

A randomized controlled trial of compassion cultivation training: Effects on mindfulness, affect, and emotion regulation

Hooria Jazaieri · Kelly McGonigal ·
Thupten Jinpa · James R. Doty · James J. Gross ·
Philippe R. Goldin

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Abstract Compassion is a positive orientation towards suffering that may be enhanced through compassion training and is thought to influence psychological functioning. However, the effects of compassion training on mindfulness, affect, and emotion regulation are not known. We conducted a randomized controlled trial in which 100 adults from the community were randomly assigned to either a 9-week compassion cultivation training (CCT) or a waitlist (WL) control condition. Participants completed self-report inventories that measured mindfulness, positive and negative affect, and emotion regulation. Compared to WL, CCT resulted in increased mindfulness and happiness, as well as decreased worry and emotional suppression. Within CCT, the amount of formal meditation practiced was related to reductions in worry and emotional suppression. These findings suggest that compassion cultivation training effects cognitive and emotion factors that support psychological flexible and adaptive functioning.

Keywords Compassion · Mindfulness · Affect · Emotion · Emotion regulation · Meditation

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H. Jazaieri (✉) · J. J. Gross · P. R. Goldin
Department of Psychology, Stanford University, 420 Jordan
Hall, Room 430, Stanford, CA 94305-2130, USA
e-mail: hooria@stanford.edu

K. McGonigal · T. Jinpa · J. R. Doty
Center for Compassion and Altruism Research and Education,
Palo Alto, CA, USA

J. R. Doty
School of Medicine, Stanford University, Stanford, CA, USA

Introduction

Compassion may be defined as a complex multidimensional construct that is comprised of four key components: (1) an *awareness* of suffering (cognitive component), (2) *sympathetic* concern related to being emotionally moved by suffering (affective component), (3) a *wish* to see the relief of that suffering (intentional component), and (4) a *responsiveness* or readiness to help relieve that suffering (motivational component) (Jinpa 2010). Although definitions of compassion vary (e.g., Goetz et al. 2010; Halifax 2012; Jinpa 2010), there is broad agreement that compassion is comprised of a combination of affective, cognitive, and motivational components.

In recent years, there has been a dramatic increase in research interest on this topic. At its peak in 2009, Google Scholar reported 37,500 scholarly citations to publications containing the term “compassion”, with the most recent count for 2012 indicating over 30,000 scholarly publications containing the word “compassion” (see Fig. 1). Scholars from a variety of backgrounds have taken interest in compassion, and it is now clear that compassion is positively associated with adaptive qualities such as life-satisfaction, wisdom, happiness, optimism, curiosity, and social connectedness, as well as inversely associated with maladaptive qualities such as self-criticism, depression, anxiety, and rumination (e.g., Cosley et al. 2010; Neff 2003; Neff et al. 2007). In light of the many positive correlates of compassion, many have sought to develop methods of increasing compassion.

Compassion training programs

There are now several compassion meditation programs that vary in the focus of their training. For example, self-compassion has been associated with enhanced well-being

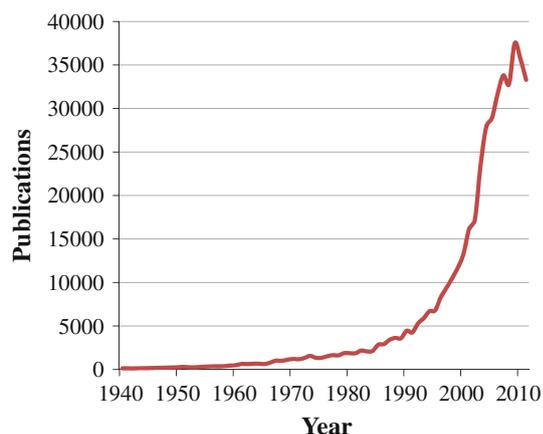


Fig. 1 Number of publications containing the exact phrase “compassion” in Google scholar each year from 1940 to 2011

(see review in Barnard and Curry 2011) and some programs have been designed to specifically target the development of self-focused compassion. One example is compassionate mind training (CMT) developed by Paul Gilbert and colleagues. CMT is a group therapy program based on compassion focused therapy (CFT; Gilbert 2010). CMT was designed primarily for people suffering from high levels of shame and self-criticism, and has demonstrated effectiveness in reducing anxiety, depression, and shame (Gilbert and Procter 2006). Mindful-self compassion (MSC), another self-focused compassion program (Neff and Germer 2012), has been shown to increase self-compassion, mindfulness, compassion for others, life satisfaction, and reduce depression, anxiety, stress, and avoidance.

Other compassion training programs target both self- and other-focused compassion. For example, a 6-week cognitive-based compassion training (CBCT), developed at Emory University, cultivates other-centered thoughts and behaviors while overcoming maladaptive self-focused thoughts and behaviors. Initial studies of CBCT have demonstrated improved immune response to psychosocial stressors in healthy adults (Pace et al. 2009). Our team at Stanford University has developed a 9-week, self- and other-focused compassion cultivation training (CCT) program (Jinpa 2010). Only one randomized controlled trial of CCT has been conducted to date. Findings suggest that CCT reduces the fear of compassion for others, for oneself, and being the recipient of compassion, and enhances compassion for oneself. Further, greater compassion meditation practice is related to greater compassion for others (Jazaieri et al. 2012).

