

Laughter and Amusement's Buffering Effect on Stress in a
Population with Symptoms of Anxiety: An Experimental Design

By

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Thesis

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Thesis under the direction of Professor Leslie D. Kirby

Anxiety and stress can have debilitating effects on our physical and mental health. The purpose of the current study was to examine a way to buffer, or protect, people with anxious symptoms from the negative affect produced by a stressor. I examined if co-occurring laughter and amusement, elicited by an amusing video and instructions to act amused, has a stress buffering effect for people with elevated symptoms of anxiety. The study employed a between-subject design with two conditions. Participants were randomly assigned to either the control condition (boring video/boring instructions) or amusing condition (amusing video/amusing instructions). Results did not show evidence of a stress buffering effect of co-occurring laughter and amusement in this specific population of people with symptoms of anxiety. Negative affect post-stressor task significantly increased, rather than decreased ($t(27) = -2.995$; $p < 0.01$). The current study reveals that a stress buffering manipulation that was effective in a sample of the general population was not effective in a sample of people with anxious symptoms. Potential reasons for these results, as well as limitations and future directions, are discussed.

Approved: Leslie D. Kirby, Ph.D.

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INTRODUCTION

You are sitting in the waiting room at the doctor's office. You feel nervous about your impending appointment. Your palms sweat, your heart race quickens, and your stomach tenses. You are appraising this situation at the doctor's office in a way that results in physiological reactions and negative feelings.

Appraisal theory is the idea that our emotions derive from our perception of situations and events (Smith & Lazarus, 1990). Primary appraisal is the evaluation of whether or not the current situation aligns with one's goals. Secondary appraisal is the evaluation of whether or not one possesses the coping strategies and abilities to deal with the current situation (Smith & Lazarus, 1990). Your primary appraisal may be that at this doctor's appointment you could receive information about your health that is detrimental to you. Your secondary appraisal may be that you do not have the family support or health insurance to handle such a situation. You now feel anxious, uneasy, and stressed.

Situations such as the one mentioned above occur on a regular basis. People can perceive situations such as traffic, exams, work commitments, and family conflicts as stressful. If people do not possess the tools to buffer or protect themselves from stress and subsequent negative emotions there can be detrimental effects. Research by McEwen (2008) looked at the neural effects and changes that occur in response to stress. He refers to chronic stress and the accompanying lifestyle changes, such as diet change, sleep disturbance, and alcohol consumption, as the "allostatic overload." Allostatic overload, as well as acute stress, can alter regions in the brain, specifically the hippocampus, prefrontal cortex, and the amygdala. PET and fMRI data shows that the volume of these structures decreases with depressive illness. Smaller volume of the hippocampus can

result in cognitive impairments such as issues with memory and recall as well as issues regulating glucose throughout the body (McEwen, 2008). Stress has harmful effects on the immune system as well. A study by Keicolt-Glaser et al. (1995) examined the effects of stress on the immune system of those caring for relatives suffering from Alzheimer's disease. Results showed that caregivers' wounds took longer to heal than controls' wounds. Cytokines in the blood such as interleukin-1B function to protect people's bodies against infection and accelerate wound healing. Results in this study showed that caregivers produced less of these cytokines than the controls, which exhibited how their immune systems were implicated by their chronic stress of caring for their diseased relatives.

Chronic stress negatively affects the nervous system and hormonal system as well. Consistent stress can cause a series of aches and pains, specifically headaches and joint dysfunction (Seaward & AAOS, 2000). Those who experience extreme stress may also develop digestion issues and ulcers. A study by Gray et al. (1951) found that continuous release of corticotropin, a hormone active in the stress response, can lead to gastric hemorrhage and peptic ulcers. In regards to disease and illness, chronic stress increases susceptibility to the common cold; it may also cause heart disease and possibly cancer by affecting the productivity of white blood cells (Seaward & AAOS, 2000).

As well as having acute and prolonged detrimental effects on the physical body, stress also affects psychological functioning. Research shows a strong relationship between perceived stress and overall mental health (Bovier, Chamot, & Perneger, 2004). Bovier et al.'s (2004) study showed that stress has a significant correlation with mental health, based on responses to the SF-12 health survey. This correlation was mediated by

mastery and self-esteem, meaning that these mental resources serve protective functions in regards to stress. A study by DeLongis, Folkman, and Lazarus (1988) relatedly found that when people with poor social support and low self-esteem experienced increased stress in their lives they were more vulnerable to illness as well as intense mood disturbances and depressed mood. Prolonged stress during childhood, resulting from hostile home environments or strained familial relationships, can lead to mood disorders in adulthood (Bear, Connors & Paradiso, 2007). Stress activates the hypothalamic-pituitary-adrenal axis in the brain. When HPA-axis is consistently active, people have difficulty regulating the overflow of stress hormones and their adverse effects appropriately, therefore potentially leading to mental health issues such as depression and anxiety (Bear, Connors & Paradiso, 2007).

