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Imaginary friends: The effect of imagined social support on subjective and physiological indicators of stress

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IMAGINARY FRIENDS:

THE EFFECT OF IMAGINED SOCIAL SUPPORT ON SUBJECTIVE AND PHYSIOLOGICAL INDICATORS OF STRESS

by

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Abstract

Social support is known to help buffer the effects of stress (Uchino et al., 1996). However, in many situations social support is unavailable, and imagining social support may help to reduce the impact of stress. Although imagined physical touch has been shown to be an effective stress buffer, little research has compared it to other types of imagined support (Feldman et al., 2010). To gain greater insight into these processes, the purpose of this project was to identify whether imagining supportive touch or emotional social support is best at moderating stress, shown through measures of perceived stress, heart rate, and blood pressure. Results showed that changes in stress, heart rate or blood pressure did not significantly vary by support condition. This suggests that a high stress situation may overpower and negate the effects of any type of imagined social support. Ways to bolster the meaningfulness and impact of imagined support are discussed.

Imaginary Friends:

The Effect of Imagined Social Support on Subjective and Physiological Indicators of Stress

Stress can affect all individuals regardless of age, race, gender, or geographic location. The stress associated with home, work, political divisiveness, and the future of the United States continues to rise. This increase in stress was shown in a survey done by the American Psychological Association (2018), where over 90% of those in Generation Z (aged 15-21) reported stress symptoms and signs of depression and a lack of energy and motivation. When faced with potential stressors, social support can help individuals to be less reactive and better able to deal with challenges (Uchino et al., 1996). Social baseline theory posits that people rely on being in interdependent relationships, and when violations to this expectation occurs, the brain is more attentive to risk and protecting the body. This increase of cognitive and physiological effort can result in acute and chronic stress, which can lead to negative health outcomes (Coan & Sbarra, 2016). However, when others are close by, individuals become less focused on the stressors, demonstrating that the social environment impacts the level of stress one experiences (Coan, 2008). For example, individuals who were instructed to climb a hill with a friend estimated the hill to be not as steep compared to individuals who were tasked to climb alone (Schnall et al., 2008). To gain greater insight into these processes, the purpose of this project was to identify whether imagining supportive touch or emotional social support is best at moderating stress, shown through a measure of perceived stress, heart rate, and blood pressure.

Physiology and Stress

The psychological experience of stress affects many physiological processes such as heart rate and blood pressure (American Heart Association; Taleman et al., 2009). When the body is stressed it experiences a “fight or flight” response by releasing adrenaline, which

temporarily causes heart rate and blood pressure to rise. The stressor triggers the autonomic nervous system and activates the sympathetic nervous system, which results in epinephrine and norepinephrine being secreted into the bloodstream. This secretion also raises blood pressure and heart rate. Chronic stress can lead to repeated activation, overload and exhaustion of the hormonal, cardiovascular and neural systems due to not having enough time to repair. Additionally, during a stressful situation, the hypothalamus–pituitary–adrenal (HPA) axis is activated, increasing cortisol secretion (Dickerson et al, 2004). This secretion raises glucose in the blood and "turns-off" nonessential bodily functions to prepare for fight-or-flight (Mayo Clinic, 2019).

Social Support and Stress

Stress is most effectively buffered when the individual is in the presence of an attentive and emotionally responsive attachment figure (Kane et al., 2012). This stems from attachment theory, stating that a strong emotional and physical attachment to at least one primary caregiver is critical to personal development (Bowlby, 1975). This attachment figure can change over time, from parent to romantic partner. Regardless of age, a solid attachment figure promotes exploration by being available for additional support. Furthermore, a responsive figure can provide a sense of security, thereby lowering stress (Bowlby, 1988).

Both physical touch and emotional support have been shown to buffer the effects of stress. Physical touch support (hug, pat, squeeze, etc.) signals safety and trust, which can relax an individual during a stressful event. For instance, individuals who were alone, anticipating a painful shock, had heightened brain activity in the amygdala, which is commonly associated with stress and threat (Coan et al., 2006). Individuals who had a partner with them to hold their hand, showed little to no reaction at all. Similarly, when subjected to stress, emotional support reduces

the rise in blood pressure and secretion of stress-related hormones (American Institute of Stress, 2012). Not only that, but after a stressful event, a support provider who intervenes can help reframe the situation and promote adaptive coping (Cohen & Wills, 1985).