Beyond compassion: potential effects of compassion training

Initial findings of various compassion training programs are promising. However, it is not yet clear whether

compassion training enhances other components aside from compassion, such as various cognitive and emotional factors that support psychological flexibility. As Kashdan and Rottenberg (2010) highlight, psychological flexibility is fundamental to health and well-being, and includes several dynamic processes that unfold over time. They describe psychological flexibility as how a person: (1) adapts to fluctuating situational demands, (2) reconfigures mental resources, (3) shifts perspective, and (4) balances competing desires, needs, and life domains. Based on findings from other studies of non-compassion based meditation trainings (e.g., Grossman et al. 2004; Shapiro et al. 2012), we were interested in investigating how compassion meditation training would impact mindfulness, affect, and emotion regulation, which we view as fundamental components of psychological flexibility and self-regulation. To date, no study of a comprehensive training program encompassing both self- and other-focused compassion meditation has examined the effects on mindfulness, affect, and emotion regulation. Based on the specific practices taught in compassion training (described in the methods section), we expected that compassion training would promote psychological flexibility by increasing mindfulness, positive emotions, effective emotion regulation strategies, and by decreasing negative emotions and maladaptive emotion regulation strategies.

Mindfulness

Mindfulness has been defined as “paying attention in a particular way, on purpose, in the present moment, and non-judgmentally” (Kabat-Zinn 1990, p. 4). Mindfulness refers to awareness of one’s emotions, cognitions, mind states, as well as to one’s environment and relationship to others. When operationally defined (Bishop et al. 2004), a two-component model of mindfulness includes: (1) self-regulation of attention to present moment experience, and (2) approaching present moment experience with a sense of curiosity, openness, and acceptance. It is important to note that Bishop et al. (2004) explicitly state that although self-regulation of attention involves a non-elaborative awareness of thoughts, feelings, and sensations, mindfulness is *not* suppression. Rather, in mindfulness practice, one’s entire experience is considered and acknowledged, and attention is re-directed back to the present moment to avoid further elaboration without “secondary elaborating processing” of thoughts, feelings, and sensations (Bishop et al. 2004). A recent review has indicated that mindfulness-based interventions have various positive psychological effects including enhancing well-being and behavioral regulation, and reducing clinical symptoms and emotional reactivity (Keng et al. 2011). Mindfulness is a promising construct to consider within the context of compassion

training. Compassion training builds and extends from the basis of mindful awareness, and is thought to influence mindfulness skills by enhancing the motivation to develop present moment mindful awareness.

Affect

The term “affect” refers to a variety of constructs, including short-term emotions (e.g., happiness), longer-term moods (e.g., worry), stress responses (e.g., perceived stress), and attitudes (e.g., acceptance) (Gross 2010). Affect is a promising construct to consider within the context of compassion training, although compassion itself is *not* considered to be an emotion. Because compassion includes an affective component, it is possible that compassion training may influence emotions in some way,¹ for example, feelings of concern for self and others. Compassion training is thought to influence emotions in part by increasing awareness of one’s own internal experience (namely affect), and the affective experience of others. Furthermore, through connection with one’s own suffering and that of another through specific practices (e.g., *tong-len* practice, the practice of visualizing taking onto oneself the suffering of others), it is likely that these specific practices taught in compassion training will influence various affective components. Lastly, compassion training may also influence emotional experience because it *in part* helps individuals to connect to and enhance motivation, as motivation is one of the components of compassion (Jinpa 2010).

Emotion regulation

Emotion regulation refers to the process of influencing which, when and how both positive and negative emotions are experienced and expressed (Gross 1998). Emotion regulation strategies can be used in adaptive and maladaptive ways depending on the context and the purpose. Difficulties with emotion regulation have been associated with increased stress responses (e.g., Wirtz et al. 2006), worry (e.g., Mennin et al. 2002; Roemer et al. 2009), and unhappiness (e.g., Côté et al. 2010). There are many types of emotion regulation strategies that can have very different results. Two forms of emotion regulation that have been most widely examined within the empirical literature are expressive suppression and cognitive reappraisal (e.g., Gross and John 2003). However, neither has been examined within the context of a compassion training program.

Expressive suppression refers explicitly to not showing to others what one is feeling internally. Expressive

suppression has been associated with increased stress-related symptoms, negative emotion, depression, and anxiety, as well as with decreased positive affect and life satisfaction, and increased negative emotion, depression, and anxiety (e.g., Campbell-Sills et al. 2006a, b; Kashdan et al. 2006; Moore et al. 2008). Expressive suppression may have both short- and long-term negative consequences for physical and psychological health (Moore et al. 2008) and can be examined both in terms of frequency of use as well as the belief in one’s ability (self-efficacy) to utilize expressive suppression. Compassion training is thought to influence expressive suppression as it encourages the approaching (rather than avoiding) uncomfortable or difficult emotions.

Cognitive reappraisal involves reframing the meaning of an emotion-eliciting situation to modulate emotional responding. Rather than treating distorted beliefs as if they are fact, cognitive reappraisal involves re-interpreting beliefs in a way that creates a more accurate and adaptive perspective. Generally, cognitive reappraisal has been associated with reduced negative affective states and increased positive affective states (e.g., Gross 1998; Lieberman et al. 2011), as well as enhanced psychological flexibility and well-being (Cheng 2001). Cognitive reappraisal can be examined both in terms of frequency of use, as well as self-efficacy or the belief in one’s ability to use cognitive reappraisal. Cognitive reappraisal self-efficacy has been associated with enhanced affect regulation and overall healthy psychosocial functioning (Bandura et al. 2003) and better clinical treatment outcomes (Goldin et al. 2012). Self-efficacy beliefs more generally have been linked to motivation (Bandura and Cervone 1986). Beyond enhancing compassion (see Jazaieri et al. 2012), compassion training might enhance cognitive reappraisal as it encourages present moment attention, reframes the meaning and importance of suffering, and enhance psychological flexibility.

