



# The Journal of Positive Psychology Dedicated to furthering research and promoting good practice

ISSN: 1743-9760 (Print) 1743-9779 (Online) Journal homepage: http://www.tandfonline.com/loi/rpos20

# Compassion at the mirror: Exposure to a mirror increases the efficacy of a self-compassion manipulation in enhancing soothing positive affect and heart rate variability

# Nicola Petrocchi, Cristina Ottaviani & Alessandro Couyoumdjian

To cite this article: Nicola Petrocchi, Cristina Ottaviani & Alessandro Couyoumdjian (2016): Compassion at the mirror: Exposure to a mirror increases the efficacy of a self-compassion manipulation in enhancing soothing positive affect and heart rate variability, The Journal of Positive Psychology, DOI: 10.1080/17439760.2016.1209544

To link to this article: http://dx.doi.org/10.1080/17439760.2016.1209544



Published online: 14 Jul 2016.

Submit	your	article	to	this	journal	

Article views: 75



View related articles 🗹

View Crossmark data 🗹

Full Terms & Conditions of access and use can be found at http://www.tandfonline.com/action/journalInformation?journalCode=rpos20

# Compassion at the mirror: Exposure to a mirror increases the efficacy of a selfcompassion manipulation in enhancing soothing positive affect and heart rate variability

Nicola Petrocchi<sup>a,b</sup> (D), Cristina Ottaviani<sup>b</sup> (D) and Alessandro Couyoumdjian<sup>a</sup>

<sup>a</sup>Department of Psychology, Sapienza University of Rome, Rome, Italy; <sup>b</sup>IRCCS Santa Lucia Foundation, Rome, Italy

#### ABSTRACT

We tested whether a mirror could enhance the efficacy of a self-compassion manipulation in increasing soothing positive affect and heart rate variability (HRV). Eighty-six participants generated four phrases they would use to soothe and encourage their best friend. Second, they described an episode where they criticized themselves and were assigned to one of three conditions: (a) repeat the four phrases to themselves while looking at the mirror; (b) repeat the four phrases to themselves while looking at the mirror; (b) repeat the four phrases. Participants in condition (a) reported higher levels of 'soothing' positive affect and HRV compared to participants in conditions (b) and (c). The effect of the 'phrases at the mirror' manipulation on soothing affect was mediated by increased common humanity. The mirror enhances the efficacy of this self-compassion manipulation in activating the soothing affect system connected with parasympathetic nervous system activity.

#### **ARTICLE HISTORY**

Received 31 December 2015 Accepted 14 June 2016

Routledge

Taylor & Francis Group

#### **KEYWORDS**

Self-criticism; selfcompassion; heart rate variability; mirror; self-talk; self-awareness

# Introduction

Self-criticism has been defined as an integrated system of beliefs, emotions and attitudes that people might activate towards themselves mainly in response to failures or setbacks (Gilbert, 2005; Whelton & Greenberg, 2005). This process often takes the form of negative and coercive selftalk and inner hostile voices, which stimulate the same neurophysiological systems as criticism generated by others (Gilbert, Baldwin, Irons, Baccus, & Palmer, 2006; Longe et al., 2010). As a result of the self-harassing dynamic, highly self-critical individuals are thought to have an over-stimulated and poorly regulated threat emotional system, with subsequent negative affectivity and underdeveloped capacities for compassionate self-soothing activities (thoughts, self-talk and images; Gilbert & Procter, 2006). Even if self-monitoring and self-correcting activities are normal components of non-clinical psychological functioning, more severe forms of self-criticism have been examined as a vulnerability risk factor for most psychopathological conditions (for a review see Schanche, 2013).

Several therapeutic approaches, such as Compassion Focused Therapy (CFT; Gilbert, 2010, 2014) and Mindful Self-Compassion training (MSC; Neff & Germer, 2013), have been developed with the aim of increasing compassion and self-compassion as an antidote to self-criticism. The primary aim of these approaches is to increase acceptance and compassion for one's own distress, and to strengthen the ability to refocus and consciously activate 'safeness' self-signaling systems (Boersma, Håkanson, Salomonsson, & Johansson, 2014). These self-soothing activities operate through the stimulation of particular types of positive affect (contentment, safeness, lovability, serenity) associated with the attachment and caring motivational systems. Physiologically, they are connected to increased activity of the vagus nerve and corresponding higher heart rate variability (Porges, 2007). These types of warm positive feelings have been found to be distinct from energizing positive affect (happiness, excitement, enthusiasm) associated with achievement, excitement and resource seeking (Depue & Morrone-Strupinsky, 2005; Gilbert et al., 2008; Panksepp, 1998). It is the safeness and contentment types of positive affect that have been specifically linked to less depression, anxiety and self-criticism, as well as more self-reassurance and attachment secureness (Gilbert et al., 2008; Kelly, Zuroff, Leybman, & Gilbert, 2012). Thus, stimulating the capacity for feeling a positive sense of contentment, safeness, and self-reassurance is the primary goal of compassion-oriented interventions (Germer, 2009; Gilbert, 2010).

One of the practices employed in CFT and other compassion-focused trainings is 'compassionate self-talk' (Gilbert, 2010). Subjects are asked to become aware of

the content and emotional tone of their 'internal dialogue' when they face setbacks, and to consciously render it more compassionate, encouraging and non-judgmentally accepting of the self. Intentionally creating compassionate self-statements after a self-criticism induction has proven to be effective in increasing positive affect, without undermining people's willingness to accept responsibility for the negative actions, and in improving perception of similarity to other people (common humanity; Leary, Tate, Adams, Allen, & Hancock, 2007). It has also shown efficacy in lowering shame and depression (Kelly, Zuroff, & Shapira, 2009), increasing self-improvement motivation, and boosting willingness to make amends and avoid repeating a moral transgression (Breines & Chen, 2012). Creating and reading aloud positive self-statements, instead of neutral self-statements, has been shown to reduce selfdeprecatory thoughts and increase self-esteem in a group of low self-esteem subjects (Lange, Richard, Gest, Vries, & Lodder, 1998). It has also been considered as an important aid for the treatment of emotional disorders (Lange, Richard, Kiestra, & van Oostendorp, 1997). Evidence seems to suggest that this intervention could be improved by the use of a mirror.

#### The mirror as a psychotherapeutic tool

The capacity of the mirror to induce a state of self-focused attention has made it the object of investigation in the research field on self-awareness and self-focusing (Silvia, 2002). According to objective self-awareness theory, when individuals are in a state of self-awareness (for example, when they are exposed to their mirror reflection), they tend to compare themselves to their standards (Duval & Wicklund, 1972). Self-to-standard comparison often brings unfavorable results, activating negative emotions as a result.

However, results regarding the aversive nature of self-focused attention induced by mirror exposure have not always been consistent. In fact, research has shown that exposure to a mirror can reduce self-critical evaluations. For example, Hofmann and Heinrichs (2002) asked undergraduate college students to record three self positive and three self negative attributes after sitting in front of a mirror for 5 min. Individuals with prior mirror exposure showed a greater balance between positive and negative self-statements, and fewer self-critical statements concerning non-socially relevant personality characteristics, than participants without previous mirror exposure. In a later study, Hofmann and Heinrichs (2003) replicated these findings with social anxiety disorder patients.

