UNIVERSITY OF TWENTE, ENSCHEDE

# Compassion against Stress?

## A RCT Design to test Positive and Negative Emotions as Mediators for the Effect of a Compassion Self-help Course on Stress

Master thesis

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## Abstract

Compassion Focused Therapy (CFT) is a promising approach for a growing mental health problem: stress. Drawing on theoretical and empirical evidence it is assumed that both types of emotions could play a role as an underlying working mechanism for the effect on stress. This study investigated if a CFT-based self-help course could reduce perceived stress and if reductions in stress were mediated by pre-post changes in positive and negative emotions. The used RCT design consisted out of two groups: an experimental group, which worked through a CFT-based self-help book and received e-mail support from counselors over a nine-week period and a waitlist control group. The data of 196 participants was used. The sample consisted out of Dutch participants with a mean age of 53.02. The results showed that the intervention had a significant reducing effect on perceived stress and negative emotions and increased positive emotions three to six months after baseline. When controlling for gender differences, similar effects were found for perceived stress and negative emotions, but not for positive emotions. The reducing effect on stress was mediated by changes in positive and negative emotions. In conclusion, this study showed that a CFT based self-help course did reduce perceived stress and that positive and negative emotions were workings mechanisms in this effect on stress. The current study was the first which investigated this topic. It is recommended to implement a study with a better distributed sample, for example to check if demographic variables are possible moderators. Gender seemed to have influence on self-compassion and its interventions. This should be further investigated to make suitable interventions. Further, it should be checked if other aspects of CFT also function as mediator for the effect on stress, like self-criticism.

**Content**

# 1 Introduction

The effects of Compassion Focused Therapy (CFT) on mental disorders are empirically supported (Leaviss & Uttley, 2015). But what is about other (mental) health problems? In the last decades, stress grew to the world second biggest problem for both mental and physical health (WHO, 2011; Schneider & Riffle, 2012). At the moment CFT's effect on stress is not investigated enough and nothing is known about possible working mechanisms. To further investigate this topic, the following research was done.

## *1.1 Stress*

Everybody knows the feeling of stress from the daily life, but the great impact it can have often is overlooked. According to the World Health Organization, stress is the world's second biggest health problem (WHO, 2011). Considering the role of stress, the term itself has to be discussed. Lazarus (1966) defines stress as a response from the interaction between the individual and the situation. Thus, not an event itself causes stress, but the personal interpretation of that event (Schneider & Riffle, 2012). Additionally, Lazarus and Folkman (1984) state that next to the interpretation of the event, also the available resources of the individual play an important role. Resources are the mental capacities of an individual that help cope with stress like skills, strategies and social support (Odgen, 2012).

The reason why an individual can feel stress in the first place can be found in the human evolution. The concept of stress gave the individual an advantage with the opportunity to cope fast with situations that needed action or defense. Stress lead in the short term to a quick preparation of the body with an increased heart rate or hormonal adaption like the secretion of adrenalin. If the stress level remains high, a slower reaction via the bloodstream occurs which leads to a secretion of cortisol. In this state more energy is mobilized. If the stress still does not cut down, it will lead to exhaustion. Thus, intense or chronic stress has negative consequences (Schneider & Riffle, 2012). Because of the evolutionary development of the brain, humans are able to imagine or think abstractly. Combined with defense mechanisms, like stress, this becomes one of the factors to develop mental health problems. Negative experiences can be relived again or ruminated on, due to the human ability of imagination and complex thinking. This of course leads to prolonged stress and to an intensification of negative emotions. This phenomenon is called "tricky brain" (Gilbert, 2014).

A study of Turner and Lloyd (2004) indicates that stressful major life events may lead to depression and anxiety disorders in young adults. This effect was seen in both sexes and all ethical groups (Turner & Lloyd, 2004). Kanner, Coyne, Schaefer and Lazarus (1981) showed that there is a significant correlation between the number of daily hassles and depression. So, according to the study, both stressful major life events and the daily life stress through daily hassles have a negative influence on the mental health of the person. The great influence of stress on the human body can be explained by its two-sided impact. Stress has a direct negative influence on for example wound healing, the

immune system and the heart (Odgen, 2012). The indirect effect of stress on the physiological health is that people often show an unhealthy behavior during a stressful period. Such unhealthy behaviors include smoking, drinking alcohol or bad eating habits (Schneider & Riffle, 2012). The amount of negative consequences on physical and mental health implies that stress causes problems for society and the economy, too. For example, people suffering from stress need more (medical) care and have more absent days. Additionally, it seems that due to work intensification, which takes place in modern time, stress is and will get even more problematic. This intensification consists of demands on the one hand (high work speed and complex tasks) and of the constant feeling of insecurity on the other hand caused by the fear of unemployment (Korunka & Kubicek, 2013).

*1.2 Compassion and Compassion Focused Therapy*

In order to prevent a state of exhaustion and the negative mental and physiological consequences of stress, effective interventions have to be found. There is indication that the relatively new treatment approach in the sector of mental health, Compassion Focused Therapy (CFT), is a suitable option to reduce stress. Compassion itself is an old concept developed in Buddhism and can be defined as the ability to tolerate pain and feel connected with the pain of oneself or others (Gilbert, 2014). Thereby, it is not self-pity nor pity in general. Compassion deals with accepting and, subsequently, confronting pain (Van den Brink & Koster, 2013). Compassion can be separated into three different forms that correlate. First of all, there is compassion for the self, then there is compassion for others, and finally there is the compassion from others for oneself (thus compassion from the surrounding) (Gilbert, 2014).