According to the Anxiety and Depression Association of America (2015), Generalized Anxiety Disorder affects 6.8 million adults in the United States. Generalized Anxiety Disorder (GAD) is characterized by excessive worry, avoidance of certain stressful situations, and compromised emotional regulation (Cisler et al., 2010; ADAA, 2015). GAD can also manifest in physical symptoms such as muscle tension, restlessness, and elevated heart rate (ADAA, 2015). Biological factors, stressful life experiences, and an overactive stress response all play a role in the etiology and maintenance of anxiety disorders (ADAA, 2015).

Increased stress and increased levels of cortisol can make people, specifically adolescents and young adults, susceptible to anxiety (Essex et al., 2010). Researchers found that elementary age girls who exhibit greater behavioral inhibition, which is defined as elevated fear responses to social and nonsocial situations, and who have higher

levels of cortisol, are more likely to develop a social anxiety disorder. Those researchers also discovered that children who were exposed to higher levels of maternal stress, and who exhibited greater behavioral inhibition, were more susceptible to developing social anxiety disorder (Essex et al., 2010). Research such as this evidences the link between anxiety and stress.

It is crucial to discover protective mechanisms and treatments to guard oneself against the negative effects of stress, especially if one is susceptible to high levels of anxiety and worry. The buffering hypothesis, proposed by Cohen and Wills (1985), suggests that experience of a positive emotion can decrease the experience of a subsequent negative emotion. This means that if I experience happiness, from say seeing an old friend or scoring high on a math test, and then experience anger, from being cut in line at the grocery store, my experience of anger will be less intense than if I had not just experienced happiness. Positive emotions serve protective functions against the stress response (Cohen & Wills, 1985). A study by Ong et al. (2006) found that the frequent experience of positive emotions decreased stress reactivity. Positive affect also aided in stress recovery. Results showed that high-resilient widows, who reported that they experienced positive emotions on a daily basis, recovered from stressful events more easily and quickly than those who did not report such levels of positive affect.

In regards to the buffering effects of a specific positive emotion, research shows that amusement and humor protect against increased stress and anxiety. Yovetic, Dale, and Hudak (1990) employed a study design to test if the experience of amusement could protect participants from anxiety produced during the study. The researchers deceived participants and convinced them that they would be experiencing an electrical shock

during an upcoming portion of the experiment. The experimenter assured the participants that this shock would not cause any physical damage or have prolonged negative effects, but the anticipation of this shock induced stress and anxiety in the participants. After learning of this impending electrical shock, participants were placed in a waiting room. Half of the participants listened to a humorous tape while waiting for the next portion of the study. Data of heart rate, zygomatic electromyogram potentials, and self-report showed that participants who listened to this funny tape had less anxiety and stress than participants who did not listen to this funny tape. This alludes to a buffering effect of humor and amusement in the laboratory setting. Similarly, a study by Kuiper and Martin (1998) examined the relationship between laughter, stress, and affect. Results showed that laughter frequency served as a mediator between increase negative life-events, meaning increased stress, and overall negative affect. Participants, both males and females, who had what was considered as high laughter frequency, and who had increased negative events over the three-day experimental period, did not have increased negative affect. In contrast, participants who had what was considered as low laughter frequency, and who had increase negative events over the three-day experimental period, did in fact have increased negative affect. This provides evidence for a stress buffering effect of laughter (Kuiper & Martin, 1998).

Due to its beneficial effects on psychological functioning, laughter has been integrated into certain treatment approaches. Kim, Kim, and Kim (2015) examined the effects of laughter therapy on patients suffering from breast cancer. Researchers specifically looked at the prevalence of depression, stress, and anxiety in those patients. Post-radiation patients were randomized into a control group or a therapeutic laughter

group. Results show that those who experienced laughter therapy had decreased levels of depression, anxiety, and stress. Most interestingly, however, is that these reductions occurred after just one session of the therapeutic laughter program. It is therefore reasonable to conclude that laughter may have immediate relieving effects in regards to depression, anxiety, and stress.

In a previously conducted study that examined the stress buffering effects of laughter and amusement, I found that there was a stress buffering effect of co-occurring laughter and amusement in a sample of Vanderbilt students (Kline Thesis, 2015). When participants were instructed to express amusement as they watched a humorous video they reported a significantly smaller increase in negative affect post-stressor task than all other participants ($t(56) = 2.37; p < 0.05$). See *Figure 1* for the negative affect difference scores.