The mirror has also been applied in the treatment of different psychopathological conditions. Its use as an

exposure tool has been extensively documented in the treatment of eating disorders (see, e.g. Hildebrandt, Loeb, Troupe, & Delinsky, 2012). It is also currently employed to improve positive self-awareness and self-representation in subjects diagnosed with autism spectrum disorder (Duff & Flattery, 2014). Mahoney (1991) has described a technique in which clients are asked to look at themselves in a mirror while spontaneously describing their experience, with the goals of enhancing clients' self-exploration and facilitating the emergence of a new 'dialoguing with one self' (Williams, Diehl, & Mahoney, 2002, p. 23). There is some evidence that this technique improves awareness of the current emotional experience (Williams et al., 2002) and self-acceptance (Beskow & Palm, 1998).

A similar technique, called 'self-mirroring' has been recently described by Vinali et al. (2015): patients are asked to watch a video of their face while recalling a significant life event. The video recording is supposed to 'mirror' their emotions and appraisal patterns, improving patients' ability to recognize and compassionately empathize with their own emotional distress.

#### The present study

Given these preliminary results that both compassionate self-talk and the mirror may positively impact self-relating, we hypothesized that the effects of compassionate selftalk might be amplified by performing this exercise in front of a mirror. The repetition of positive affirmations in front of a mirror as a way to increase self-acceptance has been extensively described and recommended for years in numerous 'pop psychology' books, websites, and self-help resources (see, e.g. Hay, 1991; Hay House, 2015), but to the best of our knowledge, it has never been empirically tested. Moreover, Gilbert (2010) suggested that self-compassion practices involving the repetition of self-compassionate phrases might be potentiated by the use of a mirror as a way to 'externalize' the 'object' of our compassion (i.e. the self). In fact, eye-gaze and facial expressions are salient components of our empathic responses (Cowan, Vanman, & Nielsen, 2014). Considering that self-related stimuli (e.g. our own face) are more relevant to us than stimuli related to others (Brédart, Delchambre, & Laureys, 2006), and that the sense of self seems to be inherently linked to one's own face (Porciello et al., 2014), looking at our own eyes and face while experiencing compassion towards ourselves might impact our psychophysiology more than just verbalizing self-compassionate phrases. Moreover, empathetic processes are supported by, and require, the embodied expression and communication of emotions that only the face provides (Cole, 2001). Thus, we hypothesized that the use of a self-reflection tool might improve our ability to empathize also with ourselves.

Specifically, we predicted that repeating self-compassionate phrases in front of a mirror after a brief induction of self-criticism would produce a higher increase in positive affect (in particular, the 'soothing' positive affect linked to increased self-reassurance and safeness) compared to repeating the phrases without the mirror, or to just looking at the mirror without repeating the phrases.

However, the repetition of the phrases at the mirror was not expected to increase activated positive affect. In fact, compassion-focused interventions are specifically designed to increase soothing positive affect (Gilbert et al., 2008; Kelly et al., 2012).

Research has reported mixed findings regarding the impact of compassion-focused interventions on negative affect: some studies have documented decreased negative affect in response to the intervention (Gilbert & Procter, 2006; Neff & Germer, 2013), while other studies have reported no specific effects on negative affect (Klimecki, Leiberg, Lamm, & Singer, 2013; Odou & Brinker, 2015). Given these mixed findings, no specific predictions were formulated as to the effect of the intervention on negative affect.

Given that increased HRV is specifically connected to the emotional state of compassion and not to positive affect in general (Stellar, Cohen, Oveis, & Keltner, 2015), we also expected that HRV would increase in the 'phrases at the mirror' condition more than in the other two conditions, in line with the increase in soothing positive affect expected in that condition.

It was also hypothesized that the effect of repeating the phrases in front of a mirror would be partially mediated by an increase in common humanity, a component of self-compassion (Neff, 2003) which reflects how 'not so abnormal and shameful' we apprise our defects and suffering, and how able we are to remind ourselves that thoughts and feelings of inadequacy are shared by most people. Data have shown that increased self-awareness, induced also by mirror exposure (Hofmann & Heinrichs, 2002, 2003), is positively linked to theory of mind, which is the ability to understand that others, similar to us, have complex mental states (beliefs, desires, emotions, knowledge, etc.) and, consequently, share with us the same potential for suffering (Keenan, Gallup, & Falk, 2003). Following this line of reasoning, we hypothesized that the state of self-awareness generated by mirror exposure might strengthen the de-shaming effect of the self-compassion phrases, by fostering a sense of 'not-aloneness' in our shortcoming, and of belonging to a shared human vulnerability to suffering and the causes of it.

The mirror, helping subjects to have an 'external view' of themselves and their issues, was expected to improve this dimension and, as a consequence, to increase the level

of compassionate feelings experienced toward their own suffering.

## Method

# Participants

The sample was composed of 43 men and 47 women, mean age 26.34 years (SD = 7.8) recruited from the general population. Four subjects were not included in the analyses due to unreliable physiological measures, leaving a sample of 86 participants (40 men). Recruitment was conducted through flyers, websites, and social networks. All subjects were Caucasian and native Italian speaking. Data on income or socioeconomic status of participants were not collected. Exclusionary criteria were major psychiatric or cognitive problems, psychotic or organic illnesses, substance abuse, cardiovascular disease, use of drugs/medications that might affect cardiovascular function, obesity (body mass index > 30 kg/m<sup>2</sup>), menopause, use of oral contraceptives during the previous 6 months, and pregnancy or childbirth within the last 12 months. The protocol was approved by the local Ethics Committee.

#### Design and procedure

Participants were asked to refrain from (a) eating, (b) drinking alcohol, tea or coffee, and (c) strenuous exercise 2 h preceding the scheduled appointment. The experiment was conducted as a randomized group comparison design. In order to obscure the focus on self-compassion and self-criticism and reduce the likelihood of biased ratings on mood items, participants were told that the aim of the study was to test for effects of different interventions on different types of thoughts and feelings.

The experimental phase took place in a one-to-one session in a small quiet office. After being informed about the procedure, participants provided informed consent, were asked to sit in front a computer monitor, and were hooked up with the electrocardiogram (ECG) electrodes. The initial steps of the experimental procedure were the same for all three conditions. Participants were first asked to relax for 5 min while leafing through a magazine with neutral content in order to acquire a baseline ECG recording. They were then asked to rate their momentary affect using visual analogue scales (VASs at Time 1 – Baseline; see Section 'Measures' for more details). All participants were then instructed by a 2 min audio recording to generate and write four compassionate phrases. The instructions were as follows:

I am now going to ask you to imagine that one of your dearest friends is experiencing an upsetting situation, which involves some kind of rejection, disappointment or failure, and that he/she is very self-critical about it.



