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Sympathy fuels creativity: The beneficial effects of sympathy on originality

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A B S T R A C T

Sympathy is usually evoked by heightened awareness of and concern for others' suffering by perceiving or reacting to their distress or need. Sympathetic contexts appear to spur creative solutions, because those who react sympathetically to others' suffering tend to seek novel, desirable, and prosocial solutions that alleviate suffering and promote well-being. We conducted two studies to investigate whether sympathy enhances creativity. Study 1 tested the feasibility of using images of distressed elderly as an unobtrusive method to induce sympathy. Study 2 sought to determine whether induced sympathy promotes creativity, and whether individual differences in trait empathy moderate this effect. Results demonstrate that sympathy fosters creative originality – but not creative fluency or flexibility – as assessed by either content-general or content-specific creativity measures. In addition, the beneficial effect of sympathy on originality is moderated by individual differences in trait empathy. The potential mechanisms that underlie these effects are discussed.

1. Introduction

Sympathy[1] is usually evoked by heightened awareness of and concern for others' suffering by perceiving or reacting to their distress or need (Chismar, 1988; Decety & Michalska, 2010; Wispé, 1991). Sympathy has been regarded as one of the most valuable emotions, because it is intimately tied to prosocial and moral behaviors such as low discrimination, cooperation, sharing, helping, supporting, and protecting others (Batson, 1991, 1998; Batson, Duncan, Ackerman, Buckley, & Birch, 1981; de Waal, 2004; Eisenberg and Miller, 1987; Fultz, Schaller, & Cialdini, 1988; Holmgren, Eisenberg, & Fabes, 1998). Considerable attention has therefore been paid to the behavioral consequences of sympathy (e.g., various prosocial behaviors), while surprisingly little has been given to the cognitive consequences of sympathy. However, anecdotal evidence suggests that sympathy influences our thinking and problem-solving skills. For instance, a group of medical professionals who joined several medical mission trips to underdeveloped countries felt sympathy for the critical shortages of supplies in

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[1] It is noteworthy that although sympathy and empathy are often used interchangeably, they are not identical (Gruen & Mendelsohn, 1986). Sympathy is sorrow for a distressed or needy person without sharing the other's relevant emotion, while empathy also seeks to share the person's emotional state (Decety & Chaminade, 2003; Gladstein, 1983; Vaish, Carpenter, & Tomasello, 2010). Therefore, sympathy occurs in an emotionally negative context (e.g., pity, sorrow, or concern), whereas empathy can occur in both positive and negative emotional contexts (Wispé, 1991). For the purposes of this study, we limit our focus to sympathy and its impact on creativity.

those countries, and was inspired to collect unused but clean surgical supplies (e.g., gloves. sutures, and drapes) that would otherwise be disposed of in U.S. hospitals. Similarly, Robbins et al. (1994) found that physicians who are more sympathetic to their patients' psychological distress tend to be more accurate in their assessments and diagnoses. These findings suggest that the experience of sympathy may improve the ability to produce distinctive and constructive ideas, which are linked to important aspects of creative cognition (Ward, Smith, & Fink, 1999).

Given the lack of studies that seek to understand the cognitive outcomes of sympathy, we set out to examine the effects of sympathy on creativity—that is, the ability to generate novel and useful ideas by exploring a range of possible solutions (Amabile, 1996; Decety & Michalska, 2010). A link between sympathy and creativity is plausible for several reasons. First, sympathy may foster creativity through its affective route. In general, a situation that engenders sympathy is usually linked to undesirable events; therefore, sympathetic emotions are considered to be negative emotions. Regarding the link between negative emotions and creativity, the feelings-as-information model suggests that negative emotions signal problems that require greater effort and improvement, and therefore stimulate creativity when making changes or seeking adequate solutions (Frijda, 1994; Schwarz & Clore, 2003). In a related vein, the mood-as-input model suggests that negative emotions signal problems or danger in a given context and evoke more effortful and systematic strategies to tackle the problem (Martin & Stoner, 1996). Similarly, growing evidence indicates that the effect of negative emotions on creativity is largely context dependent (George & Zhou, 2002; Leung et al., 2014). This contextual view suggests that negative emotions can be beneficial to creativity, especially in a context in which negative emotions are clearly identified, and their perceived recognition and rewards for creative solutions are highly regarded (George & Zhou, 2002). Noting that sympathy induced by one person's suffering can be the catalyst for strategies to end the suffering of others in a similar plight (Lee & Dow, 2011; Lyubomirksy, Sheldon, & Schkade, 2005; Piliavin, Piliavin, Dovidio, Gaertner, & Clark, 1981; Wispé, 1991), sympathetic contexts appear to spur creative solutions. Lastly, in consideration of the dual-pathway model—which assumes that negative emotions influence creativity via the persistence pathway, which refers to the degree of sustained, task-directed cognitive effort—it is plausible that sympathy's affective influence fosters creative action (Martin & Stoner, 1996).