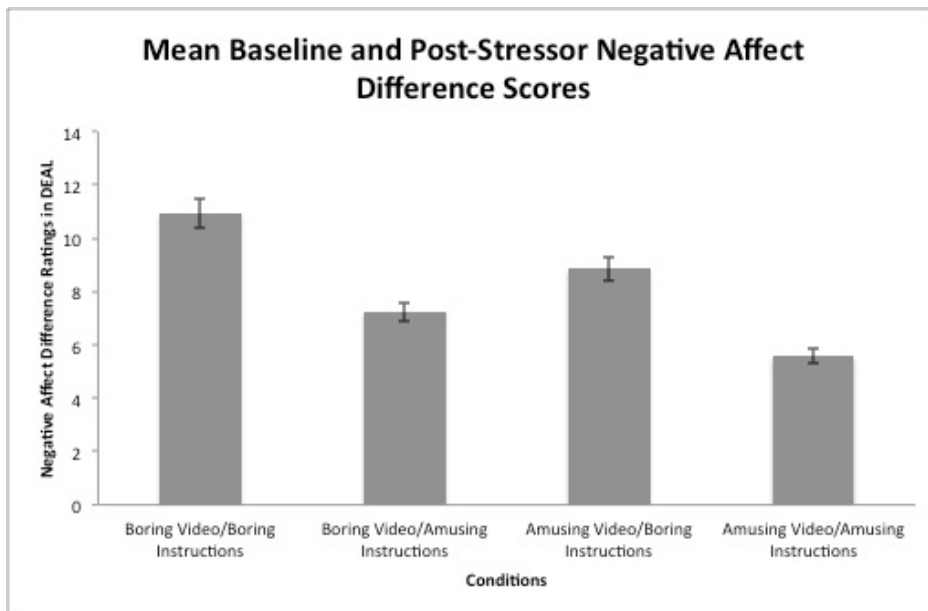


Figure 5. Mean DEAL Negative Affect Difference Scores for all Conditions.

Participants' laughter and amusement seemingly protected them from a significant increase in negative affect after a stressful task. It was not possible to differentiate, however, between the stress buffering effects of sole laughter or sole amusement. I therefore concluded that laughter and amusement should co-occur in order to see buffering effects. Interestingly, however, the co-occurring amusement and laughter manipulation did not decrease negative affect post-stressor; it just minimized the increase of negative affect. I inferred that this is because participants generally enter the lab with low levels of negative affect, therefore easily allowing for an increase in low baseline negative affect. Building upon those results, I wondered what would occur if people with high levels of negative affect, such as those suffering from symptoms of anxiety, participated in this experiment. Because research shows that laughter can have positive effects on managing anxiety (Kim et al., 2015), I speculated if co-occurring laughter and amusement can not only protect people from a stressful and anxiety-inducing situation but perhaps even decrease negative affect all together. Building upon results from the aforementioned study (Kline, 2015), I expect that the co-occurrence of laughter and amusement will be strong enough to nullify the negative effects of a stress-induction in a population of students with elevated symptoms of anxiety.

METHODS

Participants

A total of 54 undergraduate students, between the ages of 18 – 22, at Vanderbilt University (38 females, 14 males) participated in the experiment in exchange for course credit. Invited participants signed up for a study slot through the SONA software program. The SONA title was “Individual Differences in Social Communication” in

order to mask the true purpose of the study. Participants who had participated in the previously conducted laughter and amusement stress buffering study (Kline Thesis, 2015) were not permitted to participate in the present study. All participants gave informed consent to participate in the experiment.

Participant Selection

Participants were selected from the Psychology 101 cohort based on their score on the PROMIS Emotional Distress - Anxiety Questionnaire. The questionnaire was administered to 270 students, ages 17 to 22. All students who reported being 17 years old, who did not report an age, and who did not provide an email address were excluded from the present study. Extreme outliers and those with sparsely filled questionnaires were also excluded. The mean score on the questionnaire was 77.096 with a standard deviation of 20.778. The median was 75. The 110 students who scored above the median were sent invitations to their Vanderbilt email addresses to participate in the study. An access code to sign up for the study on SONA was included in the email.

Materials

PROMIS Emotional Distress – Anxiety Questionnaire. Members of the Psychology 101 course at Vanderbilt completed this questionnaire, among others, during the research-screening day at the start of the Fall 2015 semester. The 29-item questionnaire evaluates levels of emotional distress and anxiety (Pilkonis, 2011). The questionnaire instructs responders to rank on a Likert scale (1-5; never – always) how much they felt each statement in the past 7 days. PROMIS Emotional Distress- Anxiety scores correlate strongly with MASQ scores ($r = 0.80$) (Pilkonis, 2011). See *Appendix A* for the questionnaire used in this study.

The Discrete Emotion Adjective List (DEAL). After giving informed consent and after completion of the stressor task the participants completed the DEAL. This survey is meant to assess 27-discrete emotions (DEAL; Smith & Kirby, 2010). Participants ranked, on a Likert scale (0-9; not at all – extremely) how much they felt each emotion at the present time. The emotions were presented in clusters containing 1 – 3 words. The DEAL was administered on a computer through REDCap (Research Electronic Data Capture) (Harris et al., 2009). See *Appendix B* for the DEAL used in this study.

Videos. This study utilizes two videos, both of which were pilot tested in Fall 2014 for emotion elicitation. The amusing video was a video clip from the film, *Bridesmaids* (2:18 min). The neutral video was a video clip of a weather report (2:29 min). The study utilized the funny video that maximized amusement in pilot-tested participants and the neutral video that minimized amusement in pilot-tested participants.

Video Camera. While the participants watched their assigned video they were also recorded using a Canon video camera. The participants were told that a future participant would be watching the videotape to examine the present participant's social communication skills and techniques. The participant was given the instructions to either convince a future observer that the video s/he is watching is amusing or convince the observer the video s/he are watching is uninteresting and bland. The Canon video camera was placed on an elevated surface next to the computer facing the participant.

