

THE RELATIONSHIP BETWEEN TRAIT SELF-COMPASSION AND HEART RATE
DURING STRESS

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Supervised by Dr. Shadi Beshai

University of Regina

by

Sarah Nykiforuk

Regina, Saskatchewan

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Abstract

Extreme and prolonged exposure to stress can have detrimental effects on physical and mental health (Farrell et al., 2017). People who report higher levels of stress are more likely to report functional and social impairments (Palmer & Cooper, 2013). Faster recovery from stress is associated with fewer negative health outcomes and better coping with such outcomes if they occur (Bowers & Yehuda, 2015). Trait self-compassion is a concept closely related to the Buddhist concept of mindfulness (Neff, 2015). It consists of three main components: self-kindness, common humanity, and mindfulness (Neff, 2003). Higher levels of self-compassion have been associated with greater empathy, more patience, greater acceptance (of self and others), and better coping with stress (Patsiopoulos & Buchanan, 2011). The purpose of this research was to determine whether levels of trait self-compassion predicted stress reactivity and recovery, over and above other factors (i.e., demographics and depressive symptoms). A total of 110 Participants recruited from the University of Regina were asked to complete a modified Trier Social Stress Test (TSST) to determine their reactivity and recovery from stress. After completion of the TSST, participants were asked to complete several questionnaires. We predicted that self-reported levels of trait self-compassion would predict stress responses (reactivity and recovery after the TSST), beyond variance explained by other measures. A correlation analysis indicated that our modified TSST manipulation was successful. A hierarchical linear regression demonstrated that self-compassion levels had no effect on stress reactivity and recovery. It is possible that trait self-compassion does not have the same protective abilities against stress as learned self-compassion. Trait self-compassion may be unrelated to the physiological correlates (i.e., heart rate) of stress.

The Relationships Between Trait Self-Compassion and Heart Rate During Stress

Individuals experience stress when they feel that they are unable to cope with a stressor (Palmer & Cooper, 2013). Small amounts of stress can be productive, as it may motivate people to do well and complete tasks in timely, efficient, and successful manners (Palmer & Cooper, 2013). However, large amounts of stress are associated with heightened personal distress and may negatively impact people's lives (Farrell, Simpson, Carlson, Englund, & Sung, 2017). Extreme or prolonged exposure to stress can have many harmful emotional, physical, and cognitive effects; depression, anxiety, and post-traumatic stress disorder can all emerge as an effect of stress (Bowers & Yehuda, 2015). Additionally, high stress levels can result in diminished physiological health (e.g., body pains, headaches; Silva et al., 2017). People who experience high levels of stress can exhibit lower self-esteem, more aggression, and deficits in attentional capabilities (Bowers & Yehuda, 2015). Stress can be passed down from parents both environmentally (i.e., as a result of having preoccupied and anxious caregivers; Farrell et al., 2017) and physically (i.e., due to stress-related hormonal imbalances and disruptions in uterine blood flow during pregnancy; Bowers & Yehuda, 2015).

Researchers have shown that prolonged experiences of stress can have adverse effects. Extreme stress can be related to exaggerated physiological responses to stressors and a diminished ability to return to equilibrium after the removal of stressors (Palmer & Cooper, 2013). Increased heart rate is a normal response to stress; however, when the increase in heart rate as a reaction to stress is chronic, it can lead to cardiovascular problems and other issues (Tucker, Pfefferbaum, Jeon-Slaughter, Khan, & Garton, 2012). Normal amounts of stress typically cause responses such as increased heart rate, sweating, dry mouth, nausea, and increases in stress-related chemicals in the body (e.g., cortisol; Tucker et al., 2012). Stress levels

are usually determined by measuring these responses. Physical and mental health are directly related to responses to and abilities to recover from stress (Tucker et al., 2012). People who recover faster from stress show fewer negative side effects and any side effects they do experience dissipate faster than in people who take extended time periods to recover (Neff, 2015).