Imagined Social Support

In times when support is not available, stress can be emphasized, and it can be beneficial to internalize representations of attachment figures (Jakubkak & Feeney, 2016). These can be times when an individual is at work or has loved ones in the military, which calls for an even greater time apart from support providers. The formation of internal representations of these attachment figures stems from repeated experiences with them and can serve as a buffer to stress even when the individuals are away (Smith et al., 2004). Furthermore, thinking about an attachment figure buffers stress better than thinking of an acquaintance and seeing a picture of the attachment figure can facilitate the same effects as if the actual person was present (Master et al., 2009).

Other studies have shown the influence of symbolic proximity (activating mental representations of attachment figures) in buffering stress (Mikulincer et al., 2002). For example, individuals who, during an imagery task, thought about a supportive friend, saw a hill as less steep than individuals who imagined a neutral person (Schnall et al., 2008). More specifically, in a study where participants were given a high-stress task to lecture in front of an actual college class, writing about a positive significant other before giving the lecture led to lower levels of perceived stress (McGowan, 2002). Mental representations of attachment figures can also facilitate recovery following an internally generated stressor (Selcuk et al., 2012). Having individuals think about an attachment figure after they had to think about a stressful autobiographical memory reduced negative thinking in a stream of consciousness task. However,

when the order was switched, there was no effect of thinking about an attachment figure before the individual thought about a stressful memory.

As discussed above, physical touch facilitates exploration. Similarly, imagining touch support has the same effect and has been shown as more helpful to lowering stress compared to imagining verbal support (Ditzen et al., 2007). Supporting that claim, Jakubiak and Feeney (2016) found that imagining touch support, in the form of writing about a loved one, had more of a stress-buffering effect on the tasks of the Trier Social Stress Test, compared to imagining verbal support.

The Current Research

The moderating effects of imagined touch and imagined emotional support are relatively understudied compared to actual social support. Although we know that physical touch is an effective method to buffer stress, little research has compared it to other types of support. Furthermore, there are many stressful situations where social support is not available, and imagining touch or emotional support may be beneficial. The purpose of the current study was to increase the body of knowledge about the comparison of the stress-buffering effects of touch and emotional support. Additionally, there has been limited research that has used both subjective and physiological measures to investigate that comparison. Based on prior literature, imagined touch support was expected to buffer stress better than imagined emotional support. Emotional support was also expected to buffer stress compared to the control condition.

Method

Participants

Participants in this study included 120 students at the University of North Florida (16 identified as men and 104 as women). In regards to race, 56% of participants identified as white,

14% as African American, 11% as Hispanic, 8% as mixed, 6% as Asian, and 5% other. Students' ages ranged from 18-35, with a mean of 20. The students received extra credit within their psychology classes after completing the study. All study procedures were approved by the University of North Florida Institutional Review Board.

Measures and Materials

Blood Pressure

Participants' blood pressure was measured four times during the study (baseline, after writing, after speech, and after math) using a Omron-10 Series Advanced Accuracy Upper Arm Blood Pressure Monitor. Guidelines from the American Heart Association were used to determine if the participants' blood pressure was at a safe level throughout the experiment. The safe ranges (systolic/diastolic) were: at baseline less than 140/90, and during study less than 180/120.

Heart Rate

Heart rate was continuously measured using a Fitbit Charge 3. The minute-by-minute data was collected and exported by a third-party website, Pulse Watch. When scoring, the continuous data was averaged together to create four timepoints: 5 minutes at baseline, 5 minutes during writing, 5 minutes during the speech task, and 5 minutes during the math task.

Perceived Stress/Difficulty

At three time points during the study, participants were asked to rate their stress level on a scale from 0-10. Additionally, at each time point, they were asked to rate the difficulty (scale of 0-10) of the task they just completed.