J-Word Stressor Task. Participants were told to list as many words that begin with the letter “J” that they can in 2 minutes. Participants were instructed to exclude proper nouns. Participants were told, “The average Vanderbilt undergraduate can list about 30-words in 2-minutes.” The J-words were tallied and the number of repeated words,

pronouns, and non-words were noted as “error-words.” The error-words were subtracted from the tallied J-words to create a total J-word count.

Audio Recorder. During the stressor task, the participants were recorded using a computer- recording device called Amadeus. The experimenter also used a pen and paper on a clipboard to record how many target words the participant produced during the task.

Design

This study used a between-subjects design with two conditions. The independent variable was the type of video and designated instructions for expressivity. Participants were randomly assigned to one of two conditions. The two conditions were neutral video – express disinterest/boredom (n=26; 8 males, 18 females) and amusing video – express amusement (n= 28; 6 males, 22 females). The dependent variables were the negative affect and positive affect ratings from the DEAL.

Procedure

The participant knocked on the lab door at his/her scheduled time and was welcomed into the lab. The participant was instructed to take a seat at the Mac computer and to not sign the consent form that was to the right of the computer until the participant had heard the instructions for the experiment. The experimenter then told the participant that the purpose of the current study is to examine social and behavioral communication. The experimenter elaborated by saying that we are interested in the way that people use their body language and facial expressions to communicate their feelings in the moment to other people. The experimenter told the participant that we are specifically interested in the individual differences involved in non-verbal communication. This cover story

aimed to mask the true emotion-focused purpose of the study, in order to protect against subject biases. The participant was told that during the experiment s/he would be videotaped as s/he watches and reacts to a short clip on the computer. The experimenter then informed the participant that a future observer, meaning a future participant, would view that videotape of the current participant. The participant was then instructed to read through the consent form to the right of the computer, ask any questions that may arise, and sign and date it when ready. Once the participant had completed this portion the experimenter signed and stored the consent form.

The participant was then instructed to take an online questionnaire about his/her current thoughts and perceptions as s/he entered the lab. The experimenter revealed the REDCap questionnaire and instructed the participant to notify the experimenter when s/he was finished.

Once the participant notified the experimenter the experimenter told the participant that it was now time to watch the videotape. In accordance with the participant's randomly assigned condition, the experimenter instructed the participant to try and convince the future participant that the clip s/he is watching is bland and unentertaining (condition 1) or very humorous and amusing (condition 2). The experimenter instructed the participant to notify her when the clip was over. The experimenter then entered the designated clip into full screen, pressed record on the video camera, exited the room, and shut the door behind her.

When the participant notified the experimenter that the clip had ended the experimenter shut off the video camera and gave the participant the instructions for the verbal fluency task, which in actuality was the J-word stressor task. The experimenter sat

down in a chair to the right of the participant and instructed him/her that s/he has two minutes to list as many words that s/he can think of beginning with the letter “J”. The experimenter strategically added that the average Vanderbilt undergraduate can list about 30 J-words in this two minute time frame. This comparison added stress to the task. The experimenter then pressed record on the computer, instructed the participant to begin, and tallied his/her words on a notepad.

Once the two minute stressor task was complete the experimenter instructed the participant to once again complete the same survey that s/he did at the beginning of the experiment. The experimenter then pulled up the REDCap survey and instructed the participant to notify her when s/he finished the online questionnaire. When the participant notified the experimenter that s/he was finished the experimenter informed the participant that the study was complete and it was now time to debrief. The experimenter revealed the true purpose of the experiment, which was to observe the stress buffering effects of laughter and amusement in a population of people with symptoms of anxiety. See *Appendix* for the full debriefing script used in the present study.

To compute the positive affect score on the DEAL, the following items were compiled: 4 (relieved, unburdened), 5 (tranquil, calm, serene), 7 (determined, persistent, motivated), 8 (love, affection), 9 (amused), 10 (grateful, appreciative, thankful), 11 (interested, engaged), 13 (hopeful, optimistic), 16 (proud, triumphant), 18 (compassionate, empathetic), 22 (awed, wondrous, amazed), 24 (joyful, happy, eager), 25 (eager, enthused, excited), 27 (satisfied, content). Participants’ ratings of these items were summed to get an overall positive affect score. The positive affect score had high reliability (14 items; $\alpha = 0.87$). To compute the negative affect score on the DEAL, the

following items were compiled: 2 (guilty, culpable), 3 (defeated, resigned, beaten), 6 (schadenfreude), 12 (mad, angry, annoyed), 14 (bored, detached, uninterested), 15 (nervous, anxious, apprehensive), 17 (afraid, frightened, scared), 19 (sad, downhearted, blue), 20 (ashamed, disgraced), 21 (disgusted, repulsed, revolted), 26 (embarrassed, humiliated). Participants' ratings of these items were summed to get an overall negative affect score. The negative affect score had high reliability (11 items; $\alpha = 0.83$).