Second, sympathy's motivational route may enhance creativity. When people are intrinsically motivated, they tend to engage in an activity for their own enjoyment or the challenge it presents. The literature suggests that intrinsic motivation is conducive to creative performance because it facilitates exploration, spontaneity, flexibility, persistence, and interest—all of which are linked to creative processes (Amabile, 1996; Deci, Koestner, &, Ryan, 1999; Elsbach & Hargadon, 2006; Grant & Berry, 2011; Reeve & Deci, 1996; Shalley, Zhou, & Oldham, 2004). Given this literature, the link between sympathy and intrinsic motivation is credible: Those who react sympathetically to others' suffering tend to be motivated to alleviate suffering and seek novel, desirable, and prosocial solutions that promote well-being. This, in turn, may afford the greatest opportunities for learning and exploration (Hepach et al., 2012; Ryan & Deci, 2000). In support of this view, Grant and Berry (2011) demonstrate that intrinsic motivation with other-focused, prosocial motives fosters the production of novel ideas (i.e., originality). Sympathy, therefore, likely promotes creativity through its motivational route.

Third, sympathy may foster creativity through perspective taking. Sympathy is largely evoked by affective perspective taking, which often promotes a shift from a self-centered view to an other-centered view and, in turn, facilitates the integration of diverse views in a meaningful way (Lamm, Batson, & Decety, 2007). In favor of this notion, Grant and Berry (2011) propose that other-focused psychological processes play an important role in entertaining ideas that are not only novel but also valuable, because they may be useful in addressing others' problems or needs (Mohrman, Gibson, & Mohrman, 2001). Given that perspective taking is thought to be one of the most important psychological forces underlying creativity (Decety & Jackson, 2004; Lamm et al., 2007; Parker, Atkins & Axtell, 2008), sympathy – which promotes this ability – is likely to enhance the flexibility aspect of creativity.

In light of the credible link between sympathy and creativity, our primary research goal was to determine whether induced sympathy improves creativity. We also employed a rather unobtrusive method to induce sympathy. As stated earlier, sympathy involves feelings of pity or sorrow for another's distress. Unlike empathy, however, it does not require that we share the other's relevant experiences or emotions (Lee, 2009; Wispé, 1991). Therefore, caution should be exercised when inducing sympathy that does not implicate empathy. The literature, for instance, has often induced sympathy by asking a participant to envision how a person who is described as experiencing tragic circumstances must feel (e.g., Harmon-Jones, Vaughn-Scott, Mohr, Sigelman, & Harmon-Jones, 2004). Despite the assumed effectiveness of these methods, it is possible that they may inadvertently induce empathic feelings. In Study 1, therefore, we tested the feasibility of using images of distressed elderly as an unobtrusive method of inducing sympathy for the elderly.

Study 2 aimed to determine whether participants in whom sympathy had been induced would outperform participants in the control group in creative performance, as assessed by (a) two domain-general tests of creativity, the Unusual Uses Test (Guilford, 1959) and the Wallach-Kogan Creativity Test (Wallach & Kogan, 1965), and (b) one domain-specific test, the Floor Plan Test, which asks the participant to generate ideas that can help the elderly. We examined creative performance across four dimensions: originality, fluency, flexibility, and elaboration. In view of the three potential routes that can facilitate creativity (affective, motivational, and perspective taking), we hypothesized that sympathy would particularly benefit two aspects of creativity – originality and flexibility – but not necessarily the third, fluency.