Imagined Social Support Conditions

Participants were randomly assigned to one of three writing conditions: touch support- "Recall and describe ways your loved ones touched you physically to make you feel supported;" emotional support- "Recall and describe ways your loved ones have expressed feelings of empathy, acceptance, or trust toward you;" and control- "Recall and describe the function and appearance of a printer."

Stress Test

A modified version of the Trier Social Stress Test (TSST; Allen et al., 2016) was used to raise the stress level of the participants. See the full description below.

Procedure

Students who signed up through the psychology research participation system were able to participate in the laboratory study. Participants completed the 1-hour session alone. Once the participant arrived in the lab, they signed an online consent form. Afterwards, their blood pressure was taken and recorded to make sure it was in a safe zone to continue. If it was too high, they were excused from the study and given a sheet with their results and the contact information of the student health clinic. Following the initial blood pressure reading, the Fitbit was attached to their non-dominant wrist.

Once the initial online portion was complete, participants recorded on a sheet of paper their initial stress level. Then the experimenter, always wearing a lab coat and maintaining a serious demeanor, introduced the performance tasks generally, informing participants they would be completing a speech and counting task that would be evaluated by a trained evaluator during the study and later by a panel of trained evaluators who would watch the videotaped tasks. Next, the support condition writing prompt was given to the participant where they had five minutes to

write about their assigned topic. Afterwards, blood pressure was recorded, and participants rated their stress and the difficulty of the task.

After the support manipulation, the modified TSST began. The experimenter gave specific instructions for the speech task and gave participants 3 minutes to prepare without taking notes. The experimenter told the participant that they were to mentally prepare a 5-minute speech describing why they would be a good candidate for their ideal job. They were notified that the speech would be videotaped and reviewed by a panel of judges trained in public speaking and behavioral analysis. After the preparation period, the experimenter returned with a clipboard and sat down to face the participant, who was instructed to stand. During the speech, the experimenter made direct eye contact, kept a neutral tone of voice, and refrained from any affirmations. After the 5 minutes were up, the participant's blood pressure was recorded, and they were given instructions for the arithmetic task. Participants were instructed that they had 5 minutes to count backwards from 2,023 in 17 step sequences as quickly and correctly as possible. Should they make a mistake, the experimenter told them they were incorrect and asked them to start back at the beginning. The experimenter had a list of correct responses, and measured performance by recording how far down the list participants could get. Once the time was up, blood pressure was recorded, and participants wrote down their perceived stress and difficulty of the tasks. Finally, they were fully debriefed by the experimenter.

Results

Perceived Stress

Looking at unconditional change over time of the ratings of perceived stress, the first two timepoints (baseline and writing) and the last two timepoints (speech and math) were almost identical and were combined in the analysis. The unconditional change of all variables is

illustrated in Table 1. A repeated-measures ANOVA was used to examine the effect of imagined support on changes in perceived stress. Age, gender and task difficulty were included as covariates in all analyses. Changes in perceived stress did not significantly vary by support condition, $F(2,114) = 2.58$, $p = 0.081$. Figure 1 shows changes in stress by condition.

Heart Rate

The first two timepoints (baseline and writing) were almost identical and were combined in the analysis. Figure 2 shows average heart rate at each time point (baseline, speech task and math task) by condition. A repeated-measures ANOVA was used to examine the effect of imagined support on changes in heart rate. Changes in heart rate did not significantly vary by support condition, $F(4, 228) = 1.13$, $p = 0.34$.

Blood Pressure

Like heart rate, the first two timepoints (baseline and writing) were almost identical and combined in analysis. Figure 3 shows average diastolic blood pressure at each time point (baseline, speech task and math task) by condition. A repeated-measures ANOVA was used to examine the effect of imagined support on changes in diastolic blood pressure. Changes in diastolic blood pressure did not significantly vary by support condition, $F(4, 228) = 1.27$, $p = 0.28$. Similarly, changes in systolic blood pressure also did not vary by condition, $F(6,342) = 0.45$, $p = 0.85$.