Figure 1. Flow chart of the experimental procedure.

Please write four phrases that you would use to soothe and encourage him/her, and that express compassion, understanding, and unconditional acceptance for your friend and for the part of the self that he/she dislikes.

Instructions for generating compassion-focused phrases were based on descriptions of this method as detailed by Gilbert (2010).

This was followed by the induction of self-critical negative emotions: participants were asked to think about and write a detailed description (5 min) of a recent episode in which they harshly criticized themselves, or felt ashamed and disappointed by themselves. Then, the affect VASs were administered again (Time 2). State level of common humanity feelings regarding the content of their self-criticism episode was also assessed at this point (see Measures section for more details).

Subsequently, participants were randomly assigned to 1 of 3 experimental conditions where they had to: (1) repeat the four phrases to themselves while looking at a mirror (n = 30), (2) repeat the four phrases to themselves without a mirror (n = 28); or (3) look at themselves in a mirror without repeating the phrases (n = 28). Instructions were delivered through a 3 min audio recording. The experimental manipulation was followed by a final assessment of momentary affect (using VASs) and common humanity feelings (Time 3). At this point, participants in all conditions were also asked to rate how closely they were able to follow the manipulation instructions (from 0 = completely unable to 4 = completely able) and how difficult it was for them to follow the manipulation instructions (from 0 = very difficult to 4 = very easy). Participants in condition c) were also asked if, during the mirror exposure, they repeated the phrases previously created (yes/no) or if they engaged in some kind of conscious and active compassionate self-talk (yes/no).

Finally, participants were debriefed and offered professional counseling in case of any emotional distress caused by the experiment.

Dispositional questionnaires and questions regarding habits ('how often and for how long do you look at yourself in the mirror in a typical day?'; see the Section 'Measures' for more details) were administered after the experimental procedure (to obscure the goal of the experiment), using QuestionPro survey website. A web link for the online survey was sent to participants via email after the completion of the experimental procedure. See Figure 1 for a flow chart of the procedure.

#### Measures

#### Dispositional measures

# Socio-demographic and personal information

Participants were asked to complete a socio-demographic form, which included items regarding gender, age, level of education, height and weight for BMI calculation, and smoking habits ('are you a smoker?' Yes/No).

#### Depression

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was administered. The CES-D is a 20-item self-report scale that assesses the frequency of occurrence of symptoms of depression during the past week. In this study internal consistency was  $\alpha = 0.91$ .

#### Anxiety

The Spielberger State-Trait Anxiety Inventory – Trait Form (STAI; Spielberger, Gorsuch, & Lushene, 1970) was employed. STAI-Trait is a 20-item self-report measure of anxiety proneness that requires participants to rate their frequency of anxiety symptoms. In this study internal consistency was  $\alpha = 0.93$ .

### Trait self-criticism, self-attacking, and self-reassuring

The Forms of Self-criticizing/attacking and Self-reassuring Scale (FSCRS; Gilbert, Clarke, Hempel, Miles, & Irons, 2004)

was employed. The scale consists of 22 items assessing the way people 'treat themselves' when things go wrong. This measure is composed by three dimensions: *inadequate self*, which assesses feelings of inadequacy and a sense of frustration towards the self; *hated self*, which assesses a feeling of self-hate and desire to hurt the self; and *reas-sured self*, which indicates the ability to be self-soothing and reassuring when facing failures. In the present study Cronbach's  $\alpha$  for the *Hated-Self* scale was 0.80, for the *Reassured-Self* scale was 0.88, and for the *Inadequate-Self* scale was 0.93.

### Trait self-consciousness and social anxiety

The Self-Consciousness Scale Revised (Scheier & Carver, 1985) was employed to assess dispositional private and public self-consciousness, and social anxiety. In the present study Cronbach's  $\alpha$  for the Private self-consciousness scale was 0.83, for the Public self-consciousness scale was 0.84, and for the Social anxiety scale was 0.86.

#### Other stable features

Questions regarding *perceived pleasantness of the face* (1 item, rated on a 7-point Likert scale), *minutes* spent in front of the mirror every day (1 item, rated on a 7-point Likert scale), and *perceived pleasantness of the voice* (1 item, rated on a 7-point Likert scale) were also included.

#### State measures

#### Visual analogue scales – VASs

At Time 1 (baseline), Time 2 (after the self-criticism induction), and Time 3 (after the experimental manipulation), participants were asked to rate their current levels of negative and positive affect on several visual analogue 100point scales (VAS). The VAS is a measure of affect intensity that is valid for registering short-term changes in affect (Albersnagel, 1988). Negative affect (NA) was assessed by four emotions related to the self-criticism induction (ashamed, disgusted with themselves, guilty, angry at themselves).

The activated and the soothing positive affect were assessed by two subscales of the Activation and Safe/ Content Affect Scale (Gilbert et al., 2008). Four items with the highest factorial loading of the activated positive affect (*lively, energetic, excited, enthusiastic*) and the soothing positive affect (*safe, secure, content, warm*) were chosen.

Given their high internal consistency (Cronbach's  $\alpha$  for negative affect = 0.82; activated positive affect:  $\alpha$  = 0.76; soothing positive affect:  $\alpha$  = 0.73), responses to items belonging to the same affect system were aggregated to compute the mean. These three items' parcels will be referred to as 'NA', 'activated PA', and 'soothing PA'.

#### State common humanity

At Time 2 and Time 3, participants were asked to rate, on a 7-point Likert scale, four items adapted from the *common humanity* subscale of the Self-compassion Scale (Neff, 2003), to assess the current level of this dimension regarding the content of the self-criticism episode. The four items were: 'In this moment, I see my failings as part of the human condition', 'In this moment, I feel that there are lots of other people in the world experiencing failures and imperfections', 'In this moment, my flaws and inadequacies make me feel more separate and cut off from the rest of the world' and 'In this moment, I feel alone in my failure and feelings of inadequacy'. After reversing the scores of the two negative items, the mean of the four items was computed and employed in subsequent analyses. Internal consistency for this parcel was  $\alpha = 0.79$ .

#### Psychophysiological measures

The electrocardiogram (ECG) was continuously monitored (Monitoring, Adatec s.r.l., Italy) throughout the experiment with a standard electrode configuration (right clavicle and precordial site V6). Three disposable Ag- AgCl electrodes were used. The ECG signal was digitized at 1000 Hz and inspected offline using Monitoring software (Adatec s.r.l., Italy). Successive R waves (identified by an automatic beat detection algorithm) were visually inspected, and any irregularities were edited. Heart rate and a time domain measure of HRV (Root Mean Square Successive Difference; RMSSD) were then obtained for baseline, induction, and each experimental condition using HRV Analysis Software (Niskanen, Tarvainen, Ranta-Aho, & Karjalainen, 2004). According to the Task Force guidelines, the RMSSD reflects the integrity of vagus nerve-mediated autonomic control of the heart (Task Force of the European Society of Cardiology & the North American Society of Pacing & Electrophysiology, 1996).