Self-Compassion

Self-compassion has many similarities with the Buddhist concept of mindfulness (Neff, 2003). Self-compassion has been described as an acceptance of one's own hardships, care and kindness towards oneself, and recognition and acceptance of one's own shortcomings; the ability to soothe oneself when experiencing difficult situations is also of great importance to self-compassion (Neff, 2003). Self-compassion involves a kindness toward oneself instead of being judgemental, recognizing the common human experience of suffering, relating one's experiences to those of other people, and being mindful of one's own suffering (Neff, 2015). To date, researchers have found that higher levels of self-compassion facilitate better coping with stress, more optimism, higher life satisfaction, and lower levels of depression and anxiety (Chishima, Mizuno, Sugawara, & Miyagawa, 2018; McGehee, Germer, & Neff, 2017; Patsiopoulos & Buchanan, 2011).

Self-compassion is comprised of three continuums: (a) self-kindness versus self-judgement, (b) common humanity versus isolation, and (c) mindfulness versus over-identification (Choo & Marszalek, 2018; López, Sanderman, & Schroevers, 2018). Neff (2003; 2015) describes self-kindness as demonstrating gentleness, understanding, and acceptance toward oneself in times of suffering. Common humanity refers to a recognition that a person is not alone or isolated in their life challenges. It also involves understanding that everyone faces

hardships and difficulties and an ability to find solidarity in these situations. The overarching construct of mindfulness is a practice that comes from Buddhist philosophy; however, in the context of self-compassion, mindfulness refers to a conscious awareness of one's own suffering. People practicing mindful self-compassion are aware of negative emotions and experiences, yet do not get preoccupied, distracted, or overly focused on them (Neff, 2015).

Researchers have consistently demonstrated that heightened self-compassion is associated with improved physical and mental health. Germer and Neff (2013) found that self-compassionate individuals typically exhibited enhanced motivation and fewer fears of failure. Low levels of self-compassion are associated with higher rates of depressive symptoms (López et al., 2018). Self-compassion has been linked to greater emotional wellbeing and lower levels of anxiety (McGehee et al., 2017). Researchers have also found that people with higher self-compassion exhibit resiliency, perseverance, and strong coping mechanisms when they do experience failure (Zhang et al., 2018). In addition, self-compassion has been linked to better physiological health. Researchers suggest that this improved physiological health may be due to the association of self-compassion with conscientiousness, motivation, and dedication (Luo, Qiao, & Che, 2018). As such, individuals with higher levels of self-compassion may demonstrate more concern with their health and can be more committed to maintaining healthy lifestyles (e.g., healthy eating, sufficient exercise regimes). Researchers have also found that people who are self-compassionate have greater regard for themselves, their health and their general sense of wellbeing than those who are not (Neff, 2015). Gilbert and Procter (2006) found that learning to practice self-compassion can be beneficial to people of many different demographics and is particularly helpful for individuals dealing with unwarranted feelings of guilt and shame.

Accordingly, self-compassion appears to be closely linked with indices of health and well-being (Homan & Sirois, 2017; Choo & Marszalek, 2018).

Trait self-compassion is a normally distributed, individual-difference trait that individuals exhibit naturally and without any interventions (Germer & Neff, 2013). There are several hypotheses as to why some people have naturally higher levels of self-compassion than others. For example, Gilbert and Procter (2006) suggest that people who have less extreme reactions in the sympathetic division of their autonomic nervous system when experiencing perceived environmental threats consequently show higher trait self-compassion. In addition, several studies have linked trait self-compassion with childhood experience and attachment style. Germer and Neff (2013) found that people with insecure attachment styles tended to exhibit lower self-compassion than those with secure attachment styles. Self-compassion has also been closely linked with history of trauma. People who experience trauma tend to have deficits in their self-compassion levels (Held, Owens, Thomas, White, & Anderson, 2018). Accordingly, it appears that early life experiences seem to play a large role in the development of self-compassion, but genetics and other biological factors may also be implicated.

Self-Compassion and Stress

As mentioned, self-compassion can exist as a trait, but may also be enhanced through the use of self-compassion training (SCT; Arch, Landy, & Brown, 2016). Researchers found that SCT may be a better predictor of stress responses than attachment styles, social-anxiety levels, or rumination levels (Arch et al., 2016). In addition, researchers have found that SCT inhibits anxiety and physiological responses (e.g., stress-related hormones) when exposed to stressful situations (Evans, Wyka, Blaha, & Allen, 2018). However, evidence suggests that people

respond differently to SCT depending on their pre-existing traits and conditions which can impact its levels of success.