The present study

Although studies of mindfulness-based training programs have examined the effects of mindfulness meditation on mindfulness skills, affect, and emotion regulation, to date, no studies of a self- and other-focused compassion training have examined these constructs. The present study aims to address this important gap in the literature. Specifically, the goals of the present study were to extend our findings from a prior report that CCT enhances multiple facets of compassion (Jazaieri et al. 2012). Using the same participant sample as that prior report, we examined (a) whether, compared to a waitlist control condition (WL), CCT impacts mindfulness, affect, and emotion regulation, and (b) whether the amount of compassion meditation practiced

¹ Similarly, compassion is not a behavior but includes a motivational component which is thought to influence behaviors (e.g., altruism).

during CCT is associated with CCT-related changes in mindfulness, affect, and emotion regulation. We expected that, when compared to WL, CCT would result in increased mindfulness, positive affective states (happiness), and cognitive reappraisal, as well as decreased negative affective states (stress, worry) and expressive suppression. We also expected that more meditation practice would be related to pre-to-post-CCT increases in mindfulness, positive emotion, and cognitive reappraisal, and decreases in negative emotion and expressive suppression.

Methods

Participants and procedure

Participants in this study were previously described in Jazaieri et al. (2012). Participants were primarily middle-aged adults (Mean = 43.08, SD = 12.15, range 21–68 years) from the community. Of the 158 adults who inquired about the study, 149 met study inclusion criteria (described below) and were invited to participate. Of these, 49 potential participants did not enroll in the study and were dropped from participating in the study *prior* to randomization. These potential participants were excluded from participating in the study because they did not complete the required baseline assessments within the timeframe given and thus were not randomly assigned to either study arm. The remaining 100 participants who completed baseline assessments were randomly assigned to either CCT ($n = 60$) or WL ($n = 40$) groups. Of the 60 randomized to CCT, 51 received the intervention and only one was lost to follow-up, thus 50 participants were included in the analysis. For WL, of the 40 randomized, 10 were lost to follow-up, thus 30 were included in the analyses (see Fig. 2). The CCT and WL groups did not differ significantly in age (CCT: $M = 41.98$, $SD = 11.48$, WL: $M = 44.68$, $SD = 13.05$; $t = -1.08$), ethnicity (Caucasian: CCT: $n = 39$ (65 %), WL: $n = 32$ (83 %); $\chi^2 = 1.93$), or gender (women: CCT: $n = 39$ (65 %), WL: $n = 33$ (80 %); $\chi^2 = 2.83$) (all $ps > .1$).

As reported in Jazaieri et al. (2012), potential participants were recruited through web-based online community listings throughout the San Francisco Bay Area, email listservs, and advertisements on community bulletin boards. Potential participants had to pass an initial online screening procedure which excluded individuals who self-endorsed bipolar disorder, major depressive disorder, psychosis, or active suicidal ideation. Participants provided informed consent in accordance with Stanford University Human Subjects Committee rules and were not paid for their participation. Using a random number generator, participants were randomized with a 60 % probability of

receiving CCT or a 40 % probability of receiving WL. All participants completed measures of mindfulness, affect, and emotion regulation before randomization to CCT/WL and 9-weeks later after completing CCT or WL.

Compassion cultivation training (CCT)

Compassion cultivation training is a structured, comprehensive, compassion meditation training program developed by a team at Stanford University. CCT consists of a 2-h introductory orientation, eight once weekly 2-h classes, and daily compassion-focused meditation practices. Participants are encouraged to engage in daily home meditation practice for at least 15 min (building up to 30 min) using pre-recorded guided meditations. The formal meditations in CCT are derived from Tibetan Buddhist contemplative practices and some of the experiential exercises from Western psychology. CCT is taught, however, as an entirely secular approach to enhancing compassion for oneself and others.

Through systematically progressing through six sequential steps (see Table 1 and fully described in Jazaieri et al. 2012), self-compassion and compassion for others are cultivated. Practices for stabilizing attention and enhancing awareness of present-moment experience, as well as attitudes of curiosity and openness to inner experience are incorporated into each session. CCT also includes the practice of loving-kindness meditation (LKM) or *metta*, a practice used to increase feelings of warmth and caring for oneself and others (Salzberg 1995). Although mindfulness (attention/awareness of one's experience) is trained, this is achieved primarily through compassion meditation rather than mindfulness meditation (as is found in mindfulness-based interventions). The practices in CCT (which include *tong-len*) focus on enhancing awareness of one's own suffering and the suffering of others to support the cultivation of compassion for self and others. This is done with an attitude of willingness and curiosity without holding onto, pushing away, or denying any aspect of one's present moment experience. Further, CCT primes emotional experience, in part, by facilitating the motivational aspect of compassion, and creating a physiological state (e.g., calm breath, still body) that supports compassion rather than sympathetic distress, by means of imagery in meditations, stories, poems, and so forth.

Compassion cultivation training was taught by two Ph.D.-level instructors who met the instructor qualifications as outlined in the CCT manual, namely, advanced training in psychology, formal meditation practice, including a variety of compassion practices, and experience teaching meditation practices. Instructors had 16–23 years of personal

