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### The Association between Diet, Exercise, and Neurobehaviors

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# The Association Between Diet, Exercise and Neurobehaviors

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## Introduction

- Neurotransmitters are essential for regulating and maintaining physiological functions (1).
- The amino acids tryptophan and tyrosine are found in high protein foods such as meats and cheese and are precursors to the neurotransmitters serotonin and dopamine, respectively (2).
- Serotonin and dopamine modulate mood and motivation, respectively.
- Individuals with higher intrinsic motivation are more likely to stick to their exercise goals, which may in turn reinforce the individual's motivation (3).
- A diet high in fats has been shown to negatively impact physical and cognitive health (4).
- A diet that includes the daily recommended tyrosine intake of 14 mg/kg per day is more likely to have a positive effect on mood and other neurotransmitters in the body (5).
- Tyrosine influences behavioral phenotypes. Injected with tyrosine reduced pain sensitivity and boosted the production of neurotransmitters, suggesting a correlation between the two (6).
- Diets high in tyrosine negatively correlates with feelings of anxiety and boredom. Diets low in tryptophan positively correlates with symptoms of depression, anxiety, fatigue, and hostility (7).
- Tryptophan and tyrosine play a significant role in dopergenic cycle of reward and functioning (8).
- Therefore, dietary habits may significantly influence the brain concentrations of neurotransmitters and the mental health of individuals.
- This study proposes that diets rich in tyrosine will lead to increased motivation, regular exercise, and positive neuro-behaviors. We hope to better understand the relationship between diet, exercise, and motivation.

## Methods

- An anonymous online survey using a modified Treatment Self-Regulation and Food-Mood Questionnaire (FMQ) and motivation scales was distributed online through community outreach and social media between January and May 2021 (9, 10).
- The survey included questions on demographic, eating and exercise habits, mental health, and motivation. Answer choices were based on a 5-point Likert scale (10).
- The data collected were analyzed using a Spearman's Rho correlations in SPSS version 25.0 (11).

## Acknowledgements

We would like to thank all participants for completing the survey. We would also like to thank Alexander's Cafe and Binghamton University's Undergraduate Research Center for their generosity and support.

## Results

A total of 421 participants 18 and above completed the survey

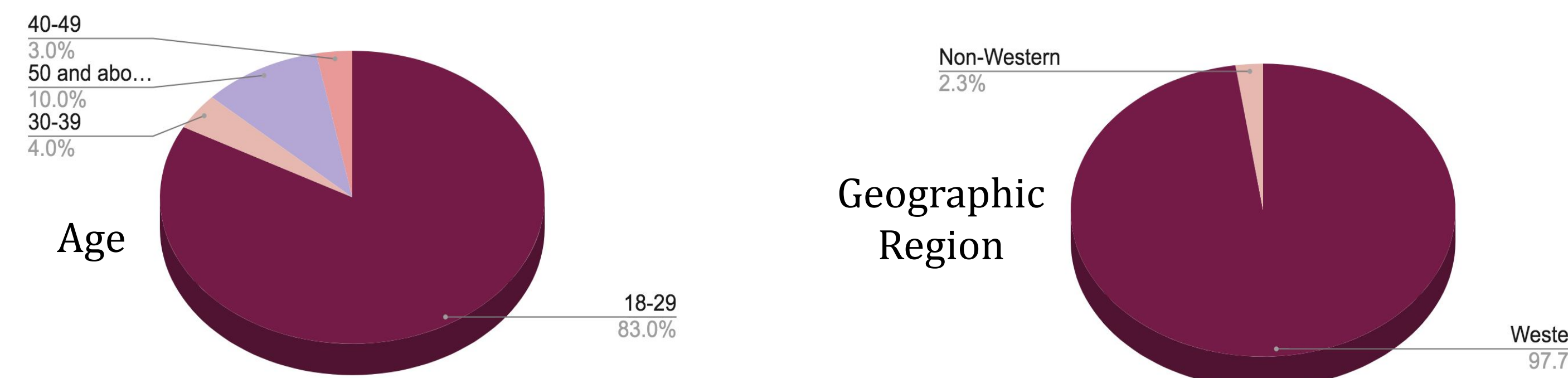


Table 1: Healthy Diet And Dietary Behaviors In Relation To Psychological Distress