In order to compute inter-rater reliability scores I randomly assigned 2 raters, from a pool of 3 total raters, to score each participant video using a Likert scale from 1-7 on how amused the participant seemed and how genuine the participant seemed. The sound on the videos was removed in order to mask what condition the participant was in. The raters were trained on what were good examples of high amusement and high genuineness and what were poor examples. High amusement was defined as sustained laughter and smiling. Low amusement was defined as sustained bored or blank facial expressions. High genuineness was defined as consistent facial expressions and consistent focus (eye gaze) on the video. Low genuineness was defined as inconsistent displays of emotion (infrequent spurts of laughter followed by blank facial expression) as well as eye contact with the video camera or other aspects of the room. Cohen's Kappa produced an un-weighted inter-rater reliability score of 0.580 on amusement, which is considered moderate-substantial agreement. Cohen's Kappa produced an un-weighted inter-rater reliability score of 0.243 on genuineness, which is considered fair agreement. These inter-rater reliability scores and coders' evaluations will be discussed in the discussion section.

Research Hypothesis

Buffering Effect. I hypothesized that participants who watched the amusing video clip and who were instructed to act amused would report significantly less negative affect post-stressor task than at baseline. I expected that participants who watched the boring video and who were instructed to act neutral/bored would report significantly more negative affect post-stressor task than at baseline.

RESULTS

Behavioral Outcomes

The coders' responses were analyzed using independent sample t-tests. Results indicate that the amusement scores for those in condition 1 (boring video/boring instructions) were significantly lower than the amusement scores for those in condition 2 (amusing video/amusing instructions) ($t(124) = -24.894$; $p < 0.00$). The amusement score means are reported in *Table 1*.

<u>Condition</u>	<u>Mean Amusement Score</u>	<u>Mean Genuine Score</u>
Boring Video/Boring Instructions	1.16	4.26
Amusing Video/Amusing instructions	4.92	4.78

This served as a successful manipulation check. Amusement scores, however, were a bit lower than expected. Ideally, the scores would have been between 6-7, to prove that participants were truly laughing when they watched the amusing video. I will discuss these scores and their implications more in the discussion section. Results indicate that genuine scores for those in condition 1 (boring video/boring instructions) were not significantly different than the genuine scores for those in

condition 2 (amusing video/amusing instructions) ($t(124) = - 1.816$; $p > 0.05$). The genuine score means are reported in *Table 1*.

In regard to the J-word stressor task, there was no significant difference in the number of J-words produced across conditions ($t(52) = 0.480$; $p > 0.60$). The number of error words, which was the total of proper nouns, repeated words, and non-words produced, were almost significantly different across conditions ($t(52) = - 1.738$; $p < 0.10$). Those in the amusing condition (condition 2) produced a mean of 1.54 error words and those in the boring condition (condition 1) produced a mean of 0.81 error words.

Emotional Outcomes

Negative affect scores were analyzed using t-tests. An independent sample t-test showed that the negative affect scores of both groups did not differ significantly at baseline ($t(52) = - 0.554$; $p > 0.50$). Paired sample t-tests were used to compare baseline and post-stressor negative affect scores. As expected, for those in the control condition, negative affect significantly increased post-stressor task from baseline ($t(25) = - 4.599$; $p < 0.00$). Contrary to my research hypothesis, however, for those in the amusing condition, negative affect significantly increased post-stressor task from baseline ($t(27) = - 2.995$; $p < 0.01$). No gender differences were observed. The negative affect means are reported in *Table 2*.

Table 2		
<i>Mean Negative Affect Scores Across Conditions</i>		
<u>Condition</u>	<u>Baseline</u>	<u>Post</u>
Boring Video/Boring Instructions	20.73	31.23
Amusing Video/Amusing Instructions	19.57	26.00

While the change in negative affect between baseline and post-stressor is smaller in the amusing condition than in the control condition, post-stressor scores across both conditions were not significantly different from one another ($t(52) = 1.419$; $p > 0.10$).

Positive affect scores were analyzed using t-tests. An independent sample t-test showed that the positive affect scores of both groups did not differ significantly at baseline ($t(52) = 0.981$; $p > 0.30$). Paired sample t-tests were used to compare baseline and post-stressor positive affect scores. For those in the control condition, positive affect significantly decreased post-stressor task ($t(25) = 5.745$; $p < 0.00$). For those in the amusing condition, positive affect also significantly decreased post-stressor task ($t(27) = 3.284$; $p < 0.01$). No gender differences were observed. The positive affect means are reported in *Table 2*.

Table 2		
<i>Mean Positive Affect Scores Across Conditions</i>		
<u>Condition</u>	<u>Baseline</u>	<u>Post</u>
Boring Video/Boring Instructions	52.04	37.88
Amusing Video/Amusing Instructions	47.57	39.96

While the change in positive affect between baseline and post-stressor is smaller in the amusing condition than in the control condition, post-stressor scores across both conditions were not significantly different from one another ($t(52) = -0.500$; $p > 0.60$).

I expected that there would be a decrease in negative affect post-stressor task for those who experience co-occurring laughter and amusement (condition 2). Results indicate, interestingly, that there was no stress buffering effect of co-occurring laughter and amusement in this population with symptoms of anxiety. I will discuss potential reasons why and the possible limitations of our study in the next section.