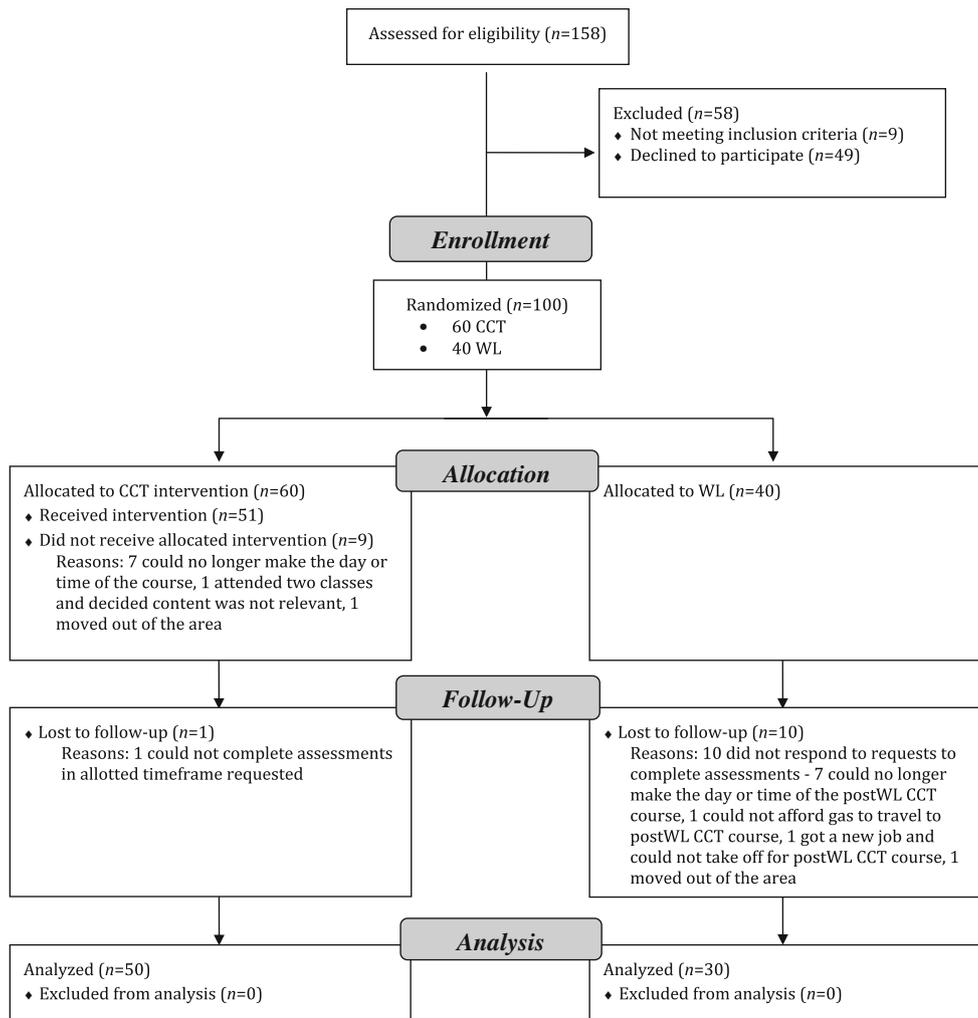


Fig. 2 Consolidated standards of reporting trials diagram for randomized controlled trial of CCT versus WL control condition. Reprinted with permission

Table 1 Core components of the 9-week CCT Course

Session #	Step	Main content
1		Introduction to course and introduction to settling and focusing the mind
2	Step 1	Settling and focusing the mind
3	Step 2	Loving-kindness and compassion for a loved one
4	Step 3a	Compassion for oneself
5	Step 3b	Loving-kindness for oneself
6	Step 4	Embracing shared common humanity and developing appreciation of others
7	Step 5	Cultivating compassion for others
8	Step 6	Active compassion practice (<i>tong-len</i>)
9		Integrated daily compassion cultivation practice

meditation experience, 12–13 years of experience teaching meditation, and were further trained by the protocol creator, Thupten Jinpa, Ph.D. Adherence to the CCT protocol was obtained for each class by an independent rater familiar with the CCT protocol. To ensure CCT was implemented correctly, an independent adherence rater rated each class using a CCT adherence scale that we developed for this study (no psychometric properties have been established for this tool as this is not an official rating scale). To achieve adherence, teachers had to achieve a score of $\geq 90\%$ adherence. Both teachers were in full adherence with the CCT protocol.

Measures

As part of a larger study (Jazaieri et al. 2012), here we examine the constructs of mindfulness, affect, and emotion regulation. The effects of CCT on compassion are described in a previous report (see Jazaieri et al. 2012).

Mindfulness

The Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al. 2004), is a 39-item self-report measure designed to assess four aspects of mindfulness: observing, describing, acting with awareness, and accepting without judgment. Participants respond on a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*almost always or always true*). Higher scores reflect more mindfulness. Internal consistency was good in the current samples (CCT = .92; WL = .88). The Experiences Questionnaire (EQ; Fresco et al. 2007), is a 20-item self-report measure designed to examine rumination and decentering or “reperceiving”, defined as “the ability to observe one’s thoughts and feelings as temporary, objective events in the mind, as opposed to reflections of the self that are necessarily true” (p. 234). Participants respond to questions about life experiences on a 5-point Likert scale ranging from 1 (*never*) to 5 (*all the time*). Internal consistency was good in the current samples (Cronbach’s alphas: CCT = .84; WL = .82).

Affect

The Penn State Worry Questionnaire (Meyer et al. 1990) is a 16-item measure of worry. Eleven items are negatively worded in the direction of pathological worry (e.g., “My worries overwhelm me”), while the remaining five items are positively worded, indicating that worry is not a problem (e.g., “If I do not have enough time to do everything, I do not worry about it”). Items are rated on a four-point Likert scale ranging from 1 (*not at all typical of me*) to 5 (*very typical of me*). In the present sample, internal consistency was good (Cronbach’s alphas: CCT = .93, WL = .94). The Perceived Stress Scale (PSS-4; Cohen et al. 1983) is a four-item brief version of the original PSS and is the most widely used psychological instrument for measuring an individual’s perceptions of stress response during the past month. Stress responsivity is considered to be a form of affect (see Gross and Thompson 2007). In the present sample, internal consistency was good (Cronbach’s alphas: CCT = .81; WL = .75). The Subjective Happiness Scale (SHS; Lyubomirsky and Lepper 1999), is a 4-item measure of happiness, measured on a six-point Likert scale. Two of the items ask participants to characterize their happiness relative to others, whereas the other two items offer brief descriptions and ask participants the extent to which each characterization describes them. Internal consistency was fair in the current samples (Cronbach’s alphas: CCT = .61; WL = .56).