We also sought to determine whether individual differences in trait empathy – the general ability to perceive, understand, feel, and share another's feelings and sensations – would modulate the impact of sympathy on creativity. It is probable that those who have a greater tendency to feel empathic are also more likely to experience sympathy for others' troubles. Given the

Table 1
Critical measures as a function of induced sympathy in Study 1.

Study 1	Induced Sympathy ($n = 38$)	Control ($n = 37$)	t
Demographics			
Age	21.3 (1.91)	21.7 (1.81)	−0.93
Gender (male: female)[a]	11:27	14:24	0.67
Ageism as a manipulation check			
Avoidance	2.48 (0.43)	2.73 (0.43)	2.48*
Antilocution	2.43 (0.59)	2.64 (0.48)	1.67
Discrimination	2.21 (0.42)	2.18 (0.47)	0.29
Mood and arousal			
Pleasant	4.03 (2.3)	3.73 (2.0)	1.65
Unpleasant	1.76 (1.9)	1.76 (1.6)	0.04
Tense	2.13 (2.5)	2.08 (2.1)	0.21
Energetic	3.76 (2.0)	3.38 (1.6)	1.71

*Note: SD*s are shown in parentheses. *$p < 0.05$.
[a] Chi-square test was performed instead of an independent-samples t-test.

close link between sympathy and empathy, therefore, it is important to elucidate potential interactions between trait-level empathic abilities and state-level sympathetic feelings.

2. Study 1

We had two goals in Study 1. First, we investigated whether sympathy could be induced through exposure to images of distressed elderly without directly asking participants to sympathize with them. Given the literature suggesting that the experience of sympathy begins by giving attention to a person or group in need (Dickert & Slovic, 2009), we tested whether paying sufficient attention to images of people who were suffering could induce sympathy without a concomitant effort to sympathize with them. Second, we examined whether sympathy that had been inconspicuously induced could be checked by an unobtrusive manipulation check instead of an explicit self-report measure. This is because directly asking participants to rate the extent to which they feel sympathetic might dispel the induced emotional state by causing them to be suspicious of the study's purpose (Yang, Yang, & Isen, 2013). Therefore, we reasoned that if participants feel sympathetic at the sight of suffering elderly, they will be more willing to approach and help them, and therefore less likely to avoid social interactions with the elderly (Batson et al., 1997). To this end, we employed the avoidance subscale of ageism – which measures prejudice against the elderly based on negative attitudes toward and stereotypes about aging – as an implicit manipulation check on induced sympathy (Fraboni, Saltstone, & Hughes, 1990). We expected that if sympathy had been successfully induced, the sympathy condition would report lower avoidance tendency toward the elderly.

2.1. Participants

Seventy-five undergraduates participated in the study in exchange for extra course credit. Participants were randomly assigned to either the control condition ($n = 37$; male = 11; $M_{age} = 21.7$, $SD = 1.81$) or the sympathy condition ($n = 38$; male = 14; $M_{age} = 21.3$, $SD = 1.91$; for details, see Table 1). There were more females than males in each condition, but their ratios did not differ significantly.

2.2. Materials

2.2.1. Pictures of afflicted elderly

Thirty-three images of elderly persons who appeared ill, poor, hungry, feeble, unhealthy, pathetic, or exhausted were selected from publicly available online sources and edited to highlight their suffering.

2.2.2. The Fraboni Ageism Scale (FAS)

The avoidance subscale of the FAS – which is known to measure negative attitudes toward and stereotypes about the elderly – was employed as an implicit manipulation check on induced sympathy toward the elderly (Fraboni et al., 1990). The FAS consists of 29 items in three subscales: *antilocution* (antagonism based on misconceptions about elderly people), *discrimination* (discriminatory opinions regarding the political rights, segregation, or activities of elderly people), and *avoidance* (withdrawal from social contact with elderly people).