Discussion

The present study sought to examine the role of internalizing attachment figures on the reduction of stress. The overarching aim of the study was to identify whether imagining supportive touch or emotional social support is best at moderating stress, shown through a measure of perceived stress, heart rate, and blood pressure. Although the investigation was

largely exploratory, the general hypothesis was that imagined touch support was expected to buffer stress better than imagined emotional support and emotional support was expected to buffer stress better than the control condition. The results did not support the hypothesis, suggesting that a high stress situation may overpower and negate the effects of any type of imagined social support.

Regardless of the condition, the same pattern emerged: a steady increase in stress until after the speech task and a slow decrease afterwards. This pattern is illustrated with measures of perceived stress, heart rate, and blood pressure, suggesting that the manipulation of imagined support was not strong enough for the stressful nature of the Trier Social Stress Test. Comparing these results to previous literature (Jakubkak & Feeney, 2016; Master et al., 2009; McGowan, 2002), these results did not match the general idea that imagining any type of social support buffers stress better than a control condition.

Limitations and Future Directions

One important limitation of this study deals with the sample composition. The relatively small number of participants were a convenience sample of undergraduate college students, with a majority identifying as women (87%). While this study did not look at gender differences, recruiting more men in the future could lead to an investigation to see if the stress-buffering effect of imagined social support differs between men and women. Gender is associated with different patterns of social support. Femininity is linked to seeking and receiving emotional support (listening and empathizing), whereas masculinity is linked to receiving tangible support (taking on responsibilities for someone else) (Reevy & Maslach, 2001). Future studies may show that after a stressful event, imagining emotional support will best moderate stress in women, whereas imagining physical support will best moderate stress in men.

Additionally, as shown by the results, the conditions of imagined social support were weakly manipulated and/or the Trier Social Stress Test was too overpowering. A future study could strengthen the conditions by making the imagined support specific to the stressful situation. For example, in the touch support condition, participants will be instructed to answer, "If a close friend was here with you now, what ways would they touch you physically to make you feel supported?" This writing prompt relates directly to the stressful task whereas in the current study, participants wrote about an instance of touch support they experienced in the past. To lessen the stress of the TSST, a future study could include just the speech portion of the task without the threat of evaluation from an expert panel.

In the future, adding an additional time point after the TSST could measure when participants get back to their baseline. This could assess whether the effects of imagined support are really seen in the recovery phase of the stress response. Another change to the study design would be adding a new condition to investigate the potential stress-buffering effects of imagined giving support (e.g., "imagine how you would provide support to a friend who was facing this task"). Both receiving and giving support are associated with reduced vulnerability for negative psychological outcomes. More specifically, giving support has been shown to reduce stress related activity in the brain (Inagaki et al., 2017).

To better capture the physiological indicators of stress, a future study could include a better measure of heart rate, including heart rate variability, and add a measure of cortisol. The current study used a Fitbit to capture heart rate, which is not the most accurate measure, due to recording heart rate from the wrist. By changing to a chest strap heart rate monitor, the readings can be more accurate and reliable. Instead of just looking at beats per minute, it could be more useful to look at heart rate variability (HRV), the measure of variation in time between each

heartbeat that can capture resilience and behavioral flexibility. When an individual is stressed, the variation between heartbeats is low, compared to when they are relaxed, where the variation between beats is high (Campos, 2019). Finally, adding measures of cortisol, released by the body during a stressful scenario, can add an additional way to capture stress response and recovery.

Implementing the future directions discussed above could change the results of the study and show positive effects of imagined support. If so, the new study results could reveal several potential field applications that could benefit individuals who are dealing with stressful situations apart from their support providers. These individuals include those enrolled in the military, staying in the hospital, living in nursing homes, in a long-distance relationship, or experiencing the death of a loved one. Knowing the importance of a support provider on an individual's mental and physical well-being, stress management interventions can focus on internalizing that support provider through the form of a writing task, as illustrated in the study.

Conclusion

Overall, the current findings suggest that more research needs to be done to investigate the relationship between physiological indicators of stress and imagined social support. This relationship is important when it comes to stress management and can help those who are apart from their support provider. Knowing the impact of stress on an individual, understanding the role of imagined support can ultimately positively contribute to an individual's physical and mental well-being.

