



Stand Open

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Since 2015 the depression rate in teens has risen by 58% (Hussung, 2017). Teens spend an average of 9 hours on their phones, tablets, and computers per day. The posture adopted by many smartphone and tablet users involves a closing of the posture to hold the device and look at the small handheld screen. Research has shown that this type of closed posture can have negative effects. Amy Cuddy, social psychologist, Harvard Business School researcher and professor presented her TED Talk entitled “Your body language may shape who you are” at TED Global in 2012 which has been viewed more than 52 million times. Cuddy found in her research that expansive postures made people feel more powerful in mock-interview experiments and led to an increase in testosterone (associated with confidence) and a decrease in cortisol (associated with stress) as measured in a saliva test. The idea that body posture affects brain chemistry was an exciting insight that had many personal and career applications (Forbes, 2018). A study published in the journal *Developmental Psychology* determined that 3-year-old children already associate expansive body postures with physical strength (Medrano et al., 2018). These studies inspired the thinking, “What if there was a way to counteract some of the negative mental health effects of extended device use that would help lower anxiety and depression rates that are rising drastically in teens?”

INTRODUCTION

This experiment explored the connection between the posture that teens demonstrate while using their handheld devices to the rising rates of depression in this demographic and made a connection between Amy Cuddy’s study and peoples’, specifically teens’, posture while they are on their devices and mental health issues. Given the reliance on technology in individuals personal and professional lives, it is unlikely the use of devices will decrease in the future. However, the purpose of this experiment was to determine if expansive posture poses could counteract the negative mental health effects caused by closed body posture during screen use to lower depression and anxiety levels.

It was hypothesized that expansive body postures would counteract the negative effects of closed body postures caused by using technology such as laptops, tablets, and smartphones. This hypothesis was based on the research of Carney et al, 2010, that found that holding expansive “power” postures for two minutes reduces cortisol, a stress neurotransmitter, and increases testosterone, a dominant hormone, in saliva (Carney, 2010).

PROCEDURE

154 male and females aged 9 to 72 from Ontario, Canada were recruited through word of mouth via school, social media, family, sports, and community connections. Subjects were asked to participate via email, Instagram, Facebook, and face to face requests. All willing participants were included in the study. Participants were randomly sorted using an online random sorting tool, Mathtastic,

from New Zealand. After 15-minutes of closed posture inducing screen time, participants were sorted into two groups; one group that followed along with a two-minute video and one that did not do the expansive posture posing video. Both groups responded to a ten-question self-report survey.

An informed consent form and letter of information were created using the template from the Youth Science Canada website. Ten questions were developed with a Master’s of Counselling Psychology student to measure overall confidence and happiness. The questions were answered with “Strongly agree”, “Agree,” “Disagree,” “Strongly disagree.” Each with corresponding numeric values from 1 to 4 for analysis. Two Google Forms were created. The first form included the informed consent, the instructions to complete the survey after at least fifteen minutes of screen time on a smartphone, tablet, or any handheld devices and the ten self-report questions with radio-button response scales. The second form included the informed consent, the instruction to follow along with the open posture poses in the two-minute video than to the same survey after at least fifteen minutes of screen time on a smartphone, tablet, or smartphone and the ten self-report questions with radio-button response scales. The links to the two Google Forms were entered into the Mathtastic random sorter tool to randomly place participants in the two groups. The link was then sent via email, Instagram, and Facebook. Participants were also asked face-to-face. All participants completed the survey online between January 1 and April 19, 2019. Google form data was collected on a spreadsheet and answers were given numerical values. Individual subjects’ confidence scores were determined by calculating the sum of the numerical values for their survey questions, with the lowest score being 10 and the highest being 40.



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RESULTS

Across all participant categories of the results open posture posing for two minutes after screen time had a positive impact on self-reported confidence scores. Confidence scores after power posing were 17.28% higher than the group that didn't do the expansive posture posing for two minutes. As stated in the hypothesis, there was an increase in self-reported confidence scores after following along with the two-minute expansive posture posing video. The results of the experiment supported the hypothesis. A surprising result came from comparing the analysis across gender and age groups. Open posture poses gave a greater confidence boost in males 19 years old and younger, 33.94%, than it did for females 20 years and older, 8.23%. At first glance, it looks like it was, in fact, males over 20 that were most impacted with a 53.39% increase in the confidence score after expansive posture posing however, there was only one participant in this age category (n=1); thus, robust conclusions cannot be drawn from this participant subcategory. The survey results of participants that did not confirm that they followed along with the expansive posture posing video attached to the survey were not included for analysis.