CFT is based on evolutionary assumptions and predicates that there are three emotional regulation systems. The first system is the threat-protection system that contains, among others, the emotions anger, anxiety and disgust. This gives the individual the ability to detect and respond to danger. The threat – protection system can be activating, with a flight or fight response, but also deactivating with feelings of hopelessness or despair. It is the most dominant factor in the issue of "tricky brain" and often a major factor in developing mental illnesses. The second affect regulation system is the positive affect system of seeking and acquiring or the drive system, which focuses on stimulating and activating emotions like drive, excite and vitality. This regulation system functions as a reward for seeking and acquiring resources. This system is also linked to competitive drives and the social position. Problems occur when resources are excessive; this system can lead to a hypomanic state of mind. In western (capitalistic) societies, the drive system is often over stimulated with the feelings of "seeking", "me focus" and general activation. Especially when a goal cannot be achieved, this can lead to a feeling of hopelessness and failure which makes a person vulnerable to different mental illnesses (Gilbert, 2014).

The third emotion regulation system is that of positive affects of contentment, safeness, peacefulness and affiliation or the soothing system. This is the system which focuses on recreation and

it is of a deactivating nature. When an individual is not under threat and does not try to achieve anything, the person can feel content, accepting, non-striving, connected to others and safe. The two activating systems are then shut down (Depue & Morrone-Strupinsky, 2005). Even though the soothing system is associated with well-being, it is unfortunately often not as pronounced as the other two. In CFT, it is attempted to establish a balance in the three affect regulation systems. This is done via enhancing this third affect regulation system of contentment, safeness, peacefulness and affiliation and via the regulation of the other two.

The structure of CFT usually begins with psycho-education about among other things, the three affect regulation systems. Furthermore, CFT contains a formulation process, where the participant gets insight into the different coping strategies and how they got influenced by old experiences. Additionally, skills to train compassion like breathing and relaxation exercises, yoga and imaginary exercises (e.g. recall of being compassionate method) are taught. Such exercises should activate the positive affect regulation system of safeness and contentment. The participant learns how to use compassionate capacities in problematic situations. Thus, the handling with positive and negative emotions is a set part of CFT and compassion in general (Gilbert, 2014).

### *1.3 Empirical Evidence for the Effectiveness of Compassion or CFT based Interventions*

The results of previous studies regarding compassion or CFT are promising. A meta-analysis of Leaviss and Uttley in 2015 shows that CFT has a significant effect on mood disorders like depression. Especially participants who had to deal with a lot of self-criticism seem to profit from this kind of intervention. Another meta-analysis from Kirby, Tellegen and Steindl (2015) about several compassion based programs included five RCT studies about CFT interventions. They show a reducing effect on depressive and anxiety symptoms. In addition, a small to moderate effect was shown for psychological distress (which was here defined as the state of all mental health problems and disorders, including stress, emotions, and current symptoms) and moderate effects for life satisfaction (Kirby, Tellegen & Steindl, 2015). Bluth and Einsenlor-Moul (2017) show in their study that a mindfulness and self-compassion based intervention reduces the perceived stress in adolescents. Further, compassion co-varied negatively with depressive symptoms and positively with resilience. A study from 2016 showed that adolescent participants with a high level of self-compassion reported greater emotional well-being than adolescents with low self-compassion. When exposed to a stressor, the participants with higher self-compassion had a lower physiological stress response than participants with low self- compassion (Bluth, Roberson, Gaylord, Faurot, Grewen, Arzon & Girdler, 2016). However, both of these studies just investigated the effect of self-compassion on adolescents and not adults. Also, the sample sizes were very small, with only 47 and 28 participants.

Summarizing, it can be said that the effects of CFT on stress are promising but not yet sufficiently investigated (e.g. Leaviss &Uttley, 2015; Bluth & Einsenlohr-Moul).

*1.4 Positive and Negative Emotions*

Because of the important role of the three types of affect regulation systems in the basic theory of CFT and its design, it can be assumed that changes in emotions may mediate the effect of CFT on perceived stress. Stress is associated with negative emotions. In a meta-analysis, it was found that during acute stress, participants responded with a physiological response and negative emotions (Feldman, Cohen, Lepore, Matthews, Kamarck & Marsland, 1999). Thus, negative emotions play a major role and have to be taken into account when aiming to reduce stress.

Negative emotions are often oppressed or transformed into actions that harm oneself or people around. However, for a healthy mental state, negative emotions are crucial; they belong to everyone's life. A constructive emotional reaction pattern can even lead to personal growth and development (Hulsbergen, 2013). Paul Ekman introduced this theory in 2008, speaking of constructive and destructive emotional reaction patterns. Like said above, research results state that negative emotions are a central part of stress. This leads to the assumption that when a person learns how to deal with negative emotions properly and thus has a constructive reaction pattern, it could also be helpful to cope with stress. A constructive reaction pattern could be seen as a resource which protects the individual from stress or helps to cope with it in a more effective way. Then stress will not become chronic or that intense. During CFT the participant learns a constructive reaction pattern for negative emotions which are evoked from an overly active threat and drive system. Thus, CFT could be a possible way to reduce stress because it teaches how to react constructively on negative emotions.

The body reacts on negative emotions with muscles tenses or a faster heart rate. This will set the body ready to react on special situations like acute danger. Unlike negative emotions, positive emotions barely evoke a physical reaction or action tendencies. Thus, positive emotions do not have such a direct survival value (Levenson, Ekman & Friesen, 1990). But the Broaden-and-Build Theory explains why positive emotions are still necessary (Fredrickson, 2002). Positive emotions broaden the attention, the cognition and the behavior by making them more flexible, creative and efficient (Broaden-Effect). Furthermore, positive emotions build up long-term resources. These resources can be physical, social or cognitive, and can make the individual more resistant against harm like stress (Build-Effect) (Veehof, Bohlmeijer & Geschwind, 2013). In addition to these positive effects, there is also the Undoing-hypothesis. The hypothesis states that physical reactions from stress or negative emotions get undone faster when confronted with positive emotions afterwards. This is also a finding from Fredrickson and Levenson (1998). They tested this with an experiment where participants were exposed to a stressful situation. Afterwards, the participants saw different films. It became clear that the people who saw a positive film rehabilitated significantly faster than the groups of participants who viewed a neutral or negative toned film. This effect of positive emotions can be linked to the soothing and affiliation affect system. When the other affect regulation systems are shut down, this system can be activated which leads to recreating, making the individual also open for development and personal growth.