DISCUSSION

This study examined the possible stress buffering effect of co-occurring laughter and amusement in a population of people with symptoms of anxiety. Contrary to the proposed hypothesis, results do not provide evidence for a buffering effect in this specific population. Results of the previous study *did* provide evidence for a buffering effect of co-occurring laughter and amusement in a sample of the general Vanderbilt population (Kline Thesis, 2015). It is crucial, therefore, to discuss the differences in these two samples.

As mentioned before, the coders' amusement scores in this study were lower than expected (4.92). It appears that the participants randomly assigned to condition 2 (amusing video/amusing instructions) were not laughing and displaying amusement to the degree that was intended. Coders' amusement scores in the previous sample of the general population were significantly higher (5.86) (Kline Thesis, 2015). It is possible, therefore, that the population with anxious symptoms was not laughing enough to produce buffering effects. Upon further investigation, based on the median amusement score of those in the amusing condition (median = 5.00), I split the participants into a high laughter group and a low laughter group. Those in the high laughter group (n=16), who had an amusement score of 5.00 or higher, did *not* show a significant increase in negative affect post-stressor task ($t(15) = -2.029$; $p > 0.05$). Those in the low laughter group (n=12), who had an amusement score lower than 5.00, did show a significant increase in negative affect post-stressor task ($t(11) = -2.331$; $p < 0.05$). Although the difference between these two groups was fairly minimal, it does present some evidence for a buffering effect of high frequency laughter.

In regard to the strength of the manipulation, it is possible that the video used to elicit amusement, a clip from the movie *Bridesmaids* (2011), is not as socially relevant and amusing to this specific population. The sample consisted of primarily first and second year students, who may have a different opinion of *Bridesmaids* than older participants. It is possible that the stimuli did not produce a strong enough amusement level, which could therefore thwart a buffering effect. Overall, it appears that the attempted elicitation of amusement and laughter, in this population with symptoms of anxiety was not strong enough to warrant a stress buffering effect.

It is worthy to note as well that general anxiety scores were computed from the PROMIS Anxiety-Emotional Distress Scale, rather than a specific categorical anxiety scale. Some participants in the lab could have suffered from social anxiety symptoms, therefore making a lab experience and videotape component specifically stressful. In a future study, removing the videotape aspect of the manipulation could possibly eliminate any possible social stress. Similarly, some participants could have suffered from generalized anxiety or panic symptoms. These participants therefore may have interpreted the lab experience and manipulation in a different way. In the future, it would be beneficial to discern the symptoms of specific anxiety types.

As mentioned before, the inter-rater reliability ratings in this study were low. These un-weighted Kappa scores portray fair agreement at best across raters. Because these scores were un-weighted, a minimal discrepancy across raters (ex. a coder giving a participant an amusement score of 2 and the other coder giving that participant an amusement score of 3) was given the same value as a large discrepancy. Upon further inspection, the original dataset revealed that most coders' scores differed minimally. In

order to increase inter-reliability in the future, however, it would be beneficial to create a more succinct and detailed coding rubric and survey. It could be helpful to break down amusement and genuineness questions into specific components such as, “How often did the participant laugh?” or “What percentage of the video did the participant keep eye contact with the computer?”. These specific questions may help coders break down the components of amusement and genuineness in a more coherent and reliable way.

The current study involves a self-report emotions questionnaire. This may have presented issues, specifically in this population. It is possible that participants with symptoms of anxiety are more self-conscious about disclosing the true nature of their current emotional states. It would be interesting therefore to take physiological measures of stress, such as heart rate, skin conductance, or salivary cortisol levels. It would then be possible to measure the stress induced by the J-word task objectively rather than through subjective ratings. Future studies should incorporate such measures.

In spite of not producing significant buffering effects, this study reveals important information about a specific population. It is clear that participants in the current study, who have an elevated number of anxious symptoms, behaved and reacted differently to the manipulation than those participants sampled from the general Vanderbilt population. It is therefore necessary to identify a manipulation that would be strong enough to elicit a stress buffering effect in an anxious population specifically.

Appendix A

PROMIS Emotional Distress – Anxiety Questionnaire

Email Address:

PROMIS Item Bank v. 1.0 – Emotional Distress - Anxiety

Emotional Distress - Anxiety – Calibrated Items

Please respond to each item by marking one box per row.

In the past 7 days...

		Never	Rarely	Sometimes	Often	Always
1 <small>EDANX01</small>	I felt fearful.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2 <small>EDANX02</small>	I felt frightened.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3 <small>EDANX03</small>	It scared me when I felt nervous	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4 <small>EDANX05</small>	I felt anxious.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5 <small>EDANX07</small>	I felt like I needed help for my anxiety	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6 <small>EDANX08</small>	I was concerned about my mental health ...	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7 <small>EDANX12</small>	I felt upset.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8 <small>EDANX13</small>	I had a racing or pounding heart.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9 <small>EDANX16</small>	I was anxious if my normal routine was disturbed	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

In the past 7 days...