2.3. Procedure

Participants were randomly assigned to either the sympathy condition or control condition. Both groups were first asked to rate their current mood (pleasant or unpleasant) and arousal (energetic or tense) on a 5-point Likert scale ranging from 1

(very much *disagree*) to 5 (very much *agree*). Participants in the sympathy condition were then shown 33 pictures of afflicted elderly and asked to rate (a) the extent of the person's need, (b) the feelings (negative, neutral, or positive) the person was experiencing, and (c) the person's vulnerability. This was done not only to examine the images' effectiveness, but to ensure that participants were paying attention to the elderly person in each image. In contrast, participants in the control condition watched a 7-min slide show (a total of 30 slides) on strategies for promoting health that was purely text-based (i.e., without any images of the elderly) and were told to focus on the text and remember it for a later memory test. Immediately after this, both groups completed the 29-item ageism scale (FAS) – which was combined with 29 unrelated filler items to avoid participants' suspicion of the scale's purpose – as an implicit manipulation check on induced sympathy. Participants were then debriefed and thanked.

3. Results

3.1. Induced sympathy and manipulation check

A series of independent-samples *t*-tests showed that the two groups were equivalent in their reported mood (pleasant, unpleasant) and arousal (tense, energetic) at the outset, all $ps > 0.09$ (see Table 1).

Participants' sympathetic judgments of the images of distressed elderly were examined by a series of one-sample *t*-tests for a difference between mean rating scores and the midpoint of the 5-point Likert scale, (i.e., zero), which indicates either neutrality or abstinence. Overall, the older adults in the images were judged to be experiencing significantly greater need and negative emotion – $t(37) = 2.27$, $p = 0.029$ and $t(37) = -3.2$, $p = 0.003$, respectively – and marginally greater vulnerability, $t(37) = 1.82$, $p = 0.07$. Given that sympathy arises from acknowledging others' need, emotional distress, or vulnerability, this suggests that the pictures were effective in inducing sympathetic judgments, i.e., heightened awareness of the need, negative feelings, and vulnerability of the elderly in images.

We examined whether exposure to the images of afflicted elderly induced sympathetic feelings toward the elderly. If so, such exposure would evoke prosocial attitudes about approaching or interacting with the elderly, i.e., reduced avoidance tendency (Batson et al., 1997). We found that those in the sympathy condition scored significantly lower for avoidance tendency (e.g., less reluctance to make eye contact or converse with elderly people) than those in the control condition who watched a slide show, instead of images of the afflicted elderly, $t(73) = 2.48$, $p = 0.015$, Cohen's $d = 0.57$. Group differences were not present in overall ageism, $p = 0.094$, or the other subscales of ageism, antilocution and discrimination, $ps > 0.14$, suggesting discriminant validity that induced sympathy facilitates prosocial attitudes (i.e., lower avoidance), but does not alleviate other subscales of general discrimination against the elderly. Taken together, our findings suggest that the use of images of the afflicted elderly is effective for unobtrusively eliciting sympathy; in addition, the avoidance subscale can serve as an implicit manipulation check on induced sympathy toward the elderly.

4. Study 2

We had two goals for the second study. First, we sought to determine whether induced sympathy promotes creativity. Second, since a sympathetic response is more likely to be elicited when one's trait level of empathic concern is high (Davis, 2009; Eisenberg, 2000), we aimed to determine whether individual differences in dispositional empathy would moderate the effect of sympathy on creativity.

To make our sympathy condition comparable to the control condition, both groups viewed the same slide show about strategies for promoting health that the control group in Study 1 watched. The only difference between the two groups was that while the control group watched the text-only version, the sympathy group watched a version that contained both text and images of the afflicted elderly.