DISCUSSION

In her research, Amy Cuddy found that open posture posing increases testosterone levels a hormone commonly associated with confidence. Two minutes of expansive posture posing may be an important part of the puzzle that helps counteract rising levels of depression and anxiety with the rising use of devices.

Handheld devices are a part of the personal, academic, and business lives of people around the world. The idea that body posture affects brain chemistry is established and in the past

few years more and more teens have reported having depression and anxiety. Research proves that body postures send chemical messages to the brain which release neurotransmitters based on how the body is positioned (Carney, 2010). Screen use causes closed posture in users that negatively influences brain chemicals to release bad neurotransmitters including cortisol. Cortisol is known as the stress hormone. It is supposed to reach its lowest levels at night, but screen time right before or in bed can cause a change in this drop in cortisol which then affects this sleep cycle and can have a negative effect on mental and bodily health (Mayo Clinic, 2016). Based on the results of this experiment

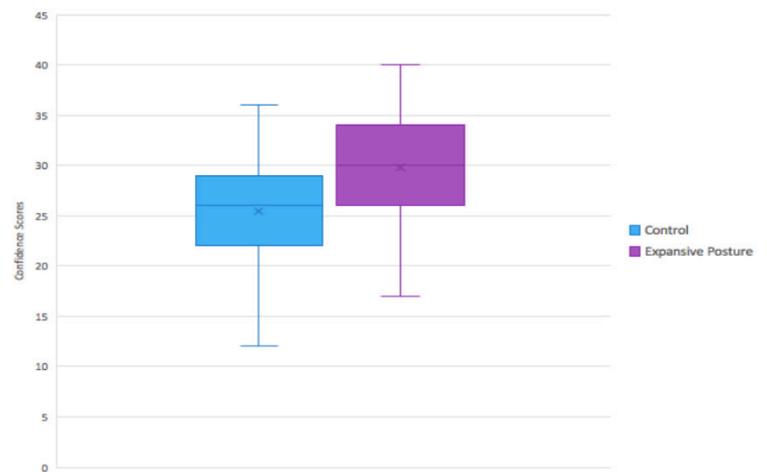


Figure 1. Confidence Score Comparison. Control group vs. group that practiced expansive postures for 2 min. after screen time.

Table 1. Mean Confidence Scores.

No Video	Video	Participant Sub Category	Percent Increase
25.44 (n=91)	29.84 (n=63)	All participants	17.28%
25.46 (n=71)	29.39 (n=49)	All females	15.41%
25.72 (n=19)	31.92 (n=13)	All males	24.11%
23.84 (n=52)	28.97 (n=37)	All teens	21.50%
27.62 (n=39)	31.08 (n=26)	All adults	12.53%
19.00 (n=1)	25.00 (n=1)	All identifying with other gender	31.58%
28.38 (n=26)	30.72 (n=25)	Females 20 and older	8.23%
23.78 (n=45)	28.00 (n=24)	Females 19 and younger	17.76%
26.08 (n=13)	40.00 (n=1)	Males 20 and older	53.39%
23.83 (n=6)	31.92 (n=12)	Males 19 and younger	33.94%

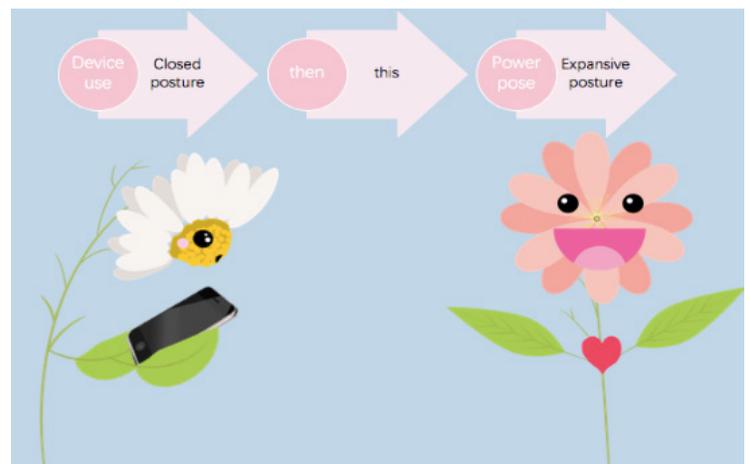


Figure 2. Cartoon depicting the potential benefit of power posing after using a device.



of 154 subjects, power posing between screen use and bedtime may be beneficial.