| Healthy Behavior | Hopelessness | Nervousness | Restlessness | Depressive Symptoms | Perceived Effort |
|------------------|--------------|-------------|--------------|---------------------|------------------|
| Exercise         | -0.201**     | -0.222**    | -0.192**     | -0.214**            | -0.262**         |
| Breakfast        | -0.111*      | -0.085      | -0.100*      | -0.124*             | -0.154**         |
| Whole Grain      | -0.133**     | -0.104*     | -0.028       | -0.100*             | -0.079           |
| Dairy            | -0.080       | -0.042      | -0.008       | -0.068              | -0.043           |
| Fruits           | -0.045       | -0.028      | 0.020        | -0.085              | -0.088           |
| Nuts             | -0.078       | -0.029      | -0.060       | -0.031              | -0.081           |
| DGLV             | -0.054       | -0.023      | -0.030       | -0.008              | -0.069           |
| Beans            | 0.070        | 0.072       | -0.133**     | 0.041               | 0.005            |
| Fish             | -0.050       | -0.055      | 0.097        | -0.055              | -0.008           |
| Yogurt           | -0.055       | -0.046      | -0.122*      | -0.033              | -0.064           |
| Raw Oats         | 0.008        | 0.016       | 0.105*       | 0.090               | 0.027            |
| Eggs             | -0.104*      | -0.016      | -0.016       | -0.065              | -0.067           |

Table 2: Unhealthy Diet and Psychological Distress

| Unhealthy Behavior | Hopelessness | Nervousness | Restlessness | Depressive Symptoms | Perceived Effort |
|--------------------|--------------|-------------|--------------|---------------------|------------------|
| Caffeine           | 0.026        | 0.036       | 0.125*       | 0.032               | 0.073            |
| HGI Food           | -0.038       | 0.094       | 0.089        | 0.063               | 0.108*           |
| Fast Food          | 0.148**      | 0.105*      | 0.171**      | 0.137**             | 0.114*           |
| Sweets             | 0.189**      | 0.168**     | 0.161**      | 0.109*              | 0.199**          |

Table 3: Healthy Diet and Dietary Behaviors in Relation to Motivation

| Healthy Behavior | Goal Accomplishment | Perceived Willpower | Confidence to Change | Solution-Seeking Behavior |
|------------------|---------------------|---------------------|----------------------|---------------------------|
| Exercise         | 0.169**             | 0.249**             | 0.214**              | 0.167**                   |
| Breakfast        | 0.135**             | 0.103*              | 0.062                | 0.077                     |
| Whole Grain      | 0.111*              | 0.101*              | 0.094                | 0.033                     |
| Fruits           | 0.123*              | 0.163**             | 0.141**              | 0.079                     |
| DGLV             | 0.149**             | 0.138**             | 0.131**              | 0.109*                    |
| Poultry          | 0.084               | 0.084               | 0.135**              | 0.085                     |
| Yogurt           | 0.075               | 0.142**             | 0.12*                | 0.080                     |
| Eggs             | 0.116*              | 0.096               | 0.168**              | 0.089                     |

Table 4: Unhealthy Diet and Motivation

| Unhealthy Behavior | Goal Accomplishment | Perceived Willpower | Confidence to Change | Solution-Seeking Behavior |
|--------------------|---------------------|---------------------|----------------------|---------------------------|
| Caffeine           | 0.039               | -0.008              | -0.013               | -0.007                    |
| HGI Food           | 0.033               | -0.058              | 0.031                | -0.031                    |
| Fast Food          | -0.158**            | -0.103*             | -0.101*              | -0.075                    |
| Sweets             | -0.134**            | -0.099              | -0.204**             | -0.043                    |