References

Allen, A. P., Kennedy, P. J., Dockray, S., Cryan, J. F., Dinan, T. G., & Clarke, G. (2016). The Trier Social Stress Test: Principles and practice. *Neurobiology of stress*, *6*, 113–126. doi:10.1016/j.ynstr.2016.11.001

American Heart Association. (n.d.). Stress and Heart Health. Retrieved from https://www.heart.org/en/healthy-living/healthy-lifestyle/stress-management/stress-and-heart-health

American Institute of Stress. (2012, July 27). Emotional and Social Support. Retrieved from https://www.stress.org/emotional-and-social-support

American Psychological Association (2018). *Stress in America: Generation Z.* Stress in America™ Survey

Bowlby, J. (1975). *Attachment and loss: separation anxiety and anger*. Pelican.

Bowlby, J. (1988). *Secure base: clinical applications of attachment theory*.

Campos, M. (2019, October 24). Heart rate variability: A new way to track well-being. Retrieved from https://www.health.harvard.edu/blog/heart-rate-variability-new-way-track-well-2017112212789

Coan, J. A. (2008). Toward a neuroscience of attachment. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 241–265) (2nd ed.). New York: Guilford Press

Coan, J. A., & Sbarra, D. A. (2015). Social Baseline Theory: The Social Regulation of Risk and Effort. *Current opinion in psychology*, *1*, 87–91. doi:10.1016/j.copsyc.2014.12.021

Coan, J. A., Schaefer, H. S., & Davidson, R. J. (2006). Lending a Hand. *Psychological Science*, *17*(12), 1032–1039. doi: 10.1111/j.1467-9280.2006.01832.x

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2004). When the Social Self Is Threatened: Shame, Physiology, and Health. *Journal of Personality*, *72*(6), 1191–1216. doi: 10.1111/j.1467-6494.2004.00295.x

Ditzen, B., Neumann, I. D., Bodenmann, G., von Dawans, B., Turner, R. A., Ehlert, U., & Heinrichs, M. (2007). Effects of different kinds of couple interaction on cortisol and heart rate responses to stress in women. Psychoneuroendocrinology, 32(5), 565–574. doi: 10.1016/j.psyneuen.2007.03.011

Inagaki, T. K., Bryne Haltom, K. E., Suzuki, S., Jevtic, I., Hornstein, E., Bower, J. E., & Eisenberger, N. I. (2016). The Neurobiology of Giving Versus Receiving Support: The Role of Stress-Related and Social Reward-Related Neural Activity. Psychosomatic medicine, 78(4), 443–453. doi: 10.1097/PSY.0000000000000302

Jakubiak, B. K., & Feeney, B. C. (2016). Keep in touch: The effects of imagined touch support on stress and exploration. *Journal of Experimental Social Psychology*, *65*, 59–67. https://doi-org.dax.lib.unf.edu/10.1016/j.jesp.2016.04.001

Kane, H. S., McCall, C., Collins, N. L., & Blascovich, J. (2012). Mere presence is not enough: Responsive support in a virtual world. *Journal of Experimental Social Psychology*, *48*(1), 37–44. doi: 10.1016/j.jesp.2011.07.001

Master, S. L., Eisenberger, N. I., Taylor, S. E., Naliboff, B. D., Shirinyan, D., & Lieberman, M. D. (2009). A Picture's Worth: Partner Photographs Reduce Experimentally Induced Pain. *Psychological Science*, *20*(11), 1316–1318. doi: 10.1111/j.1467-9280.2009.02444.x

Mayo Clinic. (2019, March 19). Chronic stress puts your health at risk. Retrieved from https://www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/stress/art-20046037

McGowan, S. (2002). Mental representations in stressful situations: The calming and distressing effects of significant others. *Journal of Experimental Social Psychology, 38*(2), 152–161. doi: 10.1006/jesp.2001.1493