Creating awareness and teaching about how body postures affect brain chemicals is one piece of the puzzle that will help us learn how to use the technology that we need in our daily life and improve positive brain chemicals (decreasing cortisol and increasing testosterone) and feelings of wellbeing. Expansive posture posing may be a secret weapon that could help us to thrive as we continue to integrate technology in our daily lives.

CONCLUSION

It was found that open posture posing for two minutes after screen time had a positive impact on self-reported confidence scores. Open posture posing after screen use can increase confidence levels and help to alleviate depression and anxiety levels that have been connected with increased screen time in young people and adults. Education about the impact of body postures on brain chemistry has the potential to be a powerful tool that helps us build a future where we successfully integrate technology and boost feelings of wellbeing. Incorporating expansive body postures regularly after using a device for pleasure, work or school may help curb the trend of increasing anxiety and depression.

REFERENCES

- Anderson, Monica, and Jingjing Jiang. Teens, Social Media & Technology 2018. 30 Nov. 2018, www.pewinternet.org/2018/05/31/teens-social-media-technology-2018/. Accessed 5 May 2019.
- Carney, D R, et al. Power Posing: Brief Nonverbal Displays Affect Neuroendocrine Levels and Risk Tolerance. 21 Oct. 2010, www.ncbi.nlm.nih.gov/pubmed/20855902.
- Carney, Dana R., et al. "Power Posing: Brief Nonverbal Displays Affect Neuroendocrine Levels and Risk Tolerance - Dana R. Carney, Amy J.C. Cuddy, Andy J. Yap, 2010." *SAGE Journals, Association for Psychological Science*, Sept. 2010, journals.sagepub.com/doi/abs/10.1177/0956797610383437.
- Cooper, Belle Beth. "Do Everything Better." *Lifehacker*, Lifehacker.com, 20 Oct. 2016, <https://lifehacker.com/the-science-behind-posture-and-how-it-affects-your-brain-1463291618>.
- "Cortisol | Hormone Health Network." *Hormone.org*, www.hormone.org/hormones-and-health/hormones/cortisol.
- Cuddy, Amy Joy Casselberry. *Presence: Bringing Your Boldest Self to Your Biggest Challenges*. Back Bay Books, 2018.
- "Elite Daily." *Elite Daily*, Elite Daily, www.elitedaily.com/.
- Giang, Vivian. The Surprising And Powerful Links Between Posture and Mood. 30 Jan. 2015, www.fastcompany.com/3041688/the-surprising-and-powerful-links-between-posture-and-mood?cid=search.
- "Homepage." *Health.com*, www.health.com/.
- Hussung, Tricia. "Cell Phone Addiction: Stats and Signs | King University Online." *King University*, 27 July 2017, online.king.edu/news/cell-phone-addiction/.
- Hussung, Tricia. "Cell Phone Addiction: Stats and Signs | King University Online." *King University*, 27 July 2017, online.king.edu/news/cell-phone-addiction/.
- James Clear. *Body Language Hacks: Be Confident and Reduce Stress in 2 Minutes*. 26 July 2018, jamesclear.com/body-language-how-to-be-confident.
- "Landmark Report: U.S. Teens Use an Average of Nine Hours of Media Per Day, Tweens Use Six Hours | Common Sense Media." *Common Sense Media: Ratings, Reviews, and Advice*, 3 Oct. 2018, www.common Sense Media.org/about-us/news/press-releases/landmark-report-us-teens-use-an-average-of-nine-hours-of-media-per-day.
- Linton, Myles-Jay, et al. "Review of 99 Self-Report Measures for Assessing Well-Being in Adults: Exploring Dimensions of Well-Being and Developments over Time." *BMJ Open, British Medical Journal Publishing Group*, 1 July 2016, bmjopen.bmj.com/content/6/7/e010641.
- Marr, Beverly. *Posture, Hormones - The Connection*. 8 Apr. 2017, www.pureposture.net/blogs/hello/posture-hormones-the-connection.
- Mayo clinic staff. *Chronic Stress Puts Your Health at Risk*. 21 Apr. 2016, www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/stress/art-20046037.
- McMillen, Matt. "How Low Testosterone Affects Health: Mood, Concentration, Weight, and More." *WebMD*, www.webmd.com/men/features/how-low-testosterone-affects-your-health#1.