This is a very important finding, especially regarding the problem of stress. The Broaden-and-Build Theory, in particular with the findings of the Build-Effect of positive emotions, is a further promising aspect to use positive emotions for stress reduction. In addition, the strong association of negative emotions regarding stress lets assume that a better dealing with negative emotions can function as a coping mechanism and reduce stress. CFT is based on the three affect regulation system theory. Therefore, it tries to regulate negative emotions and enhance positive emotions. The above named aspects imply that changes in positive and negative emotions are crucial working mechanisms in CFT in terms of reducing stress.

### *1.5 Research Question and Hypotheses*

Based on the findings above, this study investigates if CFT can reduce perceived stress. Furthermore, this study aims to test if positive and negative emotions are important working mechanisms of CFT. This presumption leads to the following research question of this paper:

**Can a CFT-based self-help course reduce perceived stress as well as negative emotions and enhance positive emotions three to six months after baseline in comparison with a waiting list control condition?**

**Is the effect of the CFT-based self-help course on perceived stress mediated by changes in positive and negative emotions?**

Based on the literature mentioned above, three hypotheses were formulated. The first hypothesis states that a CFT based self-help course will significantly reduce participants' perceived stress three to six months after baseline in comparison with a waiting list control condition (1). Secondly, it is expected that negative emotions significantly decrease three to six months after baseline in the experimental condition in comparison to the control condition (2). Also, it is predicted that positive emotions increase significantly in that time (3). Furthermore, it is predicted that changes in negative emotions function as a mediator in the effect of that CFT based self-help course on perceived stress (4). Finally, it is hypothesized that changes in positive emotions mediate the effect of CFT on perceived stress (5).

# 2 Methods

## *2.1 Design*

A randomized controlled trial (RCT) with two conditions was implemented. There was an experimental condition that received a self-help course in form of the book "Compassion as a key to happiness"[1] with weekly e-mail support from a counselor. The other condition was a waitlist control condition that got the self-help book after six months without e-mail support. Participants were randomly assigned to the conditions. The time frame of the study was 12 months, when 4 measurements took place: one baseline measurement and three measurements after the intervention. These measurements were done via online questionnaires which could be filled out at home.

## *2.2 Participants and Procedure*

Before implementing the study, ethical approval from the ethics commission of the University of Twente was obtained. The study started with the enrollment of the participants. This happened through an advertisement in two national news papers (i.e. Volkskrant, Trouw). A positively framed text was used: "Do you have an urge for more fun and relaxation in your life? But stress and self-criticism are in the way? Take part in research for a new and free compassion training. Click on www.utwente.nl/zelfcompassie"[2]. For the registration, the interested person had to download a document with information and the informed consent. On this site, one could sign up for the research. To take part, the participant had to be at least 18 years old and own a computer, laptop or tablet. A further inclusion criterion was that the participants had an e-mail address. In order to fill in the questionnaires and read the CFT-based self-help course, it was necessary for the participants to speak Dutch sufficiently. In the end of the registration process, a short screening questionnaire had to be filled in. When the person scored too high on anxiety and depression (with a score of > 11 op depression scale and / or a score of > 11 on anxiety scale from the Hospital Anxiety and Depression Scale (HADS)) or scored too high on well-being (with a score of 4 or 5 on at least one item of the sub scale "emotional well-being" from the MHC-SF and a score of 4 or 5 on at least six items from the sub scale "social well-being" and "psychological well-being" from the MHC-SF), one was excluded from this study. Five days after registration, the person got informed if one could take part in the study.

In total 243 participants took part in this research. Forty-seven were excluded from the analyses. From the excluded participants were 45 with missing data and 2 outliers. It became clear that the group of participants with and without missing values did not differ significantly considering the demographics and the total scores of stress, positive and negative emotions at the baseline.

[1] Original: "Compassie als sleutel tot geluk"
[2] Original: "Heb je behoefte aan meer plezier en ontspanning in je leven? Maar zitten stress en zelfkritiek in de weg? Doe mee met onderzoek naar een nieuwe gratis zelfcompassietraining. Kijk op www.utwente.nl/zelfcompassiel"

The used data came from 196 participants of whom 95 people were in the experimental condition and 101 in the wait list control condition. The participants were between 20 and 78 years old with a mean age of 53.02 years (SD=9.90). More than 75 % of the sample was female. All participants were Dutch. Table1 shows the demographics characteristics of the sample. When comparing the demographics of the two conditions, it became obvious that the conditions differ significantly in the distribution of gender ($p(1) = 0.037$). The control group consisted out of significantly more men than the experimental group. However, there was no difference found at baseline between the two conditions in stress ($p(194) = 0.473$), positive and negative emotions (positive emotions: $p(194)=0.356$; negative emotions: $p(194)=0.693$).