Emotion regulation

The Emotion Regulation Questionnaire (ERQ; Gross and John 2003), is a measure designed to assess individual

differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression. This study used a long version of the ERQ (Goldin et al. 2009), which has the following subscales: *Expressive Suppression frequency* (10 items), *Expressive Suppression self-efficacy* (8 items), *Cognitive Reappraisal frequency* (10 items), and *Cognitive Reappraisal self-efficacy* (8 items). Internal consistency was good in the current samples (Cronbach’s alphas: Total Scale: CCT = .81; WL = .84, *Expressive Suppression frequency*: CCT = .87; WL = .88, *Expressive Suppression self-efficacy*: CCT = .94; WL = .94, *Cognitive Reappraisal frequency*: CCT = .78; WL = .80, and *Cognitive Reappraisal self-efficacy*: CCT = .90; WL = .94).

Meditation practice diaries

Compassion cultivation training participants completed daily meditation practice diaries to record the number of minutes of formal practice (e.g., guided practices with a CD, formal sitting practices) and then submit their totals on a weekly basis during the 9-week training.

Statistical analysis

Statistical analyses were conducted using SPSS version 19. Data were checked for normality of distribution and outliers using box plots. No data were removed. A 2 (Group: CCT, WL) \times 2 (Time: Pre, Post) repeated-measures analysis of variance (ANOVA) was used to examine differential change in mindfulness, affect, and emotion regulation. Effect size was indicated by partial eta-squared (η_p^2). Pre- and post-CCT/WL correlation values for all measures are also reported (Supplemental Tables 1 & 2).

Results

Preliminary analyses

There was no significant difference ($\chi^2 (1, N = 100) = 1.56, p = .21$) in the percentage of participants who dropped after being randomly assigned to CCT ($n = 9$; 15 %) and WL ($n = 10$; 25 %). This dropout rate is a comparable rate to similarly structured group interventions with non-clinical samples of adults (e.g., Shapiro et al. 1998). When using a criterion of at least 7 (of 9) classes attended, 98 % of participants completed CCT. Attendance over the 9-week CCT course was excellent with the average number of missed classes being less than one ($M = 0.76, SD = 0.98$).

Effects of compassion cultivation training

Mindfulness

A 2 Group (CCT, WL) \times 2 Time (pre, post) repeated-measures ANOVA was conducted for each measure of mindfulness. Findings indicated a main effect of time ($F_{1,75} = 11.30, p < .001, \eta_p^2 = .13$), no effect of group ($F_{1,75} = 3.76, p = .056, \eta_p^2 = .05$), and a significant interaction of group by time for mindfulness skills (KIMS) ($F_{1,75} = 8.91, p < .004, \eta_p^2 = .11$). Follow-up within-group *t*-tests yielded pre-to-post-CCT increases in mindfulness skills ($p < .001$) and no change for WL ($p > .69$) (Table 2). A 2 Group (CCT, WL) \times 2 Time (pre, post) repeated-measures ANOVA resulted in a main effect of time ($F_{1,79} = 6.78, p < .01, \eta_p^2 = .08$), no effect of group ($p > .58$), and a significant interaction of group by time for decentering (EQ; $F_{1,79} = 5.56, p < .02, \eta_p^2 = .07$). Follow-up within-group *t*-tests determined pre-to-post-CCT increases in decentering ($p < .001$), and no change for WL ($p > .84$) (Table 2).

Affect

Separate 2 Group (CCT, WL) \times 2 Time (pre, post) repeated-measures ANOVAs were conducted for each measure of affect. For worry (PSWQ), there was a main effect of time ($F_{1,79} = 5.88, p < .02, \eta_p^2 = .07$), no effect of group ($p > .31$), and a significant interaction of group by time ($F_{1,79} = 9.94, p < .002, \eta_p^2 = .11$). Follow-up within-group *t* tests showed improvement for CCT on worry ($p < .001$), but no change for WL ($p > .50$) (Table 2). For perceived stress (PSS), there was no interaction of group by time ($p > .91$). For happiness (SHS), there was a significant interaction of group by time ($F_{1,73} = 3.99, p < .05, \eta_p^2 = .05$), but no main effects of time ($p > .92$) or group ($p > .61$). Follow-up within-group *t*-tests yielded no change for CCT ($p > .06$) or WL ($p > .25$) (Table 2).

Emotion regulation

For frequency of emotional suppression (ERQ expressive suppression frequency), a 2 Group (CCT, WL) \times 2 Time (pre, post) repeated-measures ANOVAs yielded a main effect of time ($F_{1,75} = 8.38, p < .005, \eta_p^2 = .1$), no effect of group ($p > .54$), and a significant interaction of group by time ($F_{1,75} = 5.30, p < .02, \eta_p^2 = .07$). Follow-up within-group *t*-tests showed significant reductions for CCT ($p < .001$), and no change for WL ($p > .65$) (Table 2). For self-efficacy of emotional suppression (ERQ expressive suppression self-efficacy), there was a significant interaction of group by time ($F_{1,75} = 4.54, p < .04, \eta_p^2 = .06$), but no main effects of time ($p > .67$) or group ($p > .60$).

Follow-up within-group *t*-tests revealed no change for CCT ($p > .06$) or WL ($p > .22$) (Table 2). For cognitive reappraisal frequency, there were no main effects of time ($p > .38$), group ($p > .41$), or interaction of group by time ($p > .9$). Follow-up within-group *t* tests yielded no change for CCT ($p > .40$) or WL ($p > .65$) (Table 2). For self-efficacy of cognitive reappraisal, there were no main effects of time ($p > .32$), group ($p > .76$), or interaction of group by time ($p > .12$). Follow-up within-group *t* tests revealed significant increases for CCT ($p < .03$), but no change for WL ($p > .74$) (Table 2).