5. Methods

5.1. Participants

One hundred and seventeen undergraduates took part in the study for extra course credit (for details, see Table 2). Participants were told that the study's purpose was to examine individual differences in memory performance and randomly assigned to either the sympathy ($n = 62$, male = 14; $M_{age} = 21.5$, $SD = 1.9$) or the control condition ($n = 55$, male = 17; $M_{age} = 21.1$, $SD = 1.87$).[2]

5.2. Materials

5.2.1. Sympathy induction

The same 7-min slide show that was used with the control group in Study 1 was used with both groups in Study 2, but each group viewed a different version. As described previously, each of 30 slides contained useful strategies for maintaining health, which were used for a later memory test. The control condition watched the text-only version of the slide show (i.e., without any images), while the sympathy condition watched a version that included images of the distressed elderly. For

Table 2
Demographics and critical measures as a function of induced sympathy in Study 2.

	Induced Sympathy ($n = 62$)	Control ($n = 55$)	t
Demographic variables			
Age	21.5 (1.91)	21.1 (1.87)	−1.09
Gender (male: female)[a]	14:48	17:38	0.31
Family type [a,b]	12:49	6:48	1.59
Frequency of visiting grandparents[c]	3.4 (2.95)	2.7(2.85)	−1.32
Ageism as a manipulation check			
Avoidance	2.37 (0.51)	2.56 (0.46)	2.08*
Antilocution	6.68 (1.23)	7.05 (1.09)	1.74
Discrimination	2.09 (0.37)	2.08 (0.41)	−0.12
Mood and arousal			
Pleasant	4.37 (2.1)	4.0 (2.19)	−0.94
Unpleasant	3.39 (2.46)	3.27 (2.51)	−0.25
Tense	2.68 (2.1)	2.38 (1.98)	−0.79
Energetic	2.84 (1.75)	2.89 (1.91)	0.88
Trait empathy			
General empathy	3.74 (0.51)	3.77 (0.38)	−0.27
Empathetic suffering	4.06 (0.51)	4.08 (0.59)	0.23
Positive sharing	4.15 (0.55)	4.05 (0.73)	−0.88
Responsive crying	3.4 (1.1)	3.35 (1.1)	−0.22
Emotional attention	3.75 (0.43)	3.67 (0.59)	−0.82
Feeling for others	3.39 (0.65)	3.19 (0.66)	−1.68
Emotional contagion	3.43 (0.62)	3.35 (0.84)	−0.59

Note: SDs are shown in parentheses. *$p < 0.05$, **$p < 0.01$.
[a] Chi-square was performed instead of an independent-samples t-test.
[b] Family type: 0 = extended family; 1 = nuclear family.
[c] Frequency of visiting grandparents: 1 = once a month; 2 = once every 1–2 months; 3 = once every 3–4 months; 4 = once every 5–6 months; 5 = once every 7–8 months; 6 = once every 9–10 months.

instance, a slide on the importance of exercise was accompanied by the image of an elderly person suffering from severe joint pain while exercising. That is, our two conditions were comparable in encoding health-related information as the primary task, which in turn rendered our sympathy-induction procedure more unobtrusive. As in Study 1, the avoidance subscale of ageism was used as an implicit manipulation check for induced sympathy (Fraboni et al., 1990).

5.2.2. The Unusual Uses Task (UUT)

The UUT has been widely employed to assess the ability to generate unusual uses for a common object, such as a garbage bag (Guilford, 1959; Torrance, 1974). Participants were told to list as many uses for common objects as possible without limiting themselves to uses they had previously seen or heard about. Responses on the UUT were coded on dimensions of originality, fluency, flexibility, and elaboration. Given the literature that suggests that objective scoring technique seems optimal for scoring originality on abstract tasks (Plucker et al., 2014), a statistical-infrequency technique was used to assess originality in terms of the uniqueness and rarity of the given response relative to the range of ideas generated by all participants.[2] Specifically, 1 point was assigned to responses given by at least 5% of the participants and 2 points to those given by 1% or less of the participants; these scores were summed across items for each creativity task and used as an index of originality. Fluency was measured by the total number of responses the participant generated. We also calculated corrected originality scores by dividing the originality score by the fluency score (i.e., corrected originality = originality/fluency). We did this because the literature suggests that fluency influences originality (e.g., Plucker, Qian, & Schmalensee, 2014; Runco & Dow, 2004; Silvia, 2008), such that participants generate more novel responses as they list more responses. Flexibility was measured by the total number of distinct categories of unusual uses. To reliably score flexibility, we developed our own category-coding schemes based on a database comprising approximately 300 participants. Specifically, for the unusual task our coding scheme delineated 12 categories for a newspaper and 9 categories for a cup. Lastly, we assessed elaboration, which indicates how detailed a participant's response is. One point was assigned for more nuanced responses, with details that specify a given category (e.g., a mold to make a sandcastle for one use of a cup). Scores were then summed to generate a total elaboration score for each participant. All ratings were performed by two independent raters, and their inter-rater reli-