Table 1

*Demographic characteristics of the sample*

| | | Experimental (N=95) | | Control (N=101) | |
|---|---|---|---|---|---|
| Variable | Conditions | Frequency (%) | Mean (SD) | Frequency (%) | Mean (SD) |
| Age | | | 52.52 (9.71) | | 53.49 (10.11) |
| Gender | Men | 17 (17.9) | | 31 (30.7) | |
| | Woman | 78 (82.1) | | 70 (69.3) | |
| Level of education* | High | 83 (87.4) | | 98 (97) | |
| | Low | 12 (12.6) | | 3 (3) | |
| Family status* | Married or registered relationship | 47 (49.5) | | 60 (59.4) | |
| | Not married | 48 (50.5) | | 41 (40.7) | |
| Living situation* | Living with family | 67 (70.5) | | 77 (76.2) | |
| | Living without family | 28 (29.5) | | 24 (23.8) | |
| Job* | Working in a job | 77 (81.1) | | 78 (77.3) | |
| | Not working in a job | 18 (19.1) | | 23 (22.8) | |

**Note:* these variables had more than the presented conditions. Conditions were summarized in these variables because of the low number of participants in some of the conditions.

*2.3 Intervention*

After the baseline measurement, the participants in the experimental condition received the self-help course. They were instructed to work through the course in nine weeks.

The self-help book "Compassion as a key to happiness" provided seven lessons. The participants were asked to approximately read one chapter per week and to do at least one of the exercises during that week. Each lesson worked on a different topic related to compassion. The topics were: developing kindness, emotion systems, self-criticism and self-compassion, activating inner resources, processing childhood/ youth experiences, changing life circumstances and compassion for others. The chapters consisted of two parts. First, the reader got information about the topic. Then, several exercises were presented and explained. One of the exercises was "Breathing Mindfully". Here the participant had to sit down and experience their body mindfully. They should first focus on their breathing and then mentally go through their body and try to experience every sensation they felt. This exercise should be repeated every day, with the goal to strengthen emotion regulation system of positive affects of contentment, safeness, peacefulness and affiliation. Furthermore, there were reflection exercises and experiential reports.

Every participant in the experimental group had a personal counselor from the University of Twente. These were either two psychologists, a PhD student or two Master students with supervision from two experienced GGZ-psychologists. Each week, the counselor sent an e-mail, asking questions about how the week went and about possible problems. Furthermore, this email contact was used to motivate the participants, to give tips and to show a compassionate attitude towards them. This contact aimed to reduce the risk of drop-out. Participants should have answered this mail on Monday at the latest. On Wednesday, participants received feedback from the counselor. The experimental, as well as the control group, were free to use other forms of care such as self-help courses. In the end, if the participant completed all of the questionnaires, they were entered in a drawing to win one of 75 vouchers from 10 to 50 Euro.

*2.4 Measures*

The intervention started after the first measurement, the baseline measurement (T0). The second measurement (T1) was done three months after the baseline measurement. Then two follow-up measurements took place, six (T2) and twelve months (T3) after the baseline measurement. The last measurement (T3) was not included in this study because after the T2 measurement the self-help course was also given to the waiting list condition.

2.4.1 Outcome Measures

To measure the stress level of the participant the Perceived Stress Scale (PSS10) was used. Here the participants had to rate their experiences with stress in their everyday life. This self report questionnaire consisted of 10 items rated a 5-point Likert-Scale, ranging from (0) "never" to (4) very

often. Four of the items had to be rescaled. A high score implied a high perceived stress level. The highest possible score was 40 and the lowest was 0. According to Cohen, Kamarck and Mermelstein (1983), the internal consistence for this test was satisfactory (Cronbach's alpha =.78). The Cronbach's alphas in this study were good with a range from 0.80 to 0.86 for the measurement moments.

#### 2.4.2 Process measures

Positive and negative emotions were measured using the 20-item Positive and Negative Affect Schedule (PANAS). Here the participant rated the presence of 20 different emotions, 10 positive and 10 negative, in everyday life. This resulted into two different scores which described the degree of positive emotions and the degree of negative emotions. The PANAS was scored on a 5-point Likert-Scale from "not at all" (1) to "to a high degree" (5). For each sub scale, the highest possible score was 50 and the lowest 10. A high score implied a high level of positive or negative emotions. Psychometric quality for the Dutch population was tested by Boon and Peeters (1999). Results showed a good internal consistency (Cronbach's alpha = 0.89 for the positive affect sub scale 0.86 for the negative affect sub scale). The Cronbach's alpha was in this study for the positive affect good with a range from 0.85 to 0.88 for the measurement moments. For the negative affect was the Cronbach's alpha good, too with a range of 0.80 to 0.85 for the measurement moments.

### *2.4 Data Analyses*

Data was analyzed with the statistical program SPSS. 21. First, the total and change scores from the outcome and process measures were computed. Forty-five participants with missing data at the measurements T1 or T2 were excluded. Beforehand, it was checked if the participants with missing values differed significantly in demographics using Chi-Square tests. T-tests were used to check if there is a significant difference between the conditions in total scores of perceived stress and positive and negative emotions at the baseline measurement.

Outliers were detected with the outlier labeling rule (Hoaglin, Iglewicz & Tukey, 1986) for the variables, stress, positive and negative emotions. In total, 2 outliers were found, and removed from the dataset. To choose the right statistical tests, a normality test was done for all variables. This was done through visually inspecting histograms. These seemed to be normal distributed histograms, hence the distribution of this sample was considered normal.

After cleaning out the data, demographics of the sample were analyzed. For every test a significance level of 0.05 was chosen. The frequencies were computed and a Chi-Square test was done, to see if there were significant differences between the two conditions regarding demographics. To test hypotheses 1-3, repeated measure ANOVA's were done. They tested if stress and positive and negative emotions improved significantly over the measurement moments in the experimental condition in comparison to the waitlist control condition. Here, the independent variable was the condition (experimental or control condition). Dependent variables were the scores of stress, positive

and negative emotions of the three measurement moments (T0, T1, T2). The within factor was time, thus the three measurement moments. Repeated measure ANOVA was done for the time from baseline to three months afterwards (T0- T1) and from baseline six months afterwards (T0-T2). Given the significant difference in gender between the conditions, it had to be tested if this difference had an influence on the results of the study. Therefore, gender was used as a co-variable in repeated measure ANOVA's. Then these results were compared with the results of the repeated measure ANOVA's without gender as a co-variable. This showed if the co-variable had an influence on the results. Based on these results, two Repeated Measure ANOVA's were done separately for men and women for the variable positive emotions. These showed how gender has an influence on the effect of the CFT-based intervention.