Practice dose effect

The average number of minutes of formal meditation practiced during CCT was 101.11 ± 56.99 min per week. There were significant associations between greater amount of formal meditation practice and (a) lesser worry (PSWQ, Fig. 3; $r(49) = .29, p < .05$), and (b) lesser frequency of expressive suppression (ERQ, Fig. 4; $r(47) = .37, p < .01$).²

Discussion

Extending beyond the preliminary findings that this self- and other-focused CCT program enhances compassion (Jazaieri et al. 2012) within this same RCT population, this present manuscript aimed to examine whether CCT influences other constructs beyond compassion. Here, we report significant effects on mindfulness, affect, and emotion regulation in a community sample of adults.

Mindfulness

Mindfulness is often considered a precursor to the development of compassion. Conceptually, the cultivation of compassion is thought to rely on first stabilizing the mind via mindful awareness practices (Jinpa 2010). The findings from this study, however, indicate that compassion training may also enhance mindfulness. As hypothesized, when compared to WL, CCT resulted in significant increases in mindfulness as measured by the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al. 2004) and the

² Although we opted to include all participants in our analyses, there is one outlier participant (defined as greater than three standard deviations above or below the group mean). When this participant is removed, the association between the average number of minutes of meditation practice and worry (PSWQ) is still significant ($r(48) = .35, p < .01$) and the association is strengthened; however, for ERQ suppression frequency, when this participant is removed the association between the average number of minutes of formal meditation practice and the ERQ suppression frequency becomes a trend ($r(46) = .28, p > .06$).

Table 2 Pre and post measures of mindfulness, affect, and emotion regulation within CCT and WL control groups

Construct	Measure			
	Group	Baseline mean (SD)	Post mean (SD)	Pre versus post <i>F</i> , effect size
<i>Mindfulness</i>				
Kentucky Inventory of Mindfulness Scale (KIMS)	CCT	126.98 (21.92)	137.62 (22.51)	18.41***, .29
	WL	123.07 (19.78)	123.70 (17.57)	.16, .01
Experiences Questionnaire (EQ)	CCT	64.34 (8.79)	68.14 (8.14)	12.42***, .20
	WL	65.19 (8.94)	65.38 (7.18)	.04, .01
<i>Affect</i>				
Penn State Worry Questionnaire (PSWQ)	CCT	52.80 (12.77)	47.06 (13.23)	14.85***, .23
	WL	52.47 (13.52)	53.22 (14.04)	.48, .02
Perceived Stress Scale (PSS-4)	CCT	8.60 (2.95)	8.08 (3.75)	1.43, .03
	WL	8.94 (2.62)	8.48 (2.69)	1.32, .04
Subjective Happiness Scale (SHS)	CCT	16.76 (3.20)	17.41 (3.05)	3.38, .06
	WL	17.04 (2.40)	16.46 (2.52)	1.38, .06
<i>Emotion Regulation</i>				
Emotion Regulation Questionnaire (ERQ)				
Expressive Suppression frequency	CCT	40.31 (10.89)	34.27 (11.38)	14.99***, .24
	WL	39.14 (11.56)	38.45 (12.34)	.21, .01
Expressive Suppression self-efficacy	CCT	32.63 (11.19)	29.38 (10.46)	3.75, .07
	WL	31.10 (12.46)	33.28 (10.20)	1.58, .05
Cognitive Reappraisal frequency	CCT	39.46 (9.78)	40.33 (8.44)	.71, .02
	WL	41.03 (6.32)	41.69 (7.38)	.21, .01
Cognitive Reappraisal self-efficacy	CCT	35.44 (11.10)	38.54 (9.76)	4.91*, .10
	WL	36.66 (11.56)	35.97 (10.57)	.11, .01

SD standard deviation, effect size = partial eta squared (η_p^2)
 *** $p < .001$, * $p < .05$

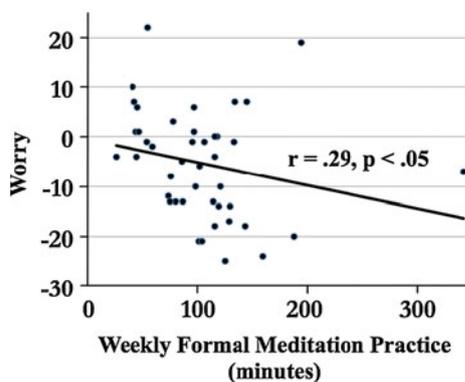


Fig. 3 Scatterplot of weekly average minutes of formal/guided meditation practice and reduction on worry (PSWQ) in those receiving immediate CCT

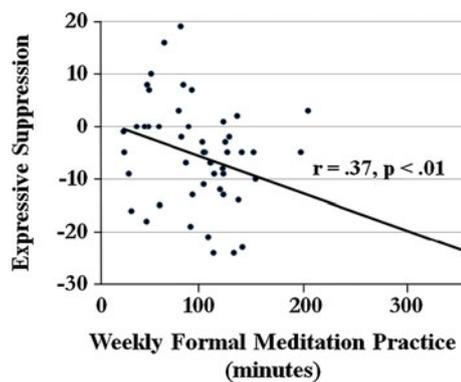


Fig. 4 Scatterplot of weekly average minutes of formal/guided meditation practice and reduction on expressive suppression (ERQ) in those receiving immediate CCT

Experiences Questionnaire (EQ; Fresco et al. 2007). These findings suggest a possible reciprocal relationship between mindfulness and compassion such that they continue to enhance and perhaps even strengthen each other. Although not a mindfulness-based intervention, CCT includes practices for stabilizing or settling the mind at the beginning of each class. This prepares the mind to engage in the more

complex mental state of compassion. This raises the interesting question of how much and what type of mindfulness practices do individuals need to support optimal development of specific forms of compassion.