[2] Previous studies suggest that although it is more common to assess originality by counting responses provided by less than 20% of the sample, its reliability estimation does not differ from the technique of counting responses provided either 5% or 10% of the sample, suggesting that the degree of infrequency does not greatly influence reliability evidence (e.g., Plucker, Qian, & Wang, 2011). We also assessed originality by following the percentage scoring method which is known as the most appropriate strategy (e.g., Plucker et al., 2011). In this method, we calculated percentage scores by dividing the number of original ideas by the total number of ideas generated. Our results did not differ from the pattern of results based on a statistical infrequency method: The sympathy condition generated significantly more original ideas than the control condition in the three creativity tasks, all $ps < .05$.

ability, measured by intra-class correlation coefficients, was significant for fluency ($r = 0.99$), originality ($r = 0.98$), flexibility ($r = 0.98$), and elaboration ($r = 0.97$), all $ps < 0.01$.

5.2.3. The Wallach-Kogan Creativity Test (WKCT)

Similar to the UUT, the WKCT requires the participant to come up with as many items as possible that contain a certain feature specified by the task (e.g., things that are round). Responses on the WKCT were scored on four dimensions of creativity: originality (and corrected originality), fluency, flexibility, and elaboration. Flexibility was scored based on 18 categories of things that are round and 16 categories of things that make noise. All ratings were performed by two independent raters, and their inter-rater reliability was significant for originality ($r = 0.96$), fluency ($r = 0.98$), flexibility ($r = 0.98$), and elaboration ($r = 0.97$), all $ps < 0.01$.

5.2.4. The Floor Plan Task (FPT)

In the FPT, which served as a domain-specific measure of creativity, participants were given a simplified floor plan of a typical office reception area and asked to modify the floor plan to make it a friendlier place for the elderly. For example, participants might propose replacing a solid door with one that has a window, so that older adults would be able to see someone approaching on the other side and react accordingly. Participants were strongly encouraged to generate as many ideas as possible. Responses on the FPT were again scored on originality (and corrected originality), fluency, flexibility – which was scored based on 6 categories – and elaboration. All ratings were performed by two independent raters, and their inter-rater reliability was significant for fluency ($r = 0.99$), flexibility ($r = 0.92$), originality ($r = 0.96$), and elaboration ($r = 0.98$), all $ps < 0.01$.

5.2.5. Emotional Empathy Scale (EES)

Given the postulated link between sympathy and individual differences in trait-level empathic concern, trait-level empathy was measured using the EES (Caruso & Mayer, 1998). The EES consists of six subscales: *empathic suffering* (e.g., "The suffering of others deeply disturbs me"), *positive sharing* (e.g., "Seeing other people smile makes me smile"), *responsive crying* (e.g., "I cry easily when watching a sad movie"), *emotional attention* (e.g., "I don't give others' feelings much thought"), *feeling for others* (e.g., "It's easy for me to get carried away by other people's emotions"), and *emotional contagion* (e.g., "When I'm with other people who are laughing, I join in"). The scale consists of 30 items scored on a 5-point Likert scale ranging from 1 (*disagree*) to 5 (*agree*). A previous study (Caruso & Mayer, 1998) reported a Cronbach's alpha of 0.78.