Patsiopoulos and Buchanan (2011) studied self-directed self-compassion in 15 practicing clinicians. The clinicians' behaviours were observed during counselling sessions, in their workplaces, and in their personal lives. The researchers identified important themes that self-compassionate clinicians demonstrated such as (a) acceptance of themselves and others, (b) recognition of their knowledge deficits, (c) use of positive self-talk, (d) present-centred orientation, (e) self care and occasional self-indulgence, and (f) forgiveness of themselves and others. One of the conclusions drawn from this research was that self-compassion requires deliberately paying attention to the self and ensuring one's own psychological health before attempting to assist others. Participants who demonstrated higher self-compassion levels showed better coping with stress and less fatigue. Participants who used more self-compassion strategies reported better physiological health, higher senses of spirituality, and more life-satisfaction. As such, the researchers found that people who practice self-compassion may experience more self-esteem, more self-confidence, and more overall happiness. The researchers suggest that people who practice self-compassion can have more positive emotional influences on the people around them.

Some evidence also suggests that higher self-compassion is associated with improved responses during stressful periods. The Trier Social Stress Test (TSST) is a standardized laboratory-induced stress procedure that is used to measure stress reactivity and recovery (Kirschbaum, Pirke, & Hellhammer, 1993). Using the TSST, Arch et al. (2014) compared a group of female participants who were trained to practice self-compassion to a control group of females. They found that individuals trained in self-compassion experienced fewer negative

effects from stress in comparison to individuals in the control condition. Using heart rate variability, salivary cortisol, and salivary alpha-amylase as measures, the researchers demonstrated that SCT improved psychological and biological responses to stress (Arch et al., 2014). SCT correlated with lower levels of aggression and self-criticism and more positive reactions to negative events. Higher levels of self-compassion resulted in less activity in the sympathetic nervous system in response to stressors (Arch et al., 2014).

Current Research

No studies to date have been conducted to specifically examine if trait self-compassion is a significant predictor of heart rate reactivity and recovery during stress. Furthermore, none of the existing literature compares the predictive ability of the self-compassion with that of vulnerability variables (e.g., depression symptoms) in predicting stress reactions. In addition, the majority of the existing research has been done primarily with females. In this study, we examined trait self-compassion as a predictor of stress reactivity and recovery in a young adult population consisting of both males and females. The present study was intended to close the gap in the literature by examining individuals' levels of trait self-compassion and comparing it to their heart rate activity during a stressful situation.

This study examined whether higher levels of trait self-compassion were associated with (a) lower heart rate reactivity during stress, and (b) faster heart rate recovery to baseline after the stressor was removed. Based on previous findings by Luo et al. (2018), we predicted that individuals who demonstrated higher levels of trait self-compassion would demonstrate smaller variations in heart rate reactivity (i.e., their heart rates under stress would more closely resemble their heart rates at baseline). We also hypothesized that the heart rates of individuals with higher

self-compassion would return to baseline faster than those with low self-compassion (Arch et al., 2014).

Methods

Participants

Power Analysis. Through a preliminary power analysis, we determined that a minimum of 80 participants needed to be tested to attain a medium-sized effect. Our final sample consisted of 110 participants.

All 110 participants were students from the University of Regina who were recruited using the university's Psychology Research Participant Pool. Participants received one percent credit toward one of their psychology classes as compensation. Participants were all 18 years of age and older and consisted of both males and females. Anyone who self identified as having heart conditions or blood pressure higher than 140/90 was not be eligible to participate as a safety precaution since a laboratory-induced stressor was used. The pertinent demographic information is summarized in Table 1.

Table 1. Demographic characteristics.