		Never	Rarely	Sometimes	Often	Always
10 EDANX18	I had sudden feelings of panic.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11 EDANX20	I was easily startled	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12 EDANX21	I had trouble paying attention.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13 EDANX24	I avoided public places or activities	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14 EDANX26	I felt fidgety	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15 EDANX27	I felt something awful would happen	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16 EDANX30	I felt worried.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
17 EDANX33	I felt terrified	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
18 EDANX37	I worried about other people's reactions to me	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
19 EDANX40	I found it hard to focus on anything other than my anxiety	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

In the past 7 days...

		Never	Rarely	Sometimes	Often	Always
20 EDANX41	My worries overwhelmed me	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
21 EDANX44	I had twitching or trembling muscles	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
22 EDANX46	I felt nervous	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
23 EDANX47	I felt indecisive.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
24 EDANX48	Many situations made me worry.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
25 EDANX49	I had difficulty sleeping	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
26 EDANX51	I had trouble relaxing	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
27 EDANX53	I felt uneasy.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
28 EDANX54	I felt tense.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
29 EDANX55	I had difficulty calming down.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

APPENDIX B

DEAL

Below are a number of clusters of adjectives that describe different emotions or feelings. Each group of adjectives is meant to get at a SINGLE basic feeling or emotion. Please indicate the extent to which each cluster of adjectives characterizes the way you feel RIGHT NOW. Use the nine-point scale.

1-----2-----3-----4-----5-----6-----7-----8-----9
 generally does not generally characterizes generally
 characterizes my feelings my feelings
 characterize my somewhat extremely well
 feelings at all

Rating

- | | | | | | |
|----|-------|---|-----|-------|--------------------------------------|
| 1) | _____ | surprised
astonished | 10) | _____ | grateful
appreciative
thankful |
| 2) | _____ | guilty
culpable | 11) | _____ | interested
engaged |
| 3) | _____ | defeated
resigned
beaten | 12) | _____ | mad
angry
annoyed |
| 4) | _____ | relieved
unburdened | 13) | _____ | hopeful
optimistic |
| 5) | _____ | tranquil
calm
serene | 14) | _____ | bored
detached
uninterested |
| 6) | _____ | schadenfreude
(pleasure at someone else's
misfortune) | 15) | _____ | nervous
anxious
apprehensive |
| 7) | _____ | determined
persistent
motivated | 16) | _____ | proud
triumphant |
| 8) | _____ | love
affection | 17) | _____ | afraid
frightened
scared |
| 9) | _____ | amused | 18) | _____ | compassionate
empathetic |

1-----2-----3-----4-----5-----6-----7-----8-----9
 generally does not characterizes generally characterizes generally
 characterizes my feelings my feelings my feelings
 feelings at all somewhat extremely well

Rating

19) _____ sad
 downhearted
 blue

24) _____ joyful
 happy
 glad

20) _____ ashamed
 disgraced

25) _____ eager
 enthused
 excited

21) _____ disgusted
 repulsed
 revolted

26) _____ embarrassed
 humiliated

22) _____ awed

 wondrous
 amazed

27) _____ satisfied

 content

23) _____ lust
 desire
 attraction

Appendix C

Study Script

Before Participant Arrives

1. Turn on the Mac computer in the room the participant will be sitting in.
2. Refer to participant info sheet to determine participant ID number and condition.
3. On the Mac computer pull up the Bookmarks in Firefox that read Pre-DEAL (baseline emotion) and Post-DEAL.
4. On the first page of the Pre-DEAL fill out the appropriate information and click next page. Open a new webpage on a different tab in order to mask the questionnaire until it is time for the participant to fill it out.
5. On the Mac computer pull up the assigned video on the Desktop, labeled either VIDEO ONE (neutral video) or VIDEO TWO (amusing video). Cover the video with the Firefox browser window.
6. Retrieve a consent form and place it in front of the computer with a pen.
7. Angle the video camera appropriately, if needed, so that it faces the participant, and NOT the computer screen.
8. Open audio recording application on the Mac.
 - a. Save the file as 'Participant #' in the desktop folder called J-task files.
9. Put on a white lab coat from the closet in the main lab room.

Baseline

1. [*as Participant enters the lab*] Hello, are you here for our study? *Lead participant over to Mac computer.* Please take a seat here and get settled in.

2. *Do not let participant automatically sign the consent form when he/she sits.* So in this study we are examining social and behavioral communication. This means we are interested in the way that people use their bodies and facial expressions to communicate their feelings and emotions in the moment to other people. There are numerous individual differences in the way that people use non-verbal communication. We are examining these individual differences. During this study, you'll be doing a couple of different activities that will help us better understand this. First, you're going to be asked to behave in a certain way while being videotaped. Specifically, you're going to watch a film clip, and, no matter what it is, you're going to try and communicate that what you are watching is neutral and unentertaining OR very amusing and humorous (*Condition 1 or Condition 2 – only state instructions for specific condition*). In a separate phase of the study, another person is going to watch that videotape we make of you, and we are going to examine how he/she perceives your nonverbal communication. After you watch the video and we record your behavior, you'll be performing a verbal fluency task related to individual differences in social and behavioral communication.
3. [*pick up consent form on the desk and hand it to the participant*] Please read through this consent form and ask me any questions that you have. Once you have done so, please sign the form. I will be in the next room so just speak up when you are done.
4. [*collect consent, sign page, and insert completed form into manila envelope*].
Okay, before we get started, we want to make sure how you behave while being

videotaped is only motivated by the instructions you are given, and not by any other perceptions of your current environment or internal state when you entered the lab. So we'd like you to fill out this questionnaire about your current thoughts before we begin. You will also complete this same questionnaire at the end of the study. Please let me know when you have completed the questionnaire. *Click on the Pre-DEAL tab to reveal the survey.*