Mikulincer, M., Gillath, O., & Shaver, P. R. (2002). Activation of the attachment system in adulthood: Threat-related primes increase the accessibility of mental representations of attachment figures. *Journal of Personality and Social Psychology, 83*(4), 881–895. doi: 10.1037/0022-3514.83.4.881

Reevy, G. M., & Maslach, C. (2001). Use of social support: Gender and personality differences. *Sex Roles: A Journal of Research, 44*(7–8), 437–459. doi: 10.1023/A:1011930128829

Schnall, S., Harber, K. D., Stefanucci, J. K., & Proffitt, D. R. (2008). Social support and the perception of geographical slant. *Journal of Experimental Social Psychology*, *44*(5), 1246–1255. doi: 10.1016/j.jesp.2008.04.011

Selcuk, E., Zayas, V., Günaydin, G., Hazan, C., & Kross, E. (2012). Mental representations of attachment figures facilitate recovery following upsetting autobiographical memory recall. *Journal of Personality and Social Psychology*, *103*(2), 362–378. doi: 10.1037/a0028125

Smith, T. W., Ruiz, J. M., & Uchino, B. N. (2004). Mental Activation of Supportive Ties, Hostility, and Cardiovascular Reactivity to Laboratory Stress in Young Men and Women. *Health Psychology*, *23*(5), 476–485. doi: 10.1037/0278-6133.23.5.476

Taelman, J., Vandeput, S., Spaepen, A., & Van Huffell, S. (2009). Influence of Mental Stress on Heart Rate and Heart Rate Variability. *4th European Conference of the International Federation for Medical and Biological Engineering.*, *22*, 1366–1369. doi: 10.1007/978-3-540-89208-3_324

Uchino, B. N., Cacioppo, J. T., & Kiecolt-Glaser, J. K. (1996). The relationship between social support and physiological processes: A review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin*, *119*(3), 488–531. doi: 10.1037/0033-2909.119.3.488

Table 1

Descriptive Statistics of Dependent Variables at each Time Point

	Baseline	Writing Task	Math Task	Speech Task
Heart Rate (BPM)	82.07 (8.88)	84.76 (10.31)	89.90 (10.60)	88.11 (11.31)
Systolic Blood Pressure	111.28 (9.96)	106.23 (9.07)	113.53 (10.08)	110.54 (10.66)
Diastolic Blood Pressure	72.73 (7.80)	71.36 (7.22)	76.32 (8.52)	75.43 (8.21)
Perceived Stress	3.93 (2.43)	4.05 (2.37)	7.00 (2.25)	7.15 (2.31)