5.3. Procedure

Participants were randomly assigned to either the sympathy or control condition. Participants in the sympathy condition watched the 7-min slide show designed to induce sympathy (i.e., the version with images of afflicted elderly), while those in the control condition watched the same slide show without any images. All participants were then asked to complete the avoidance subscale, which served as a manipulation check on induced sympathy. Working at their own pace, participants then took the UUT (for two items, newspapers and cups), the WKCT (for two items, things that are round and things that make noise), and the FPT to assess creativity. The order of those creativity tasks was counterbalanced. Lastly, participants completed a background survey (e.g., age, family type, frequency of visiting grandparents), the trait-empathy scale, and a short mood questionnaire that asked participants to rate their current feelings and arousal (i.e., pleasant, unpleasant, tense, energetic) using a 9-point Likert scale ranging from 1 (*not at all*) to 9 (*very much so*). Finally, participants completed a funnel questionnaire about what they believed the study's purpose to be. They were then debriefed and thanked.

6. Results

6.1. Manipulation check

Consistent with previous results, the sympathy condition had significantly lower scores on the avoidance scale ($M = 2.37$) than the control condition ($M = 2.56$), $t(115) = 2.08$, $p = 0.04$, Cohen's $d = 0.39$ (see Table 2). The sympathy group's lower tendency to avoid the elderly indicated that they felt more sympathetic toward the afflicted elderly than their counterparts in the control group. Further analyses revealed that the two groups did not differ in demographic variables, self-rated arousal, mood states, or trait-level empathy, $ps > 0.15$.

6.2. Effect of sympathy on creativity

Table 3 presents an overall correlation matrix for all variables. Table 4 presents scores for three different types of creativity tasks as a function of induced sympathy. We report separate results for each creativity task below.[3]

[3] Our chi-square analysis showed that both sympathy and control conditions had similar gender ratios, with more females than males (see Table 2). However, a series of independent *t*-tests (adjusted by Bonferroni correction) indicates that males and females did not differ in terms of their performance

Table 3
Pearson Correlations among Various Indicators of Creativity.

		1[a]	2[a]	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Sympathy group	–														
2.	Gender	0.09	–													
The Unusual Uses Task (UUT)																
3.	Originality	0.09	−0.14	–												
4.	Fluency	0.001	−0.07	0.53**	–											
5.	Flexibility	−0.09	−0.12	0.53**	0.89**	–										
6	Elaboration	0.03	0.07	0.13	0.26**	0.18*	–									
The Wallach-Kogan Creativity Test (WKCT)																
7.	Originality	0.23*	0.03	0.40**	0.46**	0.39**	0.26**	–								
8	Fluency	0.01	0.09	0.25**	0.51**	0.48**	0.34**	0.63**	–							
9.	Flexibility	−0.06	0.11	0.31**	0.54**	0.52**	0.31**	0.57**	0.87***	–						
10.	Elaboration	0.03	−0.06	0.13	0.09	0.09	0.32**	0.23*	0.21*	0.27*	–					
The Floor PlanTask (FTP)																
11.	Originality	0.22*	0.03	0.31**	0.41**	0.42**	−0.03	0.23*	0.11	0.16	−0.01	–				
12.	Fluency	0.04	0.02	0.26**	0.54**	0.49**	0.05	0.31*	0.20*	0.29**	0.01	0.60**	–			
13.	Flexibility	−0.07	−0.01	0.14	0.24*	0.25**	−0.09	−0.11	0.08	0.20*	0.06	0.45**	0.68**	–		
14.	Elaboration	0.25**	0.33**	0.26**	0.15	0.13	0.29**	0.20*	0.15	0.16	0.32**	0.40**	0.23*	0.15	–	
15.	Feasibility	0.06	0.02	0.28**	0.56**	0.51**	0.07	0.32**	0.22**	0.31**	0.07	0.57**	0.94***	0.63**	0.24**	–

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[a] Spearman's rho correlation coefficients were computed for categorical variables, i.e., gender and sympathy condition.

Table 4
Creativity measures as a function of induced sympathy in Study 2.