Mood Induction

1. You are now going to watch the video. During this video we want you to use your body and expressions in different ways to try and communicate something to the future observer. *Depending on assigned condition the script is as follows:*
 - a. *Neutral expressivity (Condition 1):* While you watch this video, try and convince an observer that the video you are watching is very neutral and unentertaining to you. Regardless of your internal feelings towards the content of the video, use your behavior to convince the observer. The video camera can only see you, not the actual video. Use any facial expressions, noises, and/or bodily movements in order to portray as effectively as possible that this video is uninteresting or neutral.
 - b. *Amusing/humorous expressivity (Condition 2):* While you watch this video, try and convince an observer that the video you are watching is very amusing and humorous to you. Regardless of your internal feelings towards the content of the video, use your behavior to convince the observer. The video camera can only see you, not the actual video. Use any facial expressions, noises, and/or bodily movements in order to

portray as effectively as possible that this video is funny and entertaining to you.

2. *Minimize the Firefox window to reveal the video.*
3. *Walk over to the video camera. You can begin the video when you are ready.*

Please come open the door and notify me when the video is over. I am now going to press record on the video camera.

4. *Press record on the video camera.*
5. *Leave the room and close the door.*

Stressor

1. *When the participant opens the door, gather notepad and pen in order to administer J-word task.*
2. *When you enter the room, go over and turn off the video camera. Then sit next to the participant.*
3. We are now going to have you complete a verbal fluency test. Research shows that those with higher verbal fluency have more control over and are more able to manipulate their facial expressions and body language effectively and realistically. For the next two minutes, I would like you to list as many words that begin with a certain letter that you can think of. This has been shown in previous research to be a good measure of verbal fluency. And verbal fluency has been shown to relate to social and behavioral communication. Just so you know, the average Vanderbilt undergraduate can list about 30 words. I'll be recording your responses as you go. Please do not use any proper nouns. *Click on the recording application on the Mac computer. Start recording.*

4. Your specific letter will be J. You may begin when I say “begin.”
5. Begin!
6. *Pay attention to the timer on the Amadeus window. Tally the number of words the participant lists using the notepad.*
7. *[After the timer reaches 2:00, press stop button]* Okay now I am going to have you fill out the same questionnaire as before once more. Please let me know when you are finished. *Click on the Post-DEAL tab to reveal the questionnaire.*

Debriefing

1. The study is now complete. I will now debrief you on the purpose of the study. As you know, you completed a questionnaire through SONA prior to this study. We used that questionnaire to identify whether or not you have certain symptoms of anxiety. We invited you to participate because you met our qualifications for our target number of anxiety symptoms. The purpose of this study was to see if co-occurring laughter and amusement can protect people with symptoms of high anxiety from the negative effects of stress and even decrease negative affect overall. We hypothesized that participants who entered the lab with high negative affect who experienced co-occurring laughter and amusement would show a decrease in negative affect post-stressor compared to those who did not experience laughter or amusement. We had two conditions in this study. Those randomized to the first condition watched a neutral video and were told not to express their feelings or emotions. This was the no amusement, no laughter condition. Those randomized to the second condition watched a humorous video and were told to express amusement. This was the co-occurring amusement,

- laughter condition. You were in the (insert either first or second) condition. The stressor task we administered was masked as a verbal fluency task.
2. We will compare your survey responses from the beginning of the study to your survey responses at the end of the study (after the stressor). Examining the stress buffering effects of laughter and amusement on people with symptoms of high anxiety may help us understand and create possible therapeutic treatments and exercises to benefit the increasing number of people who suffer from anxiety.
 3. Additionally, we fabricated that the average Vanderbilt undergraduate can list about 30 J-words in 2 minutes. This information was meant to add to the stress of the task.
 4. Do you have any questions? Comments? Concerns? Thank you for participating in our study.

When Participant Leaves

1. Sign the consent form and put it in the top drawer of the filing cabinet in the corner of the room.
2. Plug the video camera into the Mac computer (using the USB cord). It also needs to be plugged into the power adapter (which is plugged into the wall to the right of the computer).
3. Open up the canon drive on the desktop and click on the video icon.
4. Scroll to the clip of the participant you just ran and open it in Quicktime.
5. Save the Quicktime file to the desktop in the folder labeled "Participant Clips". Label it as "Participant #" (Example: the first participant's clip was labeled "Participant 1")

6. Exit out of Quicktime.
7. Eject video camera. Make sure that it is charged for the next participant. You can delete some of the video clips to make room on the camera AS LONG as they are uploaded to the computer.

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