To test the last two hypotheses (i.e. 4 and 5), two single mediator analyses were done using the SPSS add-on PROCESS of Andrew F. Hayes (http://www.afhayes.com). Therefore, the independent variable, condition, and the T0-T2 change score of the dependent variable stress were used. The T0-T1 change scores of negative emotions were the tested mediators in one single mediator analysis (see figure1). The T0-T1 change scores of positive emotions were the tested mediators in the other singly mediator analysis (see figure 2). The mediator analyses consisted out of four steps. First, it was tested if there was a significant effect of the independent variable on the dependent variable (C). Secondly, it was tested if there was a significant effect of the independent variable on the mediator variables (A). Then, it was examined if there was a relationship between the mediators and the dependent variable, when the independent variable is not present (B). Lastly, to support that there is a mediating relationship, it had to be checked if there is an insignificant or meaningful reduced relationship between the independent variable and the dependent variable, when the mediator variable is controlled (C'). If there was a significant mediation effect, the confidence interval of the indirect effect of the independent variable (condition) on the dependent variable (stress) did not include 0. Both mediator analyses were based on 1000 bootstrapping samples with a confidence interval (CI) of 95%.

Figure1: Model of the mediating relationship between CFT, Stress and Negative Emotions

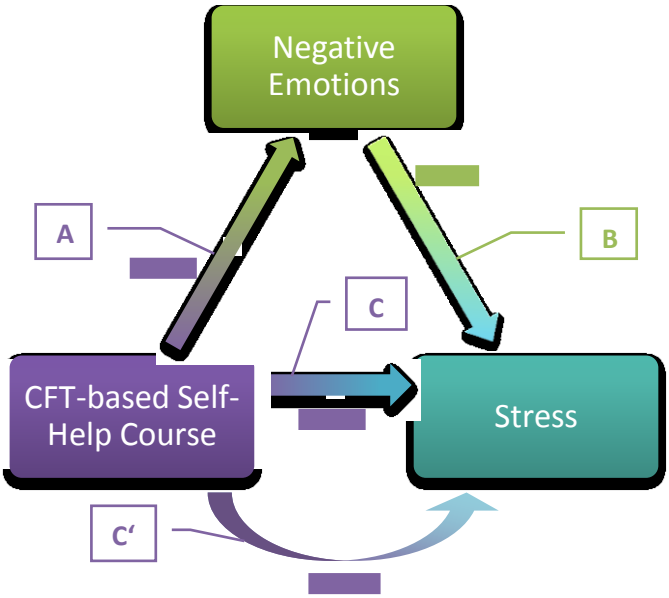
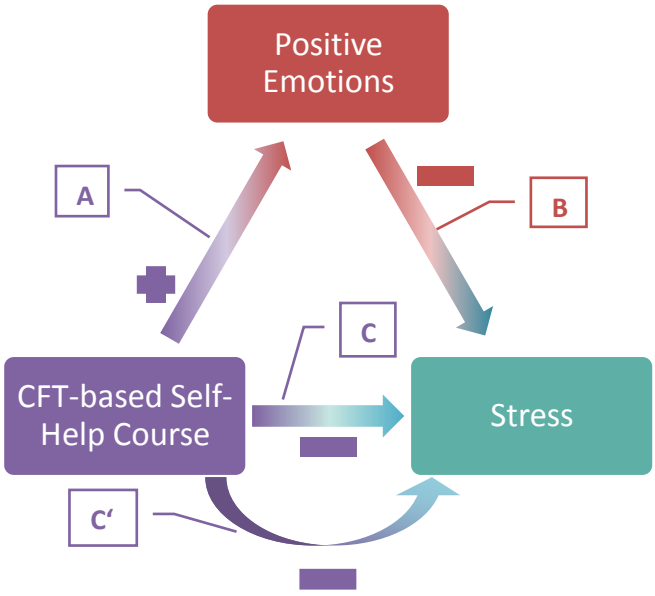



Figure 2: Model of the mediating relationship between CFT, Stress and Positive Emotions



## 3 Results

### *3.1 Effects of a CFT-based self-help course on Perceived Stress, Positive and Negative Emotions - Testing Hypotheses 1 to 3*

The descriptive statistics and the results of the repeated measure ANOVA's for the variables stress, positive and negative emotions are presented in table 2.

Table 2

*Descriptive Statistics for Perceived Stress Negative and Positive Emotions and Results of the Repeated Measure ANOVA*