One fundamental facet of compassion is the awareness of suffering in others. Prior to mental training via meditation practice, individuals are often distracted by

extraneous events, habitual thought patterns, and lack focus (Jinpa 2010) and can feel overwhelmed by the suffering of others. Training the mind via compassion practices, however, can modify mental attributes (such as mindfulness) that make it easier to sustain and strengthen awareness of suffering of others as a basis to be more present moment focused, less suppressed, and more engaged with others.

Affect

As hypothesized, when compared to WL, CCT resulted in significant reductions in worry and increases in happiness, but counter to our hypotheses, there was no change in perceived stress. The CCT-related reductions in worry and increases in happiness may be linked to the practices of mindfulness and self-compassion both of which have been linked to reducing negative affective states (see review in Grossman et al. 2004; Neff and Germer 2012). Furthermore, CCT also includes the practice of loving-kindness meditation (LKM), which has been associated with increasing positive affective states (Fredrickson et al. 2008; Hutcherson et al. 2008; Klimecki et al. 2012). Cultivating “compassionate attitudes” toward *others* has been associated with reductions in psychological distress in oneself (Steffen and Masters 2005). This likely leads to reduction in a wide array of possible negative emotions, including worry. CCT teaches individuals another way of being with and relating to suffering that can be considered more psychologically adaptive and flexible. Generally, individuals experience and tend to respond to pain and suffering in maladaptive ways (e.g., emotional contagion, rumination, suppression, blaming, etc.). In CCT, participants are encouraged to experience suffering in the present moment with an attitude of willingness and curiosity, without holding onto it throughout the day (e.g., rumination) and without denying or pushing away (e.g., suppression). Although quite speculative, this specific orientation towards suffering likely reduces generalized worry and may enhance more positive coping reappraisals. Further, it is possible that considering the suffering of others and generating the wish to relieve the suffering of others leads to lesser worry by enhancing one’s locus of control and self-efficacy—this needs to be explicitly tested.

The lack of reduction in perceived stress highlights a potentially important distinction between different forms of meditation training. Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn 1990) has been associated with reductions in stress (see review Chiesa and Serretti 2009). The intention behind CCT, however, is not to reduce stress. It is possible that by reflecting on one’s own suffering and the suffering of others that stress is sustained. Thus, rather than shifting attention away from negative stimuli (such as suffering and the causes of suffering), which has been

shown to reduce stress (Ellenbogen et al. 2002), CCT asks participants to directly probe and face suffering and its causes. This could enhance stress in some people. It is also possible that stress is more of an inculcated mental habit or personality trait that is not addressed in CCT. Finally, it is also quite possible that with regards to stress that we are seeing a ceiling or floor effect within our population of participants. Normative data on the 4-item measure of stress (PSS-4; Cohen et al. 1983) utilized in this study would be needed in order for inferences regarding skewness to be made.

Given the emphasis in CCT on focusing on the suffering of oneself and others, the increases in happiness associated with CCT may seem paradoxical. However, prior studies have shown that personal meaning and social connection are critical to happiness (e.g., Cacioppo et al. 2008; Ryan and Deci 2001), and when extending “compassionate goals” for *others* one’s own personal and social resources increases, which in turn promotes mental and physical well-being (Crocker 2011; Crocker and Canevello 2008). Further, others have reported that compassionate behaviors directed towards others enhances happiness within oneself (Dunn et al. 2008). For some individuals, extending compassion to others can generate fear (Gilbert et al. 2010), perhaps due to a fear of diminishing one’s own personal resources. This is likely due to a misunderstanding of the function of compassion. Because compassion practice is understood to enhance personal resources and well-being, it is not conceptually associated with burnout or depletion of one’s own resources. More specifically, loving-kindness meditation practice trained in CCT, enhances a sense of connectivity with others (Hutcherson et al. 2008), that likely increases feelings of warmth and care towards others, which may in return induce feelings of happiness within oneself. In summary, the findings from our study suggest that CCT may not modify the perception of stress, but does decrease worries (negative affect) and increase happiness (positive affect).

Emotion regulation

In partial support of our hypotheses, when compared to WL, CCT produced reductions in expressive suppression frequency and self-efficacy but had no effect on cognitive reappraisal frequency or self-efficacy. CCT encourages the *opposite* of emotional suppression, namely, *being* with and openly expressing concern, warm-heartedness, and a genuine wish to see suffering alleviated in others. This study found an increase in mindfulness; other studies have found that mindfulness meditation training may enhance higher order cognitive capacities such as emotion regulation (e.g., Garland et al. 2009; Goldin and Gross 2010). Generally, the ability to accept the present moment (via mindful awareness

and adopting a nonjudgmental stance) has been associated with more tolerance of uncomfortable emotions and a continued willingness to engage in the moment rather than suppress (e.g., Eifert and Heffner 2003; Levitt et al. 2004). Reduction in emotional suppression is associated with many benefits (e.g., authenticity, social connectedness, relationship satisfaction; English and John 2012). CCT includes *tong-len* practice, recognition of and willfully taking on the suffering of others. This and other practices within CCT explicitly encourages participants to be interpersonally engaged even in the presence of suffering.

There was no effect of CCT on cognitive reappraisal frequency and self-efficacy. Cognitive reappraisal is usually implemented via modifying the meaning of a situation to reduce one's own emotional reactivity. In CCT, the focus is on identifying suffering and its causes in others and not on one's own reactivity to other's suffering. Thus, the goal is not to change one's experience via re-interpretation as is typically done with cognitive reappraisal. In sum, the findings from our study suggest that CCT influences emotion regulation processes by reducing emotional suppression by encouraging individuals to experience emotions without judgment, inhibition, blocking, or distracting.