## Discussion

- Consumption of breakfast shows a significant negative correlation with undesirable neuro-behaviors, including feelings of hopelessness and depressive symptoms.
- Overall dairy consumption did not show a significant negative correlation with mental distress.
- However, consumption of yogurt, a source of probiotics, showed a significant negative correlation with feelings of restlessness. The extra advantage of yogurt compared to other dairy may be the result of its benefits to our gut microbiome (12)
- Bean and egg consumption was shown to reduce feelings of anxiety and fear. This supports our hypothesis since both are a source of protein.
- Caffeine intake has been correlated to increased restlessness, anxiety, stress, and depression.
- Increased intake of fast foods, sweets, and foods with a high glycemic index were correlated to increased perceived effort. Fast foods and sweets have correlations to increased hopelessness, nervousness, restlessness, and depressive symptoms which supports our hypothesis.

## Conclusion

- This study suggests that there is a positive correlation between healthy behaviors and levels of emotional wellbeing and intrinsic motivation.
- Unhealthy behaviors such as eating HGI foods may be correlated with feelings of mental distress.
- The results of this study suggest that diets rich in tyrosine lead to higher levels of motivation and positive neurobehaviors.
- Further research is needed to determine if sex-based differences affect diet, behavior, mental distress, and motivation.

## References

1. U.S. Department of Health and Human Services. (n.d.). *Mental illness*. National Institute of Mental Health. Retrieved March 28, 2022, from <https://www.nimh.nih.gov/health/statistics/mental-illness>
2. Smith, B. Depression and motivation. *Phenom Cogn Sci* 12, 615–635 (2013). <https://doi.org/10.1007/s11097-012-9264-0>
3. D'Lima, Gabrielle & Winsler, Adam & Kitsantas, Anastasia. (2014). Ethnic and Gender Differences in First-Year College Students' Goal Orientation, Self-Efficacy, and Extrinsic and Intrinsic Motivation. *The Journal of Educational Research*. 107. 341-356. 10.1080/00220671.2013.823366.
4. Renner, B., & Schwarzer, R. (2005). The motivation to eat a healthy diet: How intenders and nonintenders differ in terms of risk perception, outcome expectancies, self-efficacy, and nutrition behavior. *Polish Psychological Bulletin*, 36(1), 7–15.
5. Parker G, Brochie H. Mood effects of the amino acids tryptophan and tyrosine: 'Food for Thought' III. *Acta Psychiatr Scand*. 2011 Dec;124(6):417-26. doi: 10.1111/j.1600-0447.2011.01706.x. Epub 2011 Apr 12. PMID: 21488845.
6. Fernstrom JD. Effects on the diet on brain neurotransmitters. *Metabolism*. 1977 Feb;26(2):207-23. doi: 10.1016/0026-0495(77)90057-9. PMID: 13261.
7. Leyton M, Young SN, Pihl RO, Etezadi S, Lauze C, Blier P, Baker GB, Benkelfat C. Effects on mood of acute phenylalanine/tyrosine depletion in healthy women. *Neuropsychopharmacology*. 2000 Jan;22(1):52-63. doi: 10.1016/S0893-133X(99)00086-X. PMID: 10633491.
8. Aquili L. The Role of Tryptophan and Tyrosine in Executive Function and Reward Processing. *Int J Tryptophan Res*. 2020;13:1178646920964825. Published 2020 Oct 22. doi:10.1177/1178646920964825
9. Begdache, L., Marhaba, R., & Chaar, M. (2019). Validity and reliability of Food-Mood Questionnaire (FMQ). *Nutrition and health*, 25(4), 253–264. <https://doi.org/10.1177/0260106019870073>
10. McSpadden, K., Patrick, H., Oh, A., Yaroch, A., Dwyer, L., & Nebeling, L. (2016, January 1). The association between motivation and fruit and vegetable intake: The moderating role of social support. Retrieved April 18, 2021, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4684708/>
11. IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp
12. Fisberg, Mauro, and Rachel Machado. Oxford Academic, 2015. [https://academic.oup.com/nutritionreviews/article/73/suppl\\_1/4/1819293?login=true](https://academic.oup.com/nutritionreviews/article/73/suppl_1/4/1819293?login=true). Accessed 28 Mar. 2022.