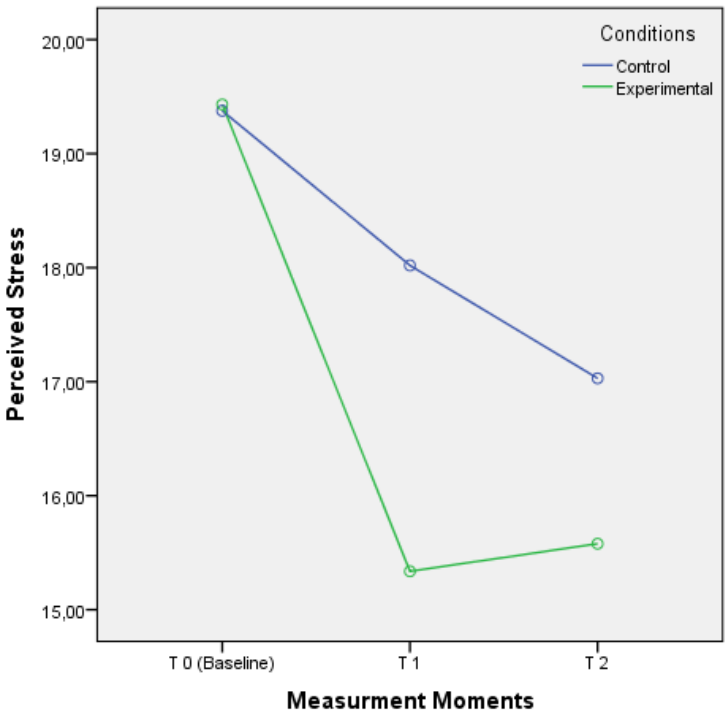
| | | Control Condition (n=101) | Experimental Condition (n = 95) | Repeated Measure ANOVA | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Time | | Group | | Interaction Time * Group | |
| Measurement Moment | | Mean (SD) | Mean (SD) | F | p | F | p | F | p |
| Stress | T0 | 19.38 (5.29) | 19.43 (5.22) | | | | | | |
| | T1 | 18.02 (5.60) | 15.34 (5.53) | 56.02 | .00 | 3.70 | .056 | 14.18 | .00 |
| | | | | (12.88) | (.00) | (4.33) | (.039) | (13.70) | (.00) |
| | T2 | 17.03 (6.19) | 15.58 (4.98) | 39.04 | .00 | 4.38 | .038 | 6.47 | .002 |
| | | | | (11.75) | (.00) | (5.35) | (.02) | (6.31) | (.002) |
| Negative | T0 | 22.26 (5.86) | 22.34 (6.09) | | | | | | |
| Emotions | T1 | 20.88 (6.49) | 19.08 (5.94) | 43.04 | .000 | 1.22 | .270 | 5.59 | .019 |
| | | | | (5.42) | (.021) | (1.09) | (.298) | (5.04) | (.026) |
| | T2 | 20.38 (6.42) | 18.58 (5.31) | 20.25 | .000 | 2.51 | .114 | 3.98 | .021 |
| | | | | (7.79) | (.00) | (2.41) | (.123) | (3.79) | (.023) |
| Positive | T0 | 32.28 (6.11) | 32.24 (5.53) | | | | | | |
| Emotions | T1 | 32.86 (6.71) | 35.54 (5.70) | 28.50 | .000 | 2.84 | .094 | 13.92 | .000 |
| | | | | (8.54) | (.004) | (3.09) | (.080) | (13.94) | (.00) |
| | T2 | 33.76 (6.23) | 35.40 (5.23) | 20.94 | .000 | 3.86 | .051 | 6.32 | .002 |
| | | | | (7.63) | (.001) | (4.35) | (.038) | (6.41) | (.002) |

Note: Between parentheses are the p- and F-values of the repeated measure ANOVA including the co-variable gender

For the time interval between baseline and T1 the repeated measure ANOVA showed neither a significant effect for condition on stress (p (1) = 0.056 with F = 3.70) nor on negative emotions (p (1) = 0.27 with F= 1.22) nor on positive emotions (p (1) = 0.094 with F= 2.84). Time however had a significant effect on stress (p (1) < 0.001 with F = 56.02), on negative (p (1) < 0.001 with F = 43.04) and on positive emotions (p (1) < 0.001 with F = 28.50). The interaction effect of time*condition was also found significant for every variable (stress: p (1) < 0.001 with F = 14.18; negative emotions: p (1) =0.019 with F= 5.59; positive emotions: p (1) < 0.001 with F =13.92). This means that stress and negative emotions of the experimental condition decreased significantly more in the time interval of T0-T1. Positive emotions increased significantly more in the experimental than in the control condition, during that time interval. Comparing these findings with the repeated measure ANOVA which included the co-variable gender, similar results were found.

For the time interval from T0 to T2 the repeated measure ANOVA revealed a significant main effect for condition on stress (p (1) = 0.038 with F = 4.38). However, the effect of the condition on negative and positive emotions was non-significant (negative emotions: p (1) = 0.114 with F = 2.51; positive emotions: p (1) = 0.051 with F = 3.86). The variables stress, negative and positive emotions, all differed significantly over time (stress: p (2) < 0.001 with F=39.4; negative emotions: p (2) < 0.001 with F = 20.25; positive emotions: p (2) < 0.001 with F=20.94). A significant time * condition interaction effect was also found for every of the three variables (stress: p (2) = 0.002 with F = 6.47; negative motions: p (2) = 0.020 with F= 3.98; positive emotions: p (2) = 0.002 with F = 6.32). During the time interval of T0-T2, stress and negative emotions significantly decreased more over time in the experimental condition than in the control condition. Positive emotions increased significantly more in the experimental condition, during that time interval. This implies that the first three hypotheses (1, 2 and 3) can be accepted. Figure 3 shows the progress of the outcome measure perceived stress from the two conditions for the three measurement moments.

Figure 3: Progress of Stress over Time




Comparing these findings with the repeated measure ANOVA which included gender as a co-variable, no major difference was found for the variables stress and negative emotions. One difference was found comparing the results for the variable positive emotions. The effect of the condition on

positive emotions became significant (p (1) = 0.038 with F=4.351). The other aspects remained nearly the same.

The repeated measure ANOVA of the women for positive emotions revealed a significant effect for condition on positive emotions (p (1) = 0.045with F= 4.10). In contrast to that, the Repeated Measure ANOVA for the men revealed a non-significant effect for condition on positive emotions (p (1) =0.541 with F =0.38). This implies that for women, the overall mean of positive emotions significantly differed between the two conditions. For men, this means that no such significant difference between the two conditions was found. The above discovered difference between the Repeated Measure ANOVA's excluding and including gender as a co-variable can be explained with this significant effect of the condition on positive emotions of women. The effects of time and condition*time on positive emotions were for both gender nearly the same.