#### **Data analyses**

The analyses were carried out using SPSS Version 21. Only significant (p < 0.05) results are reported. To control for the presence of preexisting baseline differences between the three experimental subgroups, a series of one-way Analyses of Variance (ANOVAs) were computed on all the dispositional (socio-demographic variables and trait questionnaires), state (NA, activated PA, soothing PA, and state common humanity) and physiological measures (HR and HRV).

We tested for the effectiveness of the self-criticism induction (manipulation check) by comparing all outcome measures (NA, activated PA, soothing PA, HR and HRV) at T1 and T2 using Bonferroni corrected paired *t*-tests.

	Phrases at the mirror Group M (SD)	Phrases only Group M (SD)	Mirror only Group M (SD)	Statistics
Age	29.10ª	26.10	23.5 <sup>b</sup>	a > b
	(4.03)	(3.3)	(3.2)	<i>p</i> < 0.01
Level of education	2.5ª	3.1 <sup>b</sup>	2.7	b > a
	(0.63)	(0.56)	(0.62)	p < 0.05
BMI (kg/m <sup>2</sup> )	21.82	21.50	22.01	ns
	(1.1)	(1.2)	(1.1)	

Table 1. Mean scores, standard deviations and statistics for age, level of education and body mass index. Only significant statistics are reported.

Note: Level of education scores: 0 = Junior high school; 1 = Senior high school; 2 = Bachelor's degree; 3 = Master's degree, 4 = Doctoral degree or a second-level Master's degree, ns = non significant.

To test for the effects of our experimental manipulation, a series of  $3 \times 3$  General Linear Models (GLMs) with Group (phrases at the mirror vs phrases without the mirror vs mirror without phrases) as a between subject variable, Time (Time 1, Time 2, Time 3) as a within subject variable, and Gender as covariate were conducted on NA, activated PA, soothing PA, HR and HRV. Partial eta-squared ( $\eta^2$ ) were calculated to quantify the effect sizes.

Then, bootstrapping tests of mediation were performed using the Preacher and Hayes (2008) PROCESS macro with 5000 bootstrap samples. This approach provides unstandardized betas for the indirect effect estimates, and the corresponding 95% bias-corrected and accelerated confidence intervals. If the values between the upper and lower confidence limits do not include zero, this indicates a statistically significant mediation effect. In this study, the independent variable was Group, the dependent variables were the change score from Time 2 to Time 3 of outcome variables that showed a significant Group × Time interaction in the previous GLMs, and the mediator was the change score in state *common humanity* from Time 2 to Time 3.

To control for differences between how closely participants followed the instructions and how difficult it was for them, one-way ANOVAs with Bonferroni post hoc correction were computed on these two items between the three experimental subgroups (see Section 'Design and Procedure' for more details).

# Results

# Preliminary analyses and group differences at baseline

Twelve univariate outliers were found. However, considering the little difference existing between mean and 5% trimmed mean, all outliers were considered as not distorting data and, therefore, included in the main analyses. No multivariate outliers were found using the Mahalanobis statistic. Based on examination of the Kolmogorov– Smirnov and Shapiro–Wilk statistic, several variables were not normally distributed. However, Skewness' and Kurtosis' values were not severely biased, as these were below the recommended cut-off points (Kline, 1998), consistent with the assumption of approximate normal distributions.

Initial data screening revealed no significant baseline differences at trait and state measures at Time 1 (all ps > 0.05). Chi-square tests showed no differences between the three groups for gender (p = 0.07) and smoking habits (p = 0.06). However, the three groups showed a difference in age, *F*(2,83) = 3.86, *p* < 0.05: participants in the 'mirror-only' group were significantly younger than those in the 'phrases at the mirror' group (see Table 1 for means, standard deviations and statistics). Moreover, the three groups differed on level of education, F(2,83) = 4.44, p < 0.05: the 'phrases only' participants had a significantly higher level of education than those in the 'phrases at the mirror' group. Thus, age and level of education were included as covariates in all following analyses. The assumption of homogeneity of variances and homogeneity of regression slopes was met for all the dependent variables.

# Effect of self-criticism induction

Bonferroni corrected paired *t*-tests indicated that NA significantly increased from Time 1 (before the self-criticism induction) to Time 2 (after the self-criticism induction) (all ps < 0.001). The activated PA, and the soothing PA, significantly decreased from T1 to T2 (all p < 0.001). Furthermore, HR increased and HRV decreased from T1 to T2. The induction can therefore be considered effective in increasing negative affect connected to self-criticism, and in reducing positive affect, with associated increase in HR and decrease in HRV (see Table 2).

# Effect of experimental manipulation

GLM results showed a main effect of Time on all dependent variables, except for HR and HRV. Negative affect significantly decreased from T2 to T3 (all *ps* < 0.01; see Table 2 for means, standard deviations, and statistics). The activated PA and the soothing PA, significantly increased from T2 to T3 (all *ps* < 0.05).

A significant Time  $\times$  Group interaction emerged for the soothing PA (see Figure 2) and for HRV, (see Figure 3).

<b>Table 2.</b> Mear self-criticism ii	ו scores, stand nduction (T2),	ard deviations, an and after the inte	nd statistics of affe ervention (T3).	ect systems (VA'	Ss), common hur	manity, HR, and	HRV (RMSSD) ii	n the three group	os before the	emotion inductio	n (T1), after the
		T1			T2			T3		Statist	ics
	M & P <i>M</i> (SD)	Phrases M (SD)	Mirror M (SD)	M & P <i>M</i> (SD)	Phrases <i>M</i> (SD)	Mirror M (SD)	M & P <i>M</i> (SD)	Phrases M (SD)	Mirror M (SD)	Main effect of time	Time × group interaction
Negative affect	19.7 (19.4)	17.9 (18.9)	17.7 (14.4)	43.5 (17.7)	38.9 (22.2)	40.4 (18.5)	23.7 (26.3)	27.3 (25.7)	26.5 (21.1)	F(4, 162) = 8.04, p < 0.01, partial $\eta^2$ = 0.09	su
Activated PA	50.9 (16.9)	49.8 (16.4)	52.4 (19.2)	35.2 (18.8)	40.6 (18.5)	42.1 (15.8)	49.3 (19.1)	45.9 (18.6)	47.4 (22.2)	F(4, 162) = 4.65, p < 0.05, partial $\eta^2$ = 0.05	su
Soothing PA	50.1 (18.8)	46.6 (18.1)	47.9 (16.6)	31.6 (11.1)	32.8 (16.8)	34.3 (15.3)	56.5 (17.1)	41.5 (18.6)	44.5 (17.5)	<i>F</i> (4,162) = 11.36, <i>p</i> < 0.01, partial η <sup>2</sup> = 0.12	F(4, 162) = 6.16, p < 0.01, partial $\eta^2 =$ 0.13
Common humanity		/		4.75 (0.89)	4.88 (1.44)	4.97 (1.60)	5.19 (1.09)	5.06 (1.19)	4.8 (1.23)	us	F(2,83) = 3.58, p < 0.05, partial $n^2 = 0.08$
HR (bpm) RMSSD (ms²)	82.4 (7.7) 66.1 (21.1)	82.5 (10.6) 71.4 (17.1)	81.1 (11.1) 69.1 (22.9)	84.6 (12.4) 58.1 (17.9)	83.7 (10.4) 58.9 (15.4)	82.5 (11.4) 59.07 (15.5)	84.2 (7.3) 81.4 (27.6)	81.5 (9.6) 68.6 (15.2)	81.3 (9.9) 67.6 (16.8)	รน รน	F(4,162) = 7.24, p < 0.01, p < 0.01, p = 0.0



0.15

Vote: M & P = mirror and phrases, HR = heart rate; RMSSD = root mean square of the successive differences. Only significant statistics are reported. ns = non significant.