	Frequency (<i>n</i>)	Percentage	Mean	Standard Deviation	Cronbach's α
Age			21.48	4.82	
Sex					
Female	86	78.2			
Marital Status					
Single/Never Married	101	98.8			
Married	5	4.5			
Other	4	3.6			
Ethnicity					
White/Caucasian	66	60			
Asian	24	21.8			
Black	8	7.3			

Middle Eastern	6	5.5		
Indigenous	4	3.6		
Other	7	6.4		
Year of Study				
1	24	21.8		
2	36	32.7		
3	27	24.5		
4	15	13.6		
5+	8	7.3		
Major of Study				
Psychology	56	50.9		
Biology/Biochemistry	14	12.7		
Health Studies/Nursing	7	6.4		
Business/Finance	6	5.5		
Human Justice	5	4.5		
Undeclared	8	7.3		
Other	14	12.7		
Employment Status				
Employed Part-Time	65	59.1		
Unemployed	42	38.2		
Other	3	2.7		
History of Psychiatric Condition				
Yes	19	17.3		
Patient-Health Questionnaire			8.2	6.2
Self Compassion Scale – Short Form			35.5	8.9
				.90
				.87

Measures

TSST (Kirschbaum et al., 1993). A modified TSST was used to measure stress reactivity and recovery. The TSST is a standardized laboratory stress-inducing procedure. In a traditional TSST, participants are asked to create a presentation and deliver it to a live panel of experts for evaluation (Jönsson et al., 2010). Typically, the panel of judges is made up of actors trained to remain expressionless throughout the presentation. In the present study we modified the protocol by informing participants that they were to present to a panel of judges virtually,

over video conference using a web camera. However, after preparing, participants were told that they would not actually have to deliver their presentation. The main measure of stress reactivity in a traditional TSST is heart rate variability, but measures of recovery time, respiration, electrodermal activity, and stress-related hormones can be used as well (Jönsson et al., 2010). The TSST has been demonstrated to be a valid and reliable measure of stress in populations of healthy adults (Kirschbaum et al., 1993).

Self-Compassion Scale – Short Form (SCS – SF; Raes et al., 2011). The SCS – SF was administered to assess trait self-compassion. The full SCS consists of 26 questions, while the short-form consists of 12. Items are rated using a Likert scale ranging from 1 (*almost never*) to 5 (*almost always*), and higher scores are indicative of greater self-compassion. The short-form scale has been studied and established as a valid measure of self-compassion (Raes, Pommier, Neff, & Van Gucht, 2011). The short-form scale scores are highly correlated with the long-form scale scores (Raes et al., 2011). The scale has been used extensively with undergraduate student participants of varying backgrounds and ethnicities and is a reliable measure with these demographics (Raes et al., 2011). The SCS – SF measures the hypothesized components of self-compassion with categories for self-kindness, self-judgement, common humanity, isolation, mindfulness, and overidentification (Neff, 2003).

Patient-Health Questionnaire (PHQ-8; Kroenke & Spitzer, 2002). The PHQ-8 is an 8 item self-report questionnaire that is used to measure depressive symptoms over the last week. The PHQ-8 has been used extensively in depression research, mainly with adult populations. Items are rated using a Likert scale ranging from 0 (“*not at all bothered by these problems*”) to 3 (“*bothered by these problems nearly every day*”), and higher scores indicate greater endorsement of depression symptoms. Researchers have shown that people who score higher on the PHQ-8

show higher functional impairment and utilize mental-healthcare more often than individuals scoring lower on this scale (Kroenke & Spitzer, 2002). The PHQ-8 appears to be a reliable and valid measure of the severity of depression and depressive symptoms (Kroenke & Spitzer, 2002).

Procedure

Participants were directed to a private room by a trained researcher, where they were informed what the project would entail and asked to provide their written consent. After consent was obtained, and after an acclimation period of five minutes, participants were then asked to secure a chest-band heart rate monitor around their chests, sitting approximately one half-inch below the rib cage. After they privately secured the chest-band monitor, the researcher ensured that a heart rate reading was observed for five consecutive seconds and, once this was established, the researcher would ask the participant to sit quietly and then left the room for timing of the baseline phase (0-3 minutes). The researcher recorded the participant's baseline heart rate at 0 seconds, 30 seconds, 1 minute, 1 minute and 30 seconds, and 2 minutes. An average of the five recorded heart rates was calculated. The experimenter would then inform the participant that they would have three minutes to prepare a presentation on "why they were a good friend," after which they would have to present via web-camera to a panel of three expert judges for evaluation. The experimenter recorded the participant's heart rate in this preparation phase in the same five 30-second intervals as in the baseline phase. The remaining minute was used to calculate an average heart rate for the preparation phase. The researcher then informed the participant that they no longer had to provide their presentation and they were asked to sit quietly in the room (recovery phase). The researcher then began recording the time it took the participant, in seconds, to return to the average baseline heart rate or lower and remain there for five consecutive seconds.