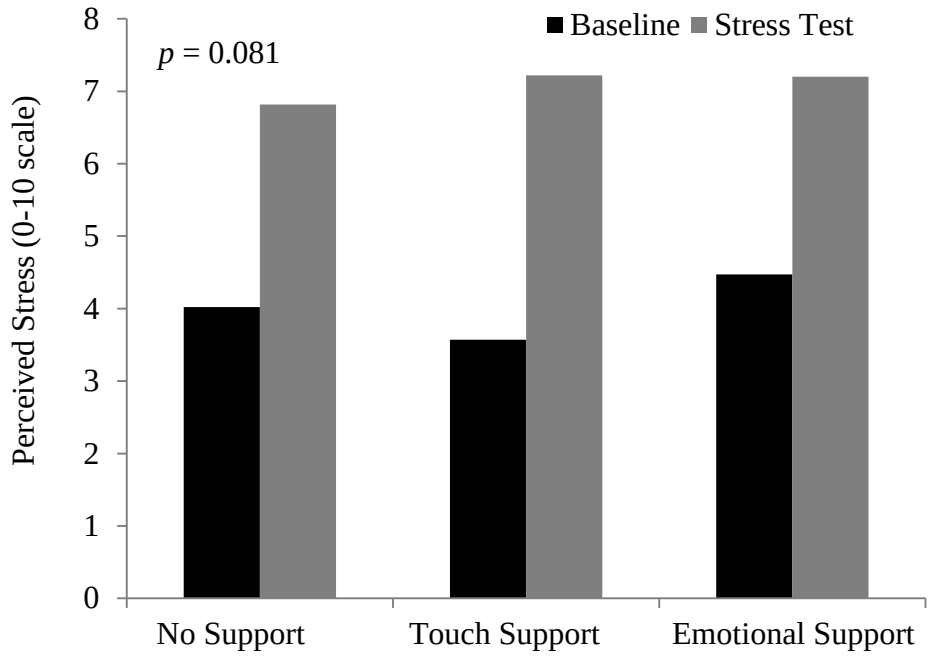

Figure 1. Change in Perceived Stress by Social Support Condition

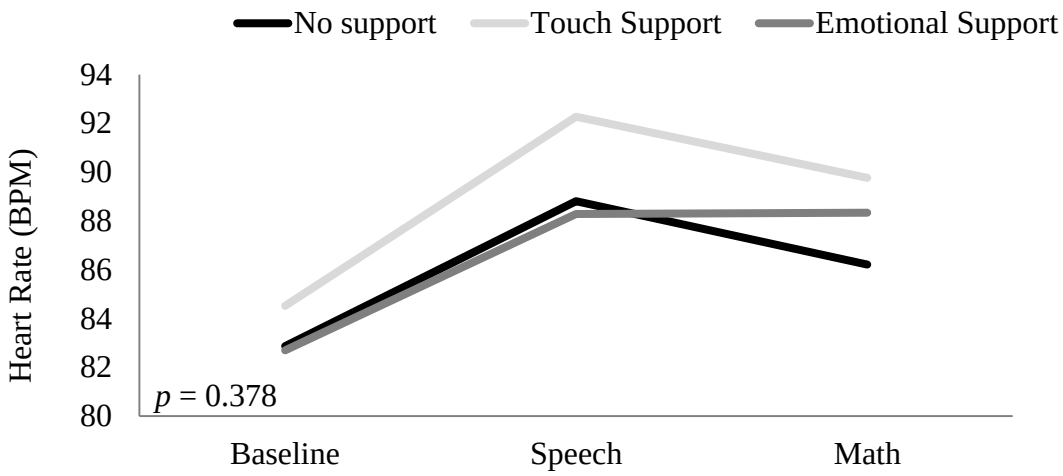

Figure 2. Change in Heart Rate by Social Support Condition

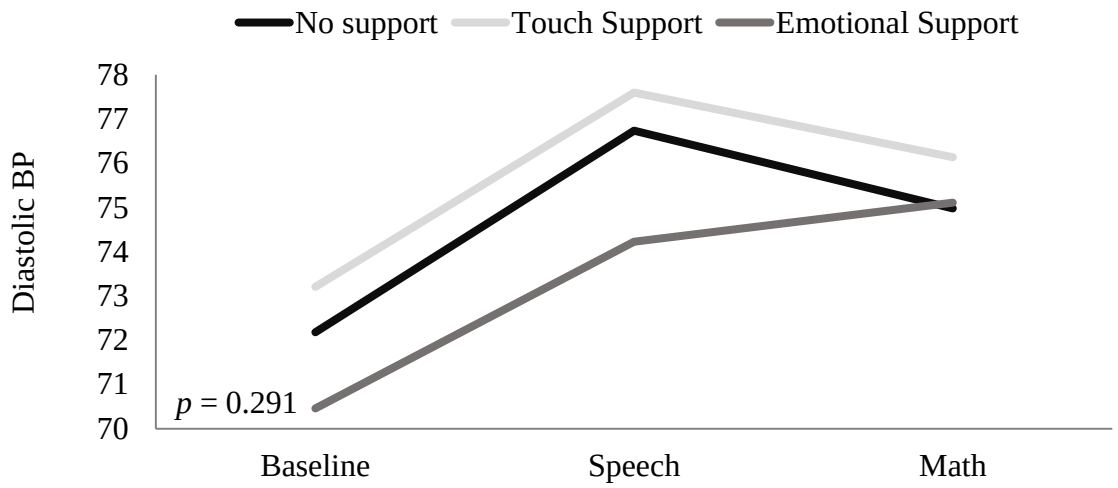

Figure 3. Change in Diastolic Blood Pressure by Social Support Condition