ORAL PRESENTATION Open Access

Nature Nourishment and Cognitive Fatigue Among College Students

Anyssa Markowich, Michael Cusack, Adam Mydland

Presented to Research Methods, Dr. H. Island, Pacific University, Forest Grove, OR. April 29, 2021

BACKGROUND

Along with the stress generated from COVID-19, there is also stress related to health care, the economy, racism and the presidential election contributing to a building mental health crisis in America (American Psychological Association, 2020). This prolonged anxiety and stress can lead to cognitive fatigue and deficiencies within the executive functioning networks relating to attention (Pacheco-Unguetti et al., 2010). Additionally, there is an overall perceived lack of motivation for online learning due to an unsuitable learning environment (Daugherty, 2020). With the necessity of online meetings, classes, and working-from-home; people of all ages are spending most of their time indoors and online which contributes to the effects of prolonged anxiety and a lack of restoration of cognitive fatigue (Smith et al., 2020). Today, about 55% of the world's population lives in urban settings (Ritchie & Roser, 2018); comparatively, humans spent more than 99.9 percent of their history living and navigating in the untouched natural environment (Ikei & Miyazaki, 2016). Perhaps the issue of reduced attentional and motivational capacities, created by excessive time spent in urbanized environments, can be modestly resolved by simply increasing quality time spent in nature. Exposure from natural stimuli induces a state of hyperawareness and hyperactivity of the parasympathetic nervous system (i.e., involuntary attention). This stimulation of the parasympathetic nervous system puts people in a state of relaxation and helps reduce stress levels. (Song et al., 2016). Although a universal remedy for improving mental attention and reducing stress levels does not exist; active leisure and time spent in natural environments could be viable options. This project will explore the idea that quality time spent in nature and intentionally not engaging in electronic use could improve people's mental health and enhance their overall performance and wellbeing.

Empirical Question

Can nature nourishment reduce cognitive fatigue (i.e., reduced motivation and attention) created by the overuse of technology among college students?

PROPOSED METHOD

Participants

Participants will be recruited from the undergraduate population at Pacific University (*N*=1,800; 36% male and 64% female). We will convenience sample for a total of 120 participants of at least 18 years of age . We anticipate the mean age at approximately 20 years, consistent with the demographic data.

To conduct this study, an experimental research design will be employed with the objective to center the focus on college student participants who are potentially struggling with cognitive fatigue in a COVID-19 world. Since COVID-19 is an ongoing issue throughout the world and in the US's educational systems, now more than ever is an important time to investigate the potential positive effects that natural stimulations (i.e., as tested through outdoor and indoor settings) have on college students' cognitive fatigue. The materials for this study included a standard demographic measure as well as the ANT and PAM.

The Attention Network Test (ANT) is a computerized flanker task, measuring reaction times to assess attentional networks by combining attentional and spatial cues.

Perceived Academic Motivation (PAM) Pre and Post Test Questionnaire is a 10 item, 1-7 Likert scale that measures intrinsic motivation for academics. We developed this questionnaire from the Intrinsic Motivation Inventory (IMI).

Randomized convenience sampling of participants will be completed to maintain validity; each participant will be assigned a pre and post Attention Network test and Perceived Academic Motivation questionnaire. The participants will be required to write a short reflection after the completion of the activity to help ensure participation. The assessments and written reflection will be completed at the location of the assigned activity. Every Participant will be given an informed consent. At the end of each experimental session any further questions will be answered for participants. Appropriate statistical analyses will be completed using SPSS®.

PROPOSED RESULTS

Multivariate Analysis of Variance (i.e., MANOVA) will be used to compare the mean results from the pre and post-test of attention and the pre and post-test of motivation to assess main effects for the independent variables, relative to motivation, and attention, as well as interactions between variables. A Bonferroni post-hoc test will be used to determine significant differences within conditions of the independent variables, relative to attention and motivation. Finally, for all significant main effects and interactions, an effect size estimate will be calculated to assess the magnitude of the manipulation on the measured outcomes for attention and motivation.

CONCLUSIONS

The value of nature nourishment is moderating cognitive fatigue among college students could provide a simple and inexpensive solution to improving mental performance and increasing student resilience. It would take minimal effort to better elevate student performance for more successful and productive futures. Although this study was developed under the specter of the COVID-19 pandemic, remote learning, acute anxiety, poor motivation, scarce academic and social engagement, the outcomes of this study could offer a sustainable practice that further nurtures an appreciation for the outdoors and the natural world.

*Pacific University, Department of Psychology,
Forest Grove, OR 97116, Email: migr0971@pacificu.edu

References

American Psychiatric Association (Mar. 20, 2020). New Poll: COVID-19 Impacting Mental Well-Being: Americans Feeling Anxious, Especially for Loved Ones; Older Adults Are Less Anxious. *American Psychiatric Association*. www.psychiatry.org/newsroom/news-releases/new-poll-covid-19-impacting-mental-well-being-americans-feeling-anxious-especially-for-loved-ones-older-adults-are-less-anxious.