After the physiological measures were obtained the participant was asked to complete several self-report questionnaires (i.e., SCS – SF and PHQ-8) as well as a demographics survey. This was done on a computer using the web-based program, Qualtrics, an online, secure surveying software. All participants were thoroughly debriefed at the end of the protocol and before they departed.

Data Analysis

All data analyses were conducted using IBM SPSS version 23. An alpha of .05 was used as the standard for significance for the analyses. Descriptive statistics were examined to determine means and standard deviations for the data. A reliability analysis was used to determine Cronbach's alpha for the PHQ and SCS – SF items. A paired-samples t-test was used to determine whether the manipulation was successful and whether heart rates were increased as a result of the TSST. A manipulation check was conducted to determine mean differences between the baseline and reactivity phases. Pearson correlations were calculated to examine the relationships between scores for baseline heart rate, preparation heart rate, recovery time, total PHQ scores, and total SCS – SF scores. A hierarchical linear regression was conducted to determine whether trait self-compassion significantly predicted recovery from stress beyond what is accounted for by age, gender, and depressive symptoms. For the regression, demographics were entered into the first block, depressive symptoms were entered into the second block, and trait self-compassion scores were entered into the third block. Recovery time was used as the dependent variable. Stress reactivity was measured in our modified TSST by calculating a baseline heart rate and a preparation heart rate and subtracting the baseline calculation from the preparation. Stress recovery was measured by recording the amount of time it took for heart rate to return to baseline after the termination of the stressor.

Results

Manipulation Check

A manipulation check determined whether the stressor in the TSST was effective. Baseline heart rate ($M = 84.64$, $SD = 14.02$) was significantly lower than preparation heart rate ($M = 94.62$, $SD = 15.76$), $t(110) = 10.31$, $p < .001$. This suggested that the manipulation in the modified TSST was successful.

Zero-Order Correlations

Baseline and reactivity heart rates were significantly correlated. Additionally, PHQ scores were significantly correlated with SCS – SF scores which corresponds with conclusions regarding depressive symptoms and self-compassion made in previous research (e.g., López et al., 2018). The complete correlation matrix is presented in Table 2.

Table 2. Correlation matrix for study measures.

Measure	1	2	3	4	5
1. Baseline Heart Rate	-	0.776**	-0.089	0.123	-0.17
2. Preparation Heart Rate	0.776**	-	-0.002	0.066	-0.001
3. Self Compassion Scale – Short Form	-0.089	-0.002	-	-0.532**	0.043
4. Patient-Health Questionnaire	0.123	0.066	-0.532**	-	-0.14
5. Recovery Time	-0.17	-0.001	0.043	-0.14	-

** $p < .001$

Unique Variance Predicted by Self-Compassion in Heart Rate Recovery

A hierarchical linear regression analysis indicated that self-compassion was not a better predictor of heart rate recovery than other variables in our sample. The complete results of the regression analysis are summarized in Table 3.

Table 3. Results of a regression analysis of SCS – SF scores as predicting recovery time beyond variance contributed by demographic variables and PHQ scores.

Outcome: Recovery Time	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1: $R = .20$, $R^2 = .04$				
Age	-0.99	0.87	-0.12	-1.15
Gender	-20.55	10.12	-0.21	-2.03
Step 2: $R = .23$, $R^2 = .05$, $\Delta R^2 = .01$				
Age	-1.08	0.87	-0.13	-1.24
Gender	-18.65	10.28	-0.19	-1.81
Patient-Health Questionnaire	-0.68	0.65	-0.10	-1.05
Step 3: $R = .24$, $R^2 = .06$, $\Delta R^2 = .004$				
Age	-0.96	0.89	-0.11	-1.08
Gender	-17.92	10.37	-0.18	-1.73
Patient-Health Questionnaire	-0.95	0.77	-0.14	-1.23
Self Compassion Scale – Short Form	-0.36	0.55	-0.08	-0.66