*3.2 Mediating Influence of Changes in Positive and Negative Emotions on the Effect of CFT on Perceived Stress – Testing Hypotheses 4 and 5*

Both single mediator analyses showed that there was no significant relationship between condition and the change scores of perceived stress (T0-T2) (ß= -1.51; t (195) = -1.95, p=0.052). The results for the different paths from the mediator analysis and the bootstrap results of the indirect effect are presented in table 3.

The results of the first mediator analysis for the different paths showed that the condition had a significant effect on negative emotions (path-a: p= 0.019 with β=-1.88) and on positive emotions (path-a: 0.003 with β=2.71). Changes (T0-T1) in negative and positive emotions had a significant effect on stress, controlling the condition (b-path negative emotions: p=0.003 with β=0.20; b-path positive emotions: p=0.010 with β= -0.19). T0-T1changes in negative and positive emotions, both mediated the effect of condition on perceived stress. The bootstrap results of the indirect effect of the condition supported these findings (negative emotions: β= -0.38, 95% CI: from -1.04 to -0.28; positive emotions: β = -0.53, 95% CI: from -1.23 to -0.11). This implies that hypotheses (4) and (5) can be accepted.

Table 3

Outcomes of single mediation models

| | | | | | | | Bootstrap results for indirect effects (95% CI) | | |
|---|---|---|---|---|---|---|---|---|---|
| | c- path | | a-path | | b-path | | | | |
| Mediator | β | p | β | p | β | p | β | Lower | Upper |
| Negative Emotions | -1.12 | .145 | -1.88 | .019 | .20 | .003 | -.38 | -1.04 | -.28 |
| Positive Emotions | - .98 | .215 | 2.71 | .003 | -.19 | .010 | -.53 | -1.23 | -.11 |

# 4 Discussion

## *4.1 The Results in Comparison*

This study aimed to test if a CFT-based self-help course can reduce perceived stress. Further, it was tested, whether changes in positive and negative emotions during the self-help course mediate the effect of the CFT based self-help course on stress. All hypotheses were accepted in this study. So the answer to the first research question is: yes, a CFT-based self-help course reduced perceived stress as well as negative emotions and enhanced positive emotions, three to six months after baseline. The second research question can be confirmed, the effect of CFT-based self-help course was mediated by changes in positive and negative emotions.

The current study empirically confirmed that compassion is a relevant concept to address the problem of perceived stress. It further verified the application of interventions which include this concept, like CFT or CFT based programs. Regarding the discovered mediating effect of positive and negative emotions, it supported the idea that these are important working mechanisms in CFT. Considering this, it can be said that this study strengthens the theoretical framework of CFT. Especially the importance of the three types of affect regulation systems and its influence on the participant is confirmed by this study. Positive emotions occur when the soothing and affiliation system was activated. Negative emotions occur when the threat protection system or the drive system was overly activated. The discovered enhancement of positive emotions and the reduction of negative emotions implied that the CFT-based self-help course stimulated the soothing and affiliation system and regulated the threat protection and drive system. This is what Gilbert (2014) described in his theory of CFT. Regarding the mediating influence of positive and negative emotions, this indicates that the activation of the soothing and affiliation system and the regulation of the threat protection and drive system functioned as working mechanisms in CFT for reduction of stress. The discovered mediating effect of changes in negative and positive emotions on the effect on stress can be explained with the strong association of stress with negative emotions. This association implies that a reduction of negative emotions also reduces stress. In line with the Broaden-and- Build Theory and the Undoing hypothesis the change in positive emotions was another factor which reduced perceived stress. This hypothesis said that negative emotions, in this case as a part of perceived stress, cannot occur simultaneously with positive emotions. This means that evoking positive emotions, which did happen during the current study, inhibits the effect of negative emotions. (Fredrickson, 2002).

The positive effect of a CFT-based self-help course on stress is consistent with the findings of Bluth and Einsenlor-Moul (2017), who showed a stress reducing effect of their compassion based intervention for adolescents. The data from the current study extended the results of Bluth and Einsenlor-Moul, because it investigates a similar topic for another group of participants. Furthermore, a positive influence of self-compassion on the physiological stress response was found in a study from Bluth et al. (2016). This physiological aspect was not included in the current study. However, the

physiological response of stress and the emotional perceived aspect of stress are strongly associated with each other (Feldman, Cohen, Lepore, Matthews, Kamarck & Marsland, 1999). Summarizing, the findings of this study fit well to the general picture of the effects of compassion on stress.

The decreasing effect of the CFT based self-help course on negative emotions was supported by the study of Arimitsu and Hofmann (2017) which found a reducing effect on negative emotions from a compassion based intervention. Also, the study from Choi, Lee, No and Kim (2016) showed that compassion alleviated negative emotions in employees. Thus, the findings of the current study fit the overall findings of the effect of CFT-based interventions. Furthermore, it seemed that the CFT-based self-help course had a positive effect on positive emotions. These findings support a study which showed a strong association between self-compassion and positive affect like happiness and optimism (Neff, Rude & Kirkpatrick, 2007).

Including gender as a co-variable in the Repeated Measures ANOVA revealed that it had influence on the effect of the intervention on positive emotions. Further investigation revealed that condition had only a significant effect on positive emotions for women and not for men. This result did not fit with the results of Bluth, Campo, Futch and Gaylord (2017). Even though the study of Bluth et al. indicated that there was a gender difference in the level of self-compassion. They found that older adolescent women have a lower level of self-compassion than all ages of adolescent men. Furthermore, it was found in this study that the self-compassion seems to have a greater protective effect in adolescent boys. This did not fit the results of the current study which found a greater effect on positive emotions, of the CFT based self-help course for women than men. This explains that there was no significant overall difference found, between the experimental and the control condition in positive emotions.