Figure 2. Time  $\times$  Group interaction for the 'soothing positive affect' VASs.

Gender was not a significant covariate in both models. Post hoc Bonferroni corrected analyses showed no differences between the 3 groups at Time 1 and the Time 2. However, at Time three there were statistically significant differences in the soothing PA, F(2, 81) = 5.8, p < 0.01, partial  $\eta^2 = 0.12$  and HRV, F(2, 81) = 4.7, p = 0.012, partial  $\eta^2 = 0.97$ . Bonferroni corrected pairwise comparisons showed that the 'phrases at the mirror' group scored significantly higher than the other two groups on both the soothing PA and HRV (see Table 2 for means, standard deviations, and statistics). No other significant differences emerged.

# Mediating effect of common humanity

Two distinct bootstrapping tests of mediation were performed, with Group as the independent variable, change score in common humanity from Time 2 to Time 3 as a mediator, and the soothing PA and HRV change scores from Time 2 to Time 3 as the dependent variables, respectively.

Overall, the model with change score in soothing PA as the dependent variable accounted for 19.4% of its variance. Importantly, the indirect effect of group on the dependent variable (via score increase in common humanity) was significant (B = -1.47; CI [-3.89, -0.09]), suggesting that increases in common humanity mediated the effect of Group on the soothing PA increases. In addition, results indicated that the direct effect of Group on the dependent variable remained significant (B = -5.52, CI [-9.5, -1.53]) when the mediator was included in the model, thus suggesting a partial mediation (see Figure 4 for unstandardized coefficients).

The model with HRV change score as the dependent variable accounted for 12.8% of its variance. However, the indirect effect of Group on the dependent variable (via score increase in common humanity) was not significant (B = -1.08; CI [-3.63, 0.07]), suggesting that score increase



Figure 3. Time × Group interaction for HRV (RMSSD; ms<sup>2</sup>).



**Figure 4.** Path diagram for the mediation model. Note: \*\*p < 0.01; \*\*\*p < 0.001. cs = change score (from Time 2 to Time 3). All coefficients are unstandardized.

in common humanity did not mediate the effect of Group on HRV increase.

### Additional analyses

There were no differences among the three groups on how closely participants were able to follow instructions of the assigned experimental condition, F(2, 83) = 1.8, p = 0.7. However, for participants in the phrases only Group it was more difficult to follow the instructions, F(2, 83) = 3.75, p < 0.05, partial  $\eta^2 = 0.11$ , M = 2.9, SD = 0.6 than for participants in the mirror only Group (M = 2.1, SD = 0.8). None of the participants in the mirror only Group repeated the phrases previously created during the mirror exposure or consciously engaged in an active compassionate self-talk.

#### Discussion

The ability to be reassuring, encouraging and compassionate towards ourselves when things go wrong in life is related to increased resilience and, in general, better psychological health (Neely, Schallert, Mohammed, Roberts, & Chen, 2009). In fact, the warm and positive feelings of safeness and contentment stemming from compassionate self-relating have been shown to protect against the depressogenic effects of shame and self-criticism (Gilbert et al., 2008).

The main purpose of this study was to investigate whether the efficacy of a 5-min compassionate self-talk manipulation in augmenting positive emotions could be enhanced by performing it in front of a mirror and directing the phrases toward participants' own reflection. As expected, results showed that repeating the phrases in front of the mirror enhanced the soothing positive affect more than repeating the phrases out loud, without the mirror, or just looking at their reflection in the mirror without repeating the phrases. The soothing affect system is triggered by signals of social connectedness and safeness (Carter, 1998; Depue & Morrone-Strupinsky, 2005; Wang, 2005). Increases in this particular type of positive affect, which is linked to the caring motivational system, and to affiliative warm relationships, are the target of all compassion-focused interventions. Research has shown that from birth, the brain has specialized systems that are highly responsive to social stimuli (warm voice tones, facial expressions, touching, and holding; Schore, 1994; Trevarthen & Aitken, 2001), and that these social signals are major regulators of arousal, emotions, and physiological processes (Cacioppo, Berston, Sheridan, & McClintock, 2000). Thus, the mirror seems to be an effective addition to the self-talk exercise because it intensifies exactly the type of positive emotions that are considered to have a major protective effect against self-criticism and shame-based difficulties. Physiological data supported this result: HRV, an index of adaptive emotion regulation, high levels of 'safety-based' positive emotions (Thayer, Åhs, Fredrikson, Sollers, & Wager, 2012), and a physiological marker of compassion (Stellar et al., 2015), increased when the phrases were repeated in front of the mirror more than in the other two conditions.

One possible explanation for this effect is that the mirror increases the quantity of positive self-relating social signals that we can process (not only the voice but also the reflection of our facial expressions and the gaze), thus intensifying the emotional response that these signals tend to elicit (feeling of safeness and lovability that are more directly conveyed by non verbal communication). Moreover, watching our own face in the mirror strongly activates the mirror neuron system (Platek et al., 2006; Uddin, Kaplan, Molnar-Szakacs, Zaidel, & lacoboni, 2005), which, through the mechanism of 'embodied simulation' (Gallese, 2013), facilitates a direct, pre-reflexive form of action understanding not exclusively dependent upon mentalistic/linguistic abilities (Gallese, 2003). We can speculate that the activation of this system may have induced participants' emotional emphasizing of their own distress, facilitating the emergence of self-compassion, as also suggested by Vinai et al. (2015). This is indirectly supported by recent research showing that exposure to our face facilitates identification of emotional facial expressions (Li & Tottenham, 2011, 2013), which is strongly related to empathetic processes (Besel & Yuille, 2010).

Another way to explain the amplifying effect of the mirror manipulation on soothing positive affect and HRV is linked to the 'objectifying properties' of the mirror. When we look at our own mirror reflection, we may experience ourselves from an external point of view, which may help us be more objective and less biased by our internal representations of ourselves (Silvia & O'Brien, 2004). In fact, research employing immersive virtual reality has shown that identification with a virtual body as a way to experience self-compassion from an embodied first-person perspective increased self-compassion and feelings of being safe in a group of highly self-critical females (Falconer et al., 2014).