Discussion

Summary

This study utilized a modified TSST to induce stress in 110 participants. Stress levels were calculated based on heart rate reactivity and recovery. Participant demographics, depressive symptoms, and self-compassion levels were also assessed. The intention of this study was to determine whether self-compassion better predicted stress responses than demographic variables and depressive symptoms. Prior to this research, there had not been any inquiry into the effects of trait self-compassion, specifically, on physiological stress responses. Self-compassion has been studied extensively but almost exclusively in the context of SCT strategies. Research on trait self-compassion has been neglected. This study was a first step in closing the literature gap regarding trait self-compassion and its interactions with bodily reactions to stress.

The ways in which people react to and deal with stress can have significant influences on their lives. One of the goals for this research was the potential to expand support options for people dealing with stressors. We theorized that if higher trait self-compassion was associated

with responses to stress, it could elucidate mechanism of the protective effects of self-compassion during stress. However, our results were not consistent with our hypotheses and, as such, we were unable to provide evidence that trait self-compassion served as a protective mechanism against physiological stress. These results were inconsistent with the findings of Arch et al. (2014; 2016) who found that learned self-compassion did moderate stress reactivity and recovery. This difference in results is potentially due to the fact that we measured only trait (i.e., dispositional) self-compassion levels while participants in Arch et al.'s studies were trained to practice self-compassion. This may indicate that trait self-compassion is not beneficial for dealing with stress but deliberate training in self-compassion strategies may be.

There are many possibilities as to why this study yielded only insignificant results. The majority of published work on self-compassion is in regard to that which is learned through SCT. Trait self-compassion had not been studied experimentally prior to this study. The only works written on trait self-compassion, specifically, are by its creators (Neff, 2003; Neff, 2015). There is a possibility that dispositional self-compassion does not actually exist; it is possible that the trait is only activated with deliberate learning and practice. In fact, many studies have indicated that individuals who learn self-compassion strategies exhibit better coping strategies than those in control groups (Arch et al., 2016; Luo et al., 2018). This may be because self-compassion is a learned strategy that must be practiced in order to be efficacious. It is probable that few of the participants in this study had ever practiced self-compassion strategies so their SCS – SF scores may have just been random. There is no evidence to suggest whether or not self-compassion must be deliberate in order to have protective benefits but it is a possibility of which further inquiry should be sought.

Strengths

Extensive education in the area of self-compassion and stress responses preceded the execution of this study. Researchers were trained in proper protocol for the implementation of a successful TSST. There was also considerable evidence for the efficacy of self-compassion in the context of stress responses. Evans et al. demonstrated that self-compassion is associated with less elevated physiological responses to stress (2018). Additionally, there has been evidence that self-compassion specifically moderates variability of heart rate in response to stress (Luo et al., 2018). People with high levels of self-compassion have been shown to demonstrate healthier lifestyles and coping mechanisms (Zhang et al., 2018). This study was founded on principles established by a collection of reputable and empirically validated research studies.

The manipulation in our modified TSST was successful. This means that our insignificant results were not a product of our modification. Our results were consistent with results from a similar study by Jönsson et al. (2010). Their research indicated that live judges were not necessary to successfully achieve an elevated stress response during a TSST. Our research demonstrated that participants do not even need to present, but that preparing for a presentation is enough to create a statistically significant stress response, in itself. This is important because our modified TSST was more cost and time efficient but it worked just as well as a traditional TSST.

Limitations

Our sample consisted entirely of undergraduate university students and the majority of them were female (78.2%), Caucasian (60%), and majoring in psychology (50.9%). For these reasons, our findings are not likely generalizable to other demographics. Our reasoning behind using this sample was mainly ease of recruitment but it did limit our potential findings. It is possible that statistically significant results could be found in other populations; for example,

other researchers have found significantly greater coping mechanisms due to higher self-compassion levels in Japanese populations (Chishima et al., 2018).