Practice dose effect

In partial support of our second hypothesis, we found that greater formal meditation practice during CCT was associated with pre-to-post-CCT reductions in worry and frequency of emotional suppression. However, there was no relationship between the amount of formal meditation practice and changes in mindfulness. Previous studies have reported that amount of meditation practiced during various meditation training programs is associated with reductions in negative affective states, as well as increases in positive affective states (e.g., Carson et al. 2004; Fredrickson et al. 2008; Pace et al. 2009; Shapiro et al. 2003). Our study and the findings of others have found a relationship between amount of meditation practice and reductions in worry (Fredrickson et al. 2008; Pace et al. 2009). Together, these findings support the notion that some of the effects of compassion practice may be "dose dependent", with more formal sitting practice leading to improved negative affect (reductions in worry) and reducing maladaptive emotion regulation strategies (reductions in expressive suppression). However, due to the correlational nature of these analyses, we cannot be certain that these findings are truly a result of more compassion practice as it is possible that there is something uniquely characteristic about the individuals who practice more compassion meditation. For example, it is possible that individuals who are characterized as being more conscientious (and thus more likely to comply with the program) are more likely to report compassion practice.

Limitations and opportunities for future research

This study utilized self-report measures of mindfulness, affect, and emotion regulation collected at two time points. Given that compassion includes a motivational component, future research should explicitly test motivation through self-report and non-self-report measures (see review in Mayer et al. 2007). Further, a measure of social desirability was not administered in this study. Given the nature of the course (compassion cultivation), it is possible that demand characteristics may influence results. Future research will benefit from using behavioral assessments to examine compassion, motivation, attention, affect, and emotion regulation (e.g., use of cognitive reappraisal and expressive suppression in varying contexts). In addition, it is possible that the best way to measure compassion is to examine the changes observed by colleagues of the individual participant in the compassion training program. Thus, independent collateral observer reports from family members, colleagues, and friends of the individual taking the CCT program could provide another window into the real-world effects of compassion training programs. In addition, future research should include longitudinal assessment with longer-term follow-up periods to assess the impact of CCT on mindfulness, affect, and emotion regulation. Follow-up data is needed to determine whether and for how long the beneficial changes persist.

This randomized controlled trial utilized a large ($n = 40$) waitlist control sample. Because these participants did not receive any intervention during the 9-week period, it is impossible to rule out non-specific or common factors. Therefore, future research of CCT must employ an active comparison group (e.g., aerobic exercise) or a comparison mental-training program (e.g., Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn 1990)) to better understand the effects of CCT on mindfulness, affect, and emotion regulation. Further, because this study found a relationship between amount of meditation practice and reductions in worry and emotional suppression, future research may choose to examine methods for supporting more meditation practice throughout the duration of the compassion training program (e.g., smartphone apps that remind individuals to practice daily, participant organized sitting groups, etc.).

This study utilized a community sample of adults. Given the importance of emotion regulation in mental health (Gross and Muñoz 1995), and the relationship between emotion dysregulation and psychopathology (e.g., Barlow 2000; Kring and Werner 2004), compassion cultivation should be carefully explored within the context of psychological disorders. It is essential that compassion meditation training be examined as an *adjunctive* intervention to current empirically-supported treatments and not as a

replacement. Because many psychological disorders contain self-deprecating thoughts (e.g., social anxiety disorder), behavioral avoidance (e.g., specific phobia), self-harm behaviors (e.g., borderline personality disorder), and suicidal ideation (e.g., major depressive disorder), compassion cultivation programs paired with treatment-as-usual may prove to be beneficial in increasing compassion for oneself and others, enhancing mindfulness, reducing negative affect, increasing positive affect, and promoting adaptive emotion regulation.

This study examined the effects of compassion training on mindfulness. It has been theoretically argued that “it is paradoxical that in order to facilitate mindfulness of our own thoughts, feelings, and sensations, we must first enable ourselves to be more compassionate towards others...mindfulness is therefore an extension of a compassionate attitude, while at the same time compassion is necessary for mindfulness” (Kumar 2002, p. 42). Future studies may benefit from examining mindfulness as a precursor to compassion and compassion as a motivator for cultivating a more profound level of mindfulness. Further, given the theoretical notion that compassion is the foundation for morality and ethics (e.g., Halifax 2012), paired with the preliminary findings linking mindfulness training (MBSR) with increased moral reasoning (Shapiro et al. 2012), future research may benefit from examining the relationship between moral reasoning or ethical decision making and compassion cultivation training.

Compassion is comprised of four components (Jinpa 2010), which include an affective or emotional component and a motivational component. Future studies of compassion trainings should explicitly measure motivation. We hypothesize that compassion training such as CCT will elicit a longer-lasting enhancement of general compassionate motivation, which in turn may lead to an increase in the general tendency to act prosocially, independent of person and situation (unlike empathic concern which is thought to be situation-specific). As others have noted, “training of compassion aims at permanently changing people’s motivation and their feelings towards other people. It strives to develop a more friendly, benevolent, connected and positive attitude towards others” (Leiberg et al. 2011). This needs to be explicitly tested.

Lastly, future research should continue to examine specific forms of compassion (e.g., for self, for others, from others) and different types of compassion training both self-focused, other-focused, and a combination of self- and other-focused compassion trainings. It is possible that these distinct forms of training programs (e.g., self-focused, other-focused, and a combination of self- and other-focused) are indeed influencing distinct and specific social (e.g., social connectedness), affective (e.g., happiness), and emotion regulatory factors. Because this study demonstrated that

some emotion regulation strategies are influenced by CCT, it is possible that having compassionate intentions (or a motivation) is in itself an emotion regulation strategy—an area for future exploration.

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