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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
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

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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 without the mirror; (c) look at themselves in the mirror without repeating the 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.

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 self-talk 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 under-developed 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, lovableness, 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, & Shapiro, 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 self-deprecatory 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 self-talk 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/m²), 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.
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 reassured self, which indicates the ability to be self-soothing and reassuring when facing failures. In the present study Cronbach’s α 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 α 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 100-point 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 α for negative affect = 0.82; activated positive affect: α = 0.76; soothing positive affect: α = 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 common humanity,’ ‘In this moment, I feel that there are lots of other people in the world experiencing failures and imperfections,’ ‘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 α = 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 (ANOVA)s 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.
N. PETROCCHI  ET AL.

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 ps < 0.05). 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 × Group interaction emerged for the soothing PA (see Figure 2) and for HRV, (see Figure 3).

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

<table>
<thead>
<tr>
<th></th>
<th>Phrases at the mirror Group M (SD)</th>
<th>Phrases only Group M (SD)</th>
<th>Mirror only Group M (SD)</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29.10^a (4.03)</td>
<td>26.10 (3.3)</td>
<td>23.5^b (3.2)</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Level of education</td>
<td>2.5^a (0.63)</td>
<td>3.1^b (0.56)</td>
<td>2.7 (0.62)</td>
<td>b &gt; a</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>21.82 (1.1)</td>
<td>21.50 (1.2)</td>
<td>22.01 (1.1)</td>
<td>ns</td>
</tr>
</tbody>
</table>

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.
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, $F(2, 81) = 11.36, p < 0.01$, partial $\eta^2 = 0.13$. 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 the 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 ($B = -1.47, 95\% CI [-3.39, -0.09]) suggesting that increases in common humanity mediated the effect of Group on the soothing PA increases. In addition, results indicated that the dependent variable remained significant ($B = -5.52, 95\% CI [-9.5, -1.53]$) when the mediator was included in the model. Thus, both models with HRV change score as the dependent variable revealed a significant indirect effect of Group on the dependent variable (via score increase in common humanity), suggesting that increases in common humanity mediated the effect of Group on the HRV (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 ($B = -1.08, 95\% CI [-3.63, 0.97]$), suggesting that score increase in common humanity had no mediating effect on changes in HRV.
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, & Iacoboni, 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].

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**References**


Appendix 1. Random selection of compassionate phrases from the three groups.

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