The findings now can help to reduce stress, even if it is just for a short time. The presented exercises can then again be used in stressful times, helping to cope with it. Thus, the participants will possibly profit longer from this intervention than the measurements reported. Eventually, the effect maybe seen only in difficult situations, when needed. For the scientific literature this research provided reliable evidence for the effect on CFT-based self-help interventions on stress but also on positive and negative emotions. Further, it gave insight in the working mechanisms of CFT. It became obvious that positive and negative emotion function as mediators. This indicates that these are important working-mechanisms. This can build the base to work on a more suitable CFT-based intervention which aims at major stress problems.

### *4.2 Strengths and Limitations*

The most important strength of this study was that this it was the first which really investigated the impact of compassion on perceived stress. Before, stress was a neglected topic of CFT research. Further, the results from the former used samples could not be generalized. This made the results of the current study a unique and important aspect in CFT research. Additionally, a strength of this study

is the good reliability of used tests. Both PSS and PANAS had in this case good reliability. The used RCT design is another positive point of this research. The design with an experimental and a control condition, a randomly divided sample and the three different measurement moments, made the results of this research more reliable, valid and easy to compare. Another positive aspect of this study was that that there were two comparable follow-up measurements. So the temporal progress was taken into account in this study and gave a more detailed view about the effect of CFT-based self-help course and its endurance.

A negative point of this research is the unbalanced sample considering the demographics. The sample consisted mostly out of older highly educated women. This makes the generalization more difficult. Maybe people with a high educational level experience a higher effect for a self-help course in form of a book. Also it seems that gender has an influence on self-compassion, which is still not sufficiently investigated. However, it may also have an influence on the effect of CFT. Further, it was found that the experimental and control conditions differ significantly in gender. Therefore, the comparison between the groups was difficult. Furthermore, no clinical participants were included in this study. As a consequence, these findings are not suitable for a clinical setting. A negative aspect of this study was that, even though the participants were checked in well-being and mental illnesses before, no screening was done regarding stress. To check if a participant suffers from a major stress problem would be an important and interesting aspect. Maybe a major stress problem inhibited the effect of the intervention, because the participant had not enough time to deal with the self-help course.

### *4.3 Recommendation*

This study was the first which investigated the influence of a CFT-based self-help course on stress. With the results of this study, it seemed that this CFT-based self-help course was suitable to reduce stress. In consideration of the limitations above, it is recommended to further investigate the topic of compassion or CFT and its relationship to stress. One study clearly is not enough to prove reducing effect of the CFT based self-help course on stress. Additionally, the results pose further questions. A tendency for a possible moderator for the effect of CFT-based self help course was found in this study. It was found that gender as a co-variable, had an influence on the effect of the CFT-based self-help course on positive emotions. It seemed that in the current study women experienced a higher effect of the intervention on positive emotion. It is recommended to implement a study with more attention regarding possible moderators. Gender and other demographics should be further analyzed to check, if there is a moderating influence on the effect. At the moment the study did not include enough participants for the different demographics to implement a meaningful moderation analysis. When implementing this study, it should be drawn attention to find a well distributed, more representative sample. At the moment for example only 15 out of 196 participants had a lower educational level. Studies before imply that gender moderates the general level of self-compassion, where women seem

to have less self-compassion. However, the results of this study imply that women experience a higher effect of the CFT-based self-help course on positive emotions. This would lead to the hypothesis that women start with a lower level of self-compassion but are capable of better enhancing this. This enhancement leads then to a higher effect of self-compassion, for example regarding positive emotions. To test this, a study should check the level of self-compassion before and after a CFT-based self-help course. Furthermore, it is important that not only self-compassion is taken into account but also variables which would profit from an enhanced level of self-compassion, like stress or emotional well-being.

Another interesting question the results posed was that if there are other working mechanisms besides positive and negative emotions on the effect on stress. CFT includes many other aspects and it would be interesting to investigate which functions as a mediator. It could be checked which mediator influences the effect on stress the most and if there is an interaction between the mediators. For example is self-criticism an important aspect which is focused on in CFT. Gilbert (2014) states that strong self-criticism activates the threat-protection affect system. This leads to perceived stress. With addressing and therefore reducing self-criticism, CFT could reduce stress. Thus self-criticism also could function as a working mechanism. It would be interesting to test if there is a difference between the mediators self-criticism and negative or positive emotions. Maybe there is an overlap between these mediators and the mediating effect of self-criticism can be explained with the negative emotions it evokes (Gilbert, 2014).

Also, it should be checked if the intervention has a long-term effect in stressful situations. Eventually, the participants did not use the exercises after the invention end, but only during a stressful time. The exercises taught to the participants will eventually function as recourses. In difficult times the participants can use them again to enhance their self-compassion and suffer less in these situations. To check if the CFT-based self-help course was further used in stressful situations, and therefore had a longer effect a mixed-method design can be used. Here questions can be included at the six month follow-up measurement, to ask if and when the exercises were used in the past three months after the intervention. Besides, this theory can be tested with inducing a stressful situation after the intervention in a laboratory setting. Comparing the experimental and the control condition it would show, if the experimental group benefit from the intervention in the long-term.

In conclusion, this study showed that a CFT based self-help course does reduce stress. Furthermore, it seemed that the effect of the intervention on stress is mediated by positive and negative emotions. Thus, the most important recommendation from this study is further investigation of this topic. For this a representative sample with attention drawn to possible moderators should be used. Also other aspects of CFT should be investigated as mediators and compared. CFT based self-help courses have a great potential and the positive findings point in the right direction. One study is for this field definitely not enough.

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