American Psychological Association. (2020, October 20). Stress in America 2020 survey signals a growing national mental health crisis [Press release]. http://www.apa.org/news/press/releases/2020/10/stress-mental-health-crisis

Attention network test. n.d. *Science of Behavior Change.* https://scienceofbehaviorchange.org/measures/attentional-network-task/

Bailey, W. A., Allen, G., Herndon, J., & Demastus, C. (2018). Cognitive benefits of walking in natural versus built environments. *World Leisure Journal*, 60(4), 293-305. https://doi.org/10.1080/16078055.2018.1445025

Cleary, Anne, Fielding, Kelly S, Bell, Sarah L, Murray, Zoe, & Roiko, Anne. (2017). Exploring potential mechanisms involved in the relationship between eudaimonic wellbeing and nature connection. *Landscape and Urban Planning*, 158, 119–128. https://doi.org/10.1016/j.landurbplan.2016.10.003

Daugherty, O. (2020, July 16). Students face obstacles, lack of motivation in transition to remote learning amid pandemic, report finds. *National Association of Student Financial Aid Administrators.* https://www.nasfaa.org/news-item/22637/Students_Face_Obstacles_Lack_of_Motivation_in_Transition_to_Remote_Learning_Amid_Pandemic_Report_Finds.

Felsten, G. (2009). Where to take a study break on the college campus: An attention restoration theory perspective. *Journal of Environmental Psychology*, 29(1), 160–167. https://doi.org/10.1016/j.jenvp.2008.11.006

Fuegen, K., & Breitenbecher, K. H. (2018). Walking and being outdoors in nature increase positive affect and energy. *Ecopsychology*, 10(1), https://doi.org/10.1089/eco.2017.0036

Grant, William B, & Holick, Micael F. (2005). Benefits and requirements of vitamin D for optimal health: a review. *Alternative Medicine Review*, 10(2). 94-111 .

Goldstein, E. B. (2018). *Cognitive Psychology: Connecting Mind, Research, and Everyday Experience (5th ed.).* Boston, MA: Centage

Intrinsic motivation inventory. N.d. *Center for Self-Determination Theory.* https://selfdeterminationtheory.org/intrinsic-motivation-inventory/

Kaplan, S. (1995). The restorative benefits of nature: toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169-182.

Mackenzie, H. S., Son, S. J., & Eitel, K. (2018). Using outdoor adventure to enhance intrinsic motivation and engagement in science and physical activity: An exploratory study. *Journal of Outdoor Recreation and Tourism*, 21, 76-86. https://doi.org/10.1016/j.jort.2018.01.008

Maranges, Heather M, Schmeichel, Brandon J, & Baumeister, Roy F. (2017). Comparing cognitive load and self-regulatory depletion: effects on emotions and cognitions. *Learning and Instruction*, 51, 74–84.

Pacheco-Unguetti, A., Acosta, A., Callejas, A., & Lupiáñez, J. (2010). Attention and Anxiety: Different Attentional Functioning Under State and Trait Anxiety. *Psychological Science*, 21(2), 298-304.

Pearson, G. D., & Craig, T. (2014). The great outdoors? Exploring the mental health benefits of natural environments. *Frontiers in Psychology*, 5, 1178–1178.

Ritchie, H., & Roser, M. (2018, June 13). Urbanization. *Our World in Data*.

Rogerson, M., Gladwell, V. F., Gallagher, D. J., & Barton, J. L. (2016). Influences of Green Outdoors versus Indoors Environmental Settings on Psychological and Social Outcomes of Controlled Exercise. *International journal of environmental research and public health*, 13(4), 363 363.

Smith, L., et al. (2020). The association between screen time and mental health during COVID-19: a cross sectional study. *Psychiatry research*, 292, 113333.

Song, C., Ikei, H., & Miyazaki, Y. (2016). Physiological effects of nature therapy: a review of the research in Japan. *International Journal of Environmental Research and Public Health*. 13(8), 781.

Trout, B. S. (2020). The corona virus-induced transition to online learning perceptions and intentions of first-time online students. *Quarterly Review of Distance Education*, 21(1), 1–12.

Ulrich, R.S., Simons, R.F., Losito, B.D., Fiorito, E., Miles, M.A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11(3), 201-230.

Ulset, V., Vitaro, F., Brendgen, M., Bekkhus, M., & Borge, A. I. (2017). Time spent outdoors during preschool: Links with children's cognitive and behavioral development. *Journal of Environmental Psychology*, 52, 69-80.

van der Schaft, J, Koek, H.L, Dijkstra, E, Verhaar, H.J.J, van der Schouw, Y.T, & Emmelot-Vonk, M.H. (2013). The association between vitamin D and cognition: A systematic review. *Aging Research Reviews, 12(4),* 1013–1023.

*Pacific University, Department of Psychology,
Forest Grove, OR 97116, Email: migr0971@pacificu.edu