Interestingly, the addition of the mirror component did not impact females differently than males. Research on self-objectification suggests that exposure to mirrors can have negative affective and cognitive consequences for females in particular, including increasing body shame (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998). However, it is possible that asking participants to generate compassionate phrases in the first part of the experiment, thus activating a compassionate mind-set, has dampened the shame reaction often linked to mirror exposure, especially for women; though, further research is needed to explore this issue more fully.

Another possible explanation for the effect of the mirror addition is that when we look at ourselves from an external point of view, we can appraise our qualities like we appraise other people's features, and apply to ourselves the same standards that we use to evaluate others, which are usually milder (Leahy, 2003). This might help us remind that we have boundaries and flaws like every other human being, and that suffering, personal failures, inadequacies are part of the shared human experience. This insight, which has been defined 'common humanity' by Neff (2003), is one of the major components of self-compassion, because it lessens the degree of blame and harsh judgment we may have placed on ourselves for our failings, softening feelings of abnormality and isolation. In fact, our data showed that the enhancement in the soothing affect system produced by repeating the phrases at the mirror was partially mediated by an increase in common humanity. However, common humanity did not play the same mediating role in HRV increases, suggesting that other possible mediating factors must be hypothesized and further investigated.

Repeating the phrases at the mirror did not lessen negative emotions more than the other two conditions. These findings confirmed that even if positive and negative affect are evidently two related constructs, at the same time they are separate dimensions, and not two opposite points on the same continuum (Baumeister & Bushman, 2010). Our results are in line with previous research showing that compassion-focused interventions do not specifically impact negative affect, or, at least, no more than other interventions (Klimecki et al., 2013; Odou & Brinker, 2015). This may be due to the nature of compassion interventions. Differently from positive reappraisal and cognitive restructuring, which are mostly aimed to 'restructure' and change the very content of the self-critical process (e.g. 'I'm not so bad; I don't have enough evidence supporting this negative assumption about myself'), thus improving negative affect, compassion-focused coping may provide individuals with an effective way to accept negative emotions, which might not be directly impacted by the intervention.

The mirror seems to potentiate the compassionate self-talk manipulation through focusing on kindness and connectedness *in the face* of an emotionally painful experience, thus increasing the positive emotions of the soothing system and HRV.

Two major limitations must be considered when interpreting the results of this study. Firstly, we did not conduct an extensive qualitative content analysis of the type of phrases that participants produced in the first part of the experiment. Differences in content and 'intensity' of the phrases among the groups may have been responsible for the pattern of results we observed. However, an informal content analysis conducted separately by the three authors seemed to suggest a general homogeneity in terms of content and emotional intensity of the phrases among the three groups. Random examples of phrases have been reported in Appendix 1. General themes of unconditional acceptance, understanding and empathy towards the suffering, willingness to support and help, common humanity, and warm encouragement seem to indistinctively recur among all the three groups.

The second limitation is that even if we asked participants to rate how closely they followed the instructions and how difficult it was for them to follow the instructions, we did not directly control for participants' compliance to the experimental task (through audio or video recordings).

Limitations notwithstanding, results suggest that the mirror is an effective tool for improving the effectiveness of a compassion-focused exercise, considering that it could be easily implemented in clinical practice. Further research is needed to determine moderators (e.g., different fears of compassion; Gilbert, McEwan, Matos, & Rivis, 2011) and other possible mediators of this effect, such as, for example, the other components of self-compassion (Germer & Neff, 2013; Neff, 2003).

#### **Disclosure statement**

No potential conflict of interest was reported by the authors.

# Funding

Support for investigators (CO) was received from the Italian Ministry of Health Young Researcher [grant number GR-2010-2312442].

# ORCID

Nicola Petrocchi D http://orcid.org/0000-0002-7210-2319 Cristina Ottaviani D http://orcid.org/0000-0002-5240-4387

#### References

- Albersnagel, F. A. (1988). Velten and musical mood induction procedures: A comparison with accessibility of thought associations. *Behaviour Research and Therapy*, *26*, 79–96. doi:10.1016/0005-7967(88)90035-6
- Baumeister, R. F., & Bushman, B. J. (2010). *Social psychology and human nature*. Belmont, CA: Thomson Wadsworth.
- Besel, L., & Yuille, J. (2010). Individual differences in empathy: The role of facial expression recognition. *Personality and Individual Differences*, 49, 107–112. doi:10.1016/j.paid.2010.03.013
- Beskow, J., & Palm, A. (1998). The mirror technique. *Constructivism in the Human Sciences*, *3*, 20–22.
- Boersma, K., Håkanson, A., Salomonsson, E., & Johansson, I. (2014). Compassion focused therapy to counteract shame, self-criticism and isolation. A replicated single case experimental study for individuals with social anxiety. *Journal* of Contemporary Psychotherapy. Advance online publication. doi:10.1007/s10879-014-9286-8
- Brédart, S., Delchambre, M., & Laureys, S. (2006). One's own face is hard to ignore. *The Quarterly Journal of Experimental Psychology*, 59, 46–52. doi:10.1080/17470210500343678
- Breines, J. G., & Chen, S. (2012). Self-compassion increases selfimprovement motivation. *Personality and Social Psychology Bulletin*, 38, 1133–1143. doi:10.1177/0146167212445599
- Cacioppo, J. T., Berston, G. G., Sheridan, J. F., & McClintock, M. K. (2000). Multilevel integrative analysis of human behavior: Social neuroscience and the complementing nature of social and biological approaches. *Psychological Bulletin*, *126*, 829– 843. doi:10.1037/0033-2909.126.6.829
- Carter, C. S. (1998). Neuroendocrine perspectives on social attachment and love. *Psychoneuroendocrinology*, 23, 779–818. doi:10.1016/S0306-4530(98)00055-9
- Cole, J. (2001). Empathy needs a face. *Journal of Consciousness Studies*, *8*, 51–68.
- Cowan, D. G., Vanman, E. J., & Nielsen, M. (2014). Motivated empathy: The mechanics of the empathic gaze. *Cognition and Emotion, 28*, 1522–1530. doi:10.1080/02699931.2014.89 0563
- Depue, R.A., & Morrone-Strupinsky, J.V. (2005). A neurobehavioral model of affiliative bonding. *Behavioral and Brain Sciences*, 28, 313–395. doi:10.1017/S0140525X05000063