The original SCS allows a measure of each of the main components of self-compassion by computing the average for each category. However, studies show that these measures may not be reliable and should not be computed with the SCS – SF since there are fewer questions in each category (Neff, 2003). This should not have been a problem for our research as we were not concerned with the individual components but with self-compassion as a whole. Raes et al., demonstrated that the short form scale was consistent with the results of the long form (2011). However, there is still a possibility that, since we used fewer questions, the scale was not able to fully and accurately capture the trait self-compassion levels of our participants.

Another potential limitation in our method was the possibility for human and mechanical error. We recorded heart rates with technological devices that may have malfunctioned without the knowledge of the researchers. The researchers also did all of the timing and recording by hand which may have resulted in slight miscalculations and mistakes. Researchers double checked all of their work for each participant but that is not to say that small mistakes could not have occurred. It is unlikely that any of these mistakes would have been the sole cause of our insignificant findings but we are unable to rule them out completely.

Future Directions

Future studies should compare the effects of trait self-compassion and learned self-compassion. This study was the first to examine trait self-compassion, specifically, in the context of stress responses so more research is needed in the area. It is unclear whether our sample and methodology were the sole causes of our insignificant results since there has been no other inquiry into this subject matter. It could also be beneficial for future researchers to determine

whether higher trait self-compassion levels predict better ability to learn self-compassion strategies (i.e., SCT).

Even though we found that trait self-compassion, in itself, was not enough to protect against elevated stress responses, it could help people to more efficiently learn self-compassion strategies through SCT. Learned self-compassion has been demonstrated to be predictive of stress responses (Arch et al., 2014; Arch et al., 2016; Chishima et al., 2018; McGehee et al., 2017). For this reason, trait self-compassion could be useful in indirectly moderating stress responses.

Future research on trait self-compassion in relation to stress should also consider subjective measures of stress. This study found that trait self-compassion was unrelated to physical stress responses. However, it would be interesting to question participants on their perceived levels of stress. It is possible that our participants' physiological stress responses did not accord with their subjective experiences of stress. It should be determined whether trait self-compassion moderates personal feelings of stress.

Conclusion

This research expanded on prior knowledge on the topic of self-compassion. The inquiry into self-compassion as a dispositional trait was a necessary step in the field of research as it had previously been untouched. Although our research did not yield any significant findings, it was still beneficial. Trait self-compassion may not be related to the physiological correlates of stress but that does not mean it is not useful. There is still a lot of information that needs to be discovered on trait self-compassion and its relationships with physiological and subjective stress responses. This study was a first step in a new direction in the study of self-compassion.

References

- Arch, J., Brown, K., Dean, D., Landy, L., Brown, K., & Laudenslager, M. (2014). Self-compassion training modulates alpha-amylase, heart rate variability, and subjective responses to social evaluative threat in women. *Psychoneuroendocrinology, 42*, 49-58. doi: 10.1016/j.psyneuen.2013.12.018
- Arch, J., Landy, L., & Brown, K. (2016). Predictors and moderators of biopsychological social stress responses following brief self-compassion meditation training. *Psychoneuroendocrinology, 69*, 35-40. doi: 10.1016/j.psyneuen.2016.03.009
- Bowers, M., & Yehuda, R. (2015). Intergenerational transmission of stress in humans. *Neuropsychopharmacology, 41*, 232-244. doi: 10.1038/npp.2015.247
- Chishima, Y., Mizuno, M., Sugawara, D., & Miyagawa, Y. (2018). The influence of self-compassion on cognitive appraisals and coping with stressful events. *Mindfulness, 1-9*. doi: 10.1007/s12671-018-0933-0
- Choo, P., & Marszalek, J. (2018). Self-compassion: A potential shield against extreme self-reliance? *Journal of Happiness Studies, 1-24*. doi: 10.1007/s10902-018-9978-y
- Evans, S., Wyka, K., Blaha, K., & Allen, E. (2018). Self-compassion mediates improvement in well-being in a mindfulness-based stress reduction program in a community-based sample. *Mindfulness, 1-8*. doi: 10.1007/s12671-017-0872-1
- Farrell, A., Simpson, J., Carlson, E., Englund, M., & Sung, S. (2017). The impact of stress at different life stages on physical health and the buffering effects of maternal sensitivity. *Health Psychology, 36*, 35-44. doi: 10.1037/hea0000424
- Germer, C., & Neff, K. (2013). Self-compassion in clinical practice. *Journal of Clinical Psychology, 69*, 856-867. doi: 10.1002/jclp.22021