- Medrano, Carlos, et al. "Expand Your Body When You Look at Yourself: The Role of the Posture in a Mirror Exposure Task." *RESEARCHER*, 23 Mar. 2018, www.researcher-app.com/search.
- "Men and Women Explore the Visual World Differently." *ScienceDaily, ScienceDaily*, 30 Nov. 2012, www.sciencedaily.com/releases/2012/11/121130222243.htm.
- Mudbug. "Heads Up! 'Text Neck' Could Ruin Your Posture." *Michael A. Gleiber, MD*, 26 Mar. 2015, www.michaelgleibermd.com/news/heads-text-neck-ruin-in-posture/.
- National Research Council (US) Panel to Review the Status of Basic Research on School-Age Children. "Self-Understanding And Self-Regulation In Middle Childhood." *Development During Middle Childhood: The Years From Six to Twelve., U.S. National Library of Medicine*, 1 Jan. 1984, www.ncbi.nlm.nih.gov/books/NBK216782/.
- "Number of Mobile Phone Users Worldwide 2015-2020." *Statista, Statista*, www.statista.com/statistics/274774/forecast-of-mobile-phone-users-worldwide/.
- Random Redirect Tool. 17 June 2016, mathstastic.co.nz/auto. Accessed 15 Jan. 2019.
- s3.amazonaws.com/jamesclear/Posts/wonder-woman-power-pose-body-language.jpg.
- Scott E. "Cortisol." *Wikipedia, Wikimedia Foundation*, 11 Apr. 2019, en.wikipedia.org/wiki/Cortisol.
- Sherman, et al. "The Interaction of Testosterone and Cortisol Is Associated With Attained Status in Male Executives." *Journal of Personality and Social Psychology, American Psychological Association (APA)*, 8 Sept. 2015, dash.harvard.edu/handle/1/22509302.
- "Should Adults Have Screen Time Limits, Too?" *Rewire, Rewire*, 11 Apr. 2018, www.rewire.org/living/adults-screen-time-limits/.
- Swins. "Americans Spend Half Their Lives in Front of Screens." *New York Post, New York Post*, 14 Aug. 2018, nypost.com/2018/08/13/americans-spend-half-their-lives-in-front-of-screens/.
- Terrizzi, Brandon, et al. *Children's Developing Judgments about the Physical Manifestations of Power*. 28 Dec. 2018, www.researcher-app.com/search. Accessed 28 Apr. 2019.
- "Testosterone & Estrogen in Women: High vs. Low vs. Normal Levels." *WebMD, WebMD*, www.webmd.com/women/guide/normal-testosterone-and-estrogen-levels-in-women.
- "Testosterone (Male Sex Hormone) Information." *MyVMC*, 4 Apr. 2018, www.myvmc.com/anatomy/testosterone/.
- Testosterone. 28 Feb. 2018, www.yourhormones.info/hormones/testosterone/. Accessed 22 Apr. 2019.
- Twenge, Jean M., et al. "Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time - Jean M. Twenge, Thomas E. Joiner, Megan L. Rogers, Gabrielle N. Martin, 2018." *SAGE Journals, Association for Psychological Science*, 14 Nov. 2017, journals.sagepub.com/doi/10.1177/2167702617723376.
- Zenger, Jack. "The Confidence Gap In Men And Women: Why It Matters And How To Overcome It." *Forbes, Forbes Magazine*, 9 Apr. 2018, www.forbes.com.



forbes.com/sites/jackzenger/2018/04/08/the-confidence-gap-in-men-and-women-why-it-matters-and-how-to-overcome-it/#4f918a033bfa.

“45% Of Teens Say They’re Online Almost Constantly.” Pew Research Center: Internet, Science & Tech, 29 May 2018, www.pewinternet.org/2018/05/31/teens-social-media-technology-2018/pi_2018-05-31_teenstech_0-05/.

“8 Surprising Cell Phone Statistics.” Mobile Coach, 30 Nov. 2018, mobilecoach.com/8-surprising-cell-phone-statistics/.

AVA FISCHER

Hi! Ava Fischer here. I’m a Grade 7 student in Collingwood, Ontario. I love reading, shooting hoops, oh, and did I mention reading? I have a growing passion for human health. This project focuses on using expansive posture poses to raise testosterone (confidence hormone) to counteract the negative mental health effects caused by closed posture poses that causes cortisol (stress hormone) levels to rise. I dug into this project in my quest to find a way to use phones and maintain a healthy lifestyle. At my school Science Fair is life. This year attending CWSF was a dream come true.