- Duff, C. K., & Flattery, J. J. (2014). Developing mirror self awareness in students with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 44*, 1027–1038. doi:10.1007/ s10803-013-1954-0
- Duval, S., & Wicklund, R. A. (1972). A theory of objective selfawareness. New York, NY: Academic Press.
- Falconer, C., Slater, M., Rovira, A., King, J., Gilbert, P., Antley, A., & Brewin, C. (2014). Embodying compassion: A virtual reality paradigm for overcoming excessive self-criticism. *PLOS ONE*, *9*, e111933. doi:10.1371/journal.pone.0111933
- Fredrickson, B., Roberts, T., Noll, S., Quinn, D., & Twenge, J. (1998). That swimsuit becomes you: Sex differences in selfobjectification, restrained eating, and math performance. *Journal of Personality and Social Psychology*, 75, 269–284. doi:10.1037/0022-3514.75.1.269
- Gallese, V. (2003). The roots of empathy: The shared manifold hypothesis and the neural basis of intersubjectivity. *Psychopathology*, *36*, 171–180. doi:10.1159/000072786
- Gallese, V. (2013). Mirror neurons, embodied simulation and a second-person approach to mindreading. *Cortex: A Journal Devoted to the Study of the Nervous System and Behavior, 49,* 2954–2956. doi:10.1016/j.cortex.2013.09.008
- Germer, C. K. (2009). *The mindful path to self-compassion: Freeing yourself from destructive thoughts and emotions*. New York, NY: Guilford Press.
- Germer, C., & Neff, K. (2013). Self-compassion in clinical practice. Journal of Clinical Psychology, 69, 856–867. doi:10.1002/ jclp.22021
- Gilbert, P. (2005). Compassion: Conceptualizations, research and use in psychotherapy. New York, NY: Routledge.
- Gilbert, P. (2010). Compassion focused therapy: Distinctive features. New York, NY: Routledge/Taylor & Francis Group.
- Gilbert, P. (2014). The origins and nature of compassion focused therapy. *British Journal of Clinical Psychology*, *53*, 6–41. doi:10.1111/bjc.12043
- Gilbert, P., Baldwin, M. W., Irons, C., Baccus, J. R., & Palmer, M. (2006). Self-criticism and self-warmth: An imagery study exploring their relation to depression. *Journal of Cognitive Psychotherapy*, 20, 183–200. doi:10.1891/jcop.20.2.183
- Gilbert, P., Clarke, M., Hempel, S., Miles, J. N. V., & Irons, C. (2004). Criticizing and reassuring oneself: An exploration of forms, styles and reasons in female students. *British Journal of Clinical Psychology*, 43, 31–50. doi:10.1348/014466504772812959
- Gilbert, P., McEwan, K., Matos, M., & Rivis, A. (2011). Fears of compassion: Development of three self-report measures. *Psychology and Psychotherapy: Theory, Research and Practice,* 84, 239–255. doi:10.1348/147608310x526511
- Gilbert, P., McEwan, K., Mitra, R., Franks, L., Richter, A., & Rockliff, H. (2008). Feeling safe and content: A specific affect regulation system? Relationships to depression, anxiety, stress and self-criticism. *The Journal of Positive Psychology*, *3*, 182–191. doi:10.1080/17439760801999461
- Gilbert, P., & Procter, S. (2006). Compassionate mind training for people with high shame and self-criticism: Overview and pilot study of a group therapy approach. *Clinical Psychology & Psychotherapy*, 13, 353–379. doi:10.1002/cpp.507
- Hay, L. L. (1991). The power of your spoken word change your negative self-talk and create the life you want. San Francisco, CA: Hay House.
- Hay House. (2015). Loving yourself: Online video course: 21 days to improved self-esteem with mirror work. San Francisco, CA: Louise L. Hay.

- Hildebrandt, T., Loeb, K., Troupe, S., & Delinsky, S. (2012). Adjunctive mirror exposure for eating disorders: A randomized controlled pilot study. *Behaviour Research and Therapy*, *50*, 797–804. doi:10.1016/j.brat.2012.09.004
- Hofmann, S. G., & Heinrichs, N. (2002). Disentangling selfdescriptions and self-evaluations under conditions of high self-focused attention: Effects of mirror exposure. *Personality* and Individual Differences, 32, 611–620. doi:10.1016/S0191-8869(01)00063-0
- Hofmann, S. G., & Heinrichs, N. (2003). Differential effect of mirror manipulation on self-perception in social phobia subtypes. *Cognitive Therapy and Research*, 27, 131–142. doi:1 0.1023/A:1023507624356
- Keenan, J. P., Gallup, G. G., Jr, & Falk, D. (2003). The face in the mirror: The search for the origins of consciousness. New York: Ecco.
- Kelly, A. C., Zuroff, D. C., Leybman, M. J., & Gilbert, P. (2012). Social safeness, received social support, and maladjustment: Testing a tripartite model of affect regulation. *Cognitive Therapy and Research*, 36, 815–826. doi:10.1007/s10608-011-9432-5
- Kelly, A. C., Zuroff, D. C., & Shapira, L. B. (2009). Soothing oneself and resisting self-attacks: The treatment of two intrapersonal deficits in depression vulnerability. *Cognitive Therapy and Research*, 33, 301–313. doi:10.1007/s10608-008-9202-1
- Klimecki, O. M., Leiberg, S., Lamm, C., & Singer, T. (2013). Functional neural plasticity and associated changes in positive affect after compassion training. *Cerebral Cortex*, 23, 1552–1561.
- Kline, R. B. (1998). *Principles and practice of structural equation modeling*. New York, NY: Guildford.
- Lange, A., Richard, R., Gest, A., Vries, M., & Lodder, L. (1998). The effects of positive self-instruction: A controlled trial. *Cognitive Therapy and Research, 22*, 225–236. doi:10.1023 /A:1018740725281
- Lange, A., Richard, R., Kiestra, J., & van Oostendorp, E. (1997). Cognitive treatment through positive self-verbalization: A multiple case study. *Behavioural & Cognitive Psychotherapy*, 25, 161–171. doi:10.1017/S1352465800018361
- Leahy, R. L. (2003). Cognitive therapy techniques: A practitioner's guide. New York, NY: Guilford Press.
- Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself kindly. *Journal of Personality and Social Psychology*, 92, 887–904. doi:10.1037/0022-3514.92.5.887
- Li, Y., & Tottenham, N. (2011). Seeing yourself helps you see others. *Emotion*, *11*, 1235–1241. doi:10.1037/a0023469
- Li, Y. H., & Tottenham, N. (2013). Exposure to the self-face facilitates identification of dynamic facial expressions: Influences on individual differences. *Emotion*, 13, 196–202. doi:10.1037/a0030755
- Longe, O., Maratos, F. A., Gilbert, P., Evans, G., Volker, F., Rockliff, H., & Rippon, G. (2010). Having a word with yourself: Neural correlates of self-criticism and self-reassurance. *NeuroImage*, 49, 1849–1856. doi:10.1016/j.neuroimage.2009.09.019
- Mahoney, M. J. (1991). *Human change processes*. New York, NY: Basic Books.
- Neely, M. E., Schallert, D. L., Mohammed, S. S., Roberts, R. M., & Chen, Y. (2009). Self-kindness when facing stress: The role of self-compassion, goal regulation, and support in college students well-being. *Motivation and Emotion*, 33, 88–97. doi:10.1007/s11031-008-9119-8

- Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity, 2*, 223–250. doi:10.1080/15298860309027
- Neff, K. D., & Germer, C. K. (2013). A pilot study and randomized controlled trial of the mindful self-compassion program. *Journal of Clinical Psychology*, 69, 28–44. doi:10.1002/jclp.21923
- Niskanen, J., Tarvainen, M. P., Ranta-Aho, P. O., & Karjalainen, P. A. (2004). Software for advanced HRV analysis. *Computer Methods and Programs in Biomedicine*, 76, 73–81.
- Odou, N., & Brinker, J. (2015). Self-compassion, a better alternative to rumination than distraction as a response to negative mood. *The Journal of Positive Psychology, 10*, 447–457. doi:10.1080/17439760.2014.967800
- Panksepp, J. (1998). *Affective neuroscience*. New York, NY: Oxford University Press.
- Platek, S. M., Loughead, J. W., Gur, R. C., Busch, S., Ruparel, K., Phend, N., ... Langleben, D. D. (2006). Neural substrates for functionally discriminating self-face from personally familiar faces. *Human Brain Mapping*, 27, 91–98. doi:10.1002/ hbm.20168
- Porciello, G., Holmes, B., Liuzza, M., Crostella, F., Aglioti, S., & Bufalari, I. (2014). Interpersonal multisensory stimulation reduces the overwhelming distracting power of self-gaze: Psychophysical evidence for 'engazement'. *Scientific Reports*, *4*, Article number: 6669. doi:10.1038/srep06669
- Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, 74, 116–143. doi:10.1016/j.biopsycho.2006.06.009
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect e ects in multiple mediator models. *Behavior Research Methods*, 40, 879–891. doi:10.3758/BRM.40.3.879
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401. doi:10.1177/014662167700100306
- Schanche, E. (2013). The transdiagnostic phenomenon of selfcriticism. Psychotherapy, 50, 316–321. doi:10.1037/a0032163
- Scheier, M. F., & Carver, C. S. (1985). The self-consciousness scale: A revised version for use with general populations. *Journal of Applied Social Psychology*, 15, 687–699. doi:10.1111/j.1559-1816.1985.tb02268.x
- Schore, A. N. (1994). Affect regulation and the origin of the self: The neurobiology of emotional development. Hillsdale, NJ: Lawrence Erlbaum.
- Silvia, P.J. (2002). Self-awarenessandemotional intensity. *Cognition and Emotion, 16*, 195–216. doi:10.1080/02699930143000310
- Silvia, P. J., & O'Brien, M. E. (2004). Self-awareness and constructive functioning: Revisiting 'the human dilemma'. *Journal of Social and Clinical Psychology*, 23, 475–489. doi:10.1521/jscp.23.4.475.40307
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. (1970). Manual for the state and trait anxiety inventory. Palo Alto, CA: Consulting Psychologist Press.
- Stellar, J. E., Cohen, A., Oveis, C., & Keltner, D. (2015). Affective and physiological responses to the suffering of others: Compassion and vagal activity. *Journal of Personality and Social Psychology*, *108*, 572–585. doi:10.1037/pspi0000010
- Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. (1996). Heart rate variability: Standards of measurement, physiological interpretation, and clinical use. *Circulation*, *93*, 1043–1065.
- Thayer, J. F., Åhs, F., Fredrikson, M., Sollers, J. I., & Wager, T. D. (2012). A meta-analysis of heart rate variability and neuroimaging

studies: Implications for heart rate variability as a marker of stress and health. *Neuroscience and Biobehavioral Reviews, 36*, 747–756. doi:10.1016/j.neubiorev.2011.11.009

- Trevarthen, C., & Aitken, K. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *Journal of Child Psychology and Psychiatry*, 42, 3–48. doi:10.1111/1469-7610.00701
- Uddin, L. Q., Kaplan, J. T., Molnar-Szakacs, I., Zaidel, E., & lacoboni, M. (2005). Self-face recognition activates a frontoparietal "mirror" network in the right hemisphere: An event-related fMRI study. *NeuroImage*, *25*, 926–935.
- Vinai, P., Speciale, M., Vinai, L., Vinai, P., Bruno, C., Ambrosecchia, M., & Gallese, V. (2015). The clinical implications and neurophysiological background of useing self-mirroring technique to enhance the identification of emotional experiences: An example with rational emotive

behavior therapy. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*. Advance online publication. doi:10.1007/s10942-015-0205-z

- Wang, S. (2005). A conceptual framework for integrating research related to the physiology of compassion and the wisdom of Buddhist teachings. In P. Gilbert (Ed.), *Compassion: Conceptualizations, research and use in psychotherapy* (pp. 75–120). New York, NY: Routledge.
- Whelton, W. J., & Greenberg, L. S. (2005). Emotion in self-criticism. *Personality and Individual Differences, 38*, 1583–1595. doi:10.1016/j.paid.2004.09.024
- Williams, A. M., Diehl, N. S., & Mahoney, M. J. (2002). Mirrortime: Empirical findings and implications for a constructivist psychotherapeutic technique. *Journal of Constructivist Psychology*, 15, 21–39. doi:10.1080/10720530275330570

A	opendix '	<ol> <li>Random</li> </ol>	selection of	com	passionate	phrases	from the	e three aroups.

		-
Phrases at the mirror group	Phrases only group	Mirror only group
I'll always be there for you, whatever you might need.	What counts for me, it's not what you do but what you are	Making mistakes is human; it's OK even if you fail
It's not the end of the world! We will find a way together	I'm sorry that you are sad, but you can count on me; everything will be all right	Life is sour sometimes, but we are all together in this, you will never be alone
We can all do mistakes	Over the years, I've seen all your changes and I've learned how to love each and every part of you. I love you	Take your time, take a bath, cuddle yourself.
I will be here even when all things will start falling apart; you are my friend, my sister, I will never leave you alone.	I know what you are feeling, but you can always count on me	A day will come when you will think back to this moment and you will smile at it
I know that you are struggling now, but please don't forget that there are people loving you, and waiting for you to feel better	After all this, you will be stronger that before	I know how difficult this moment is for you: loss, betrayals etc. But I will be by your side, whatever happens.
I'm sorry that you are feeling sad, I'll be by your side	Life is like that: there will always be difficulties and sad moments. But we can decide to be strong enough to face them.	l love you for what you are, exactly as you are, not for what you do.
Don't let anyone judge you, you are the only person that can say what's right or wrong for you	Don't take your self-critical voice so seriously; you are much wiser and bigger than that silly voice	The parts of yourself that you don't like, are parts of you that need your attention and love
You've been strong in the past, and you will be able to find your strength now too.	I'm here and I will be here forever; I'll always try to help you in any way possible	Think about all the positive things that you did and do.
Don't be too hard and critical on yourself, everyone makes mistakes.	What counts is that you had the strength to share these difficult feelings with someone	Don't worry we will fix this together
Don't worry, the sun will come back, eventu- ally; and I'll be here with you till it comes.	What can I do for you? It's better if we are in two.	l understand you completely, how can l help you?
When you are sad, you can count on me	I'm your friend and I love you; I accept you exactly as you are	Everyone makes mistakes, but we can always learn from them. Don't worry, we will find a solution together.