- Gilbert, P., & Procter, S. (2006). Compassionate mind training for people with high shame and self-criticism: Overview and pilot study of a group therapy approach. *Clinical Psychology & Psychotherapy, 13*, 353-379.
- Held, P., Owens, G., Thomas, E., White, B., & Anderson, S. (2018). A pilot study of brief self-compassion training with individuals in substance use disorder treatment. *Traumatology*. doi: 10.1037/trm0000146
- Homan, K., & Sirois, F. (2017). Self-compassion and physical health: Exploring the roles of perceived stress and health-promoting behaviors. *Health Psychology Open, 1-9*. doi: 10.1177/2055102917729542
- Jönsson, P., Wallergård, M., Österberg, K., Hansen, A., Johansson, G., & Karlson, B. (2010). Cardiovascular and cortisol reactivity and habituation to a virtual reality version of the trier social stress test: A pilot study. *Psychoneuroendocrinology, 35*, 1397-1403. doi: 10.1016/j.psyneuen.2010.04.003
- Kirschbaum, C., Pirke, K., & Hellhammer, D. (1993). The 'trier social stress test'--a tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology, 28*, 76-81. doi: 10.1159/000119004
- Kroenke, K., & Spitzer, R. (2002). The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals, 32*, 509-515. doi:10.3928/0048-5713-20020901-06
- López, A., Sanderman, R., & Schroevers, M. (2018). A close examination of the relationship between self-compassion and depressive symptoms. *Mindfulness, 1-9*. doi: 10.1007/s12671-018-0891-6
- Luo, X., Qiao, L., & Che, X. (2018). Self-compassion modulates heart rate variability and negative affect to experimentally induced stress. *Mindfulness, 1-7*. doi: 10.1007/s12671-

018-0900-9

- McGehee, P., Germer, C., & Neff, K. (2017). Core values in mindful self-compassion. *Practitioner's Guide to Ethics and Mindfulness-Based Interventions*, 279-293. doi: 10.1007/978-3-319-64924-5_11
- Neff, K. (2003). Development and validation of a scale to measure self-compassion. *Self and Identity*, 2, 223–250.
- Neff, K. (2015). The self-compassion scale is a valid and theoretically coherent measure of self-compassion. *Mindfulness*, 7, 264-274.
- Palmer, S., & Cooper, C. (2013). What is stress? *How to Deal with Stress*. London, ENG: Kogan Page Limited.
- Patsiopoulos, A., & Buchanan, M. (2011). The practice of self-compassion in counseling: A narrative inquiry. *Professional Psychology: Research and Practice*, 42, 301-307. doi: 10.1037/a0024482
- Raes, F., Pommier, E., Neff, K., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the self-compassion scale. *Clinical Psychology & Psychotherapy*, 18, 250-255.
- Silva, H., Passos, M., Oliveira, V., Silva, Y., Pitangui, A., & Araujo, R. (2017). Prevalence of anxiety, depression and stress symptoms and its association with neck/shoulder pain in adolescent athletes. *Motricidade*, 13, 13-22. doi: 10.6063/motricidade.9703
- Spitzer, R., Kroenke, K., Williams, J., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med.*, 166, 1092-1097. doi: 10.1001/archinte.166.10.1092
- Tucker, P., Pfefferbaum, B., Jeon-Slaughter, H., Khan, Q., & Garton, T. (2012). Emotional stress

and heart rate variability measures associated with cardiovascular risk in relocated Katrina survivors. *Psychosomatic Medicine*, 74, 160-168. doi: 10.1097/PSY.0b013e318240a801

Zhang, H., Carr, E., Garcia-Williams, A., Siegelman, A., Berke, D., Niles-Carnes, L., Patterson, B., Watson-Singleton, N., & Kaslow, N. (2018). Shame and depressive symptoms: Self-compassion and contingent self-worth as mediators. *Journal of Clinical Psychology in Medical Settings*, 1-12. doi: 10.1007/s10880-018-9548-9