unhealthy fats found in processed foods and may explain why the current study did not find a strong correlation.

Food insecurity was not related to increased PTSD symptoms, indicating that participants did not report that they had difficulty obtaining meals and did not worry about their households having enough to eat. The results suggest that participants were not restricted to consuming an

altered diet and had the ability to choose what foods they were consuming. The finding is consistent with the hypothesis that participants that are preoccupied with PTSD symptoms have a lack of concern for nutrition and the calories they are consuming.

There are several limitations to this study. The sample size was small due to the time allotted for data collection (12-months) and the challenges of recruiting those with a significant trauma history. PTSD includes several symptoms that interfere with willingness to participate in research, including social withdrawal and avoidance. Future research could extend this study to a larger sample of trauma-exposed individuals to determine if results are consistent. The 24-hour diet recall may not provide an accurate description of the subjects' diets. The majority of participants stated that the recall was consistent with their normal eating habits, but whether or not this information is valid cannot be determined. The 24-hour recall is a multiple-pass method to ensure that participants do not forget to add in all foods and drinks consumed, but again the information relies solely on memory. Future studies could improve the accuracy of these results by monitoring an extended period of participants' diets and by requiring participants to keep diet journals. Another possible suggestion for future research is to manipulate diet to determine a causal relationship.

The results of the study support the hypothesis that a well-balanced diet is related to a healthy mental state. Low calorie consumption, along with low protein and carbohydrate intake, were associated with increased PTSD symptoms. The results were inconsistent with some previous literature, possibly due to sample differences. Nevertheless, the results were consistent with previous findings that low levels of carbohydrates, proteins and healthy fats, along with "fast food" consumption, are associated with negative mood states. Future research should

examine causal mechanisms as to which individuals with PTSD consume fewer calories and macronutrients.

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Table 1. Means and standard deviations for primary study variables.

	N	Mean	Std. Deviation
PTSD Symptoms	20	30.8944	17.46309
Calories	20	2353.2579	1440.93808
Fat	20	92.8500	83.70286
Protein	20	82.7555	63.55906
Carbs	20	300.2564	150.51204
Sugar	20	138.7970	80.37469

Table 2. Correlation among primary study variables.

	1	2	3	4	5	6	7	8	9
1-PTSD	1.00								
2-Calories	-0.50*	1.00							
3-Protein	-0.54*	0.92**	1.00						
4-Fat	-0.41	0.93**	0.89**	1.00					
5-Carbs	-0.44*	0.85**	0.68**	0.60**	1.00				
6-Sugar	-0.30	0.79**	0.56*	0.64**	0.83**	1.00			
7-Food Insecurity	0.07	-0.34	-0.34	-0.38	-0.23	-0.26	1.00		
8-Perceived Health	-0.28	0.18	0.18	0.16	0.17	0.13	-0.25	1.00	
9-Income Level	-0.11	-0.05	-0.13	-0.08	0.02	0.09	-0.49*	-0.25	1.00

Note: * = $p < 0.05$. ** = $p < 0.01$.