	Induced Sympathy ($n = 62$)	Control ($n = 55$)	t
The Unusual Uses Task (UUT)			
Originality	2.27 (2.70)	1.44 (1.51)	−2.04*
Corrected Originality	0.34 (0.39)	0.18 (0.18)	−2.84**
Fluency	12.4 (4.4)	12.9 (6.7)	0.44
Flexibility	8.32 (2.36)	9.04 (3.67)	1.27
Elaboration	2.18 (2.36)	1.96 (2.32)	−0.49
The Wallach-Kogan Creativity Test (WKCT)			
Originality	3.5 (3.2)	2.24 (2.64)	−2.32*
Corrected Originality	0.38 (.32)	0.21 (0.19)	−3.43**
Fluency	17.3 (8.3)	18 (10.2)	0.39
Flexibility	10.2 (3.3)	10.9 (4.01)	1.17
Elaboration	0.63 (1.22)	0.47 (0.92)	−0.78
The Floor Plan Task (FPT)			
Originality	1.23 (1.4)	0.73 (1.4)	−1.97*
Corrected Originality	0.24 (0.28)	0.10 (0.15)	−3.35**
Fluency	4.8 (1.7)	5.2 (3.1)	0.91
Flexibility	2.4 (.99)	2.7 (1.4)	1.36
Elaboration	2.79 (2.30)	1.67 (1.48)	−3.08**
Feasibility	4.44 (1.71)	4.62 (2.68)	0.45

*Note: SD*s are shown in parentheses. *$p < 0.05$, **$p < 0.01$.

6.2.1. The Unusual Uses Test (UUT)

Independent-samples t-tests revealed that sympathy significantly improved originality, $t(115) = -2.04$, $p = 0.04$, Cohen's $d = -0.39$. Participants in the sympathy condition showed greater originality than those in the control condition. A more pronounced effect was observed when originality scores were corrected for fluency (i.e., corrected originality), $t(115) = -2.84$, $p = 0.005$, Cohen's $d = -0.65$. However, sympathy did not influence fluency, flexibility, or elaboration, with all $ps > 0.21$. When we also examined the content of participants' responses, none of the participants generated uses that were related to the elderly in particular.

6.2.2. The Wallach-Kogan Creativity Test (WKCT)

Independent-samples t-tests were performed on creativity scores on the WKCT. Consistent with the results reported above, sympathy significantly improved originality, $t(115) = -2.32$, $p = 0.02$, Cohen's $d = -0.43$, and corrected originality,

on creativity tasks, all ps = ns. In the same vein, our regression analysis also showed that gender did not predict any dimension of performance on creativity tasks (see Table 4), suggesting that gender did not influence the relation between sympathy and creativity.

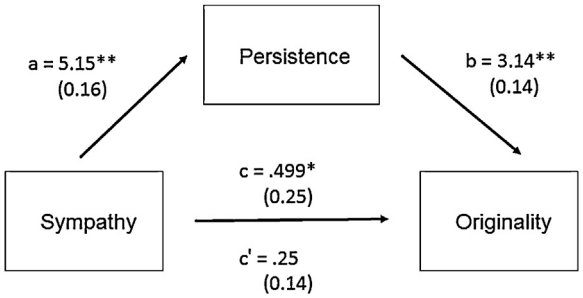

Fig. 1. The theoretical model that mediates between sympathy conditions and originality, as assessed by the Floor Plan Task. The overall amount of elaboration per category was assessed as a proxy measure of persistence. a, b, c, and c-prime are the path coefficients (unstandardized regression weights, with standard errors in parentheses). Path coefficient c represents the total effect of induced sympathy on originality. Path coefficient c-prime refers to the direct effect of sympathy on originality. Asterisks indicate significant regression paths * $p < 0.05$, ** $p < 0.01$, *** $p < 0.05$.

$t(115) = -3.4$, $p = 0.001$, Cohen's $d = -0.64$, but did not influence fluency, flexibility, or elaboration, all $ps > 0.25$. Notably, the two groups did not differ in responses that were related to the elderly, $t(115) = -0.94$, $p = 0.35$.

6.2.3. The Floor Plan Task (FPT)

Independent-samples *t*-tests revealed that induced sympathy significantly enhanced originality, $t(115) = -1.97$, $p = 0.05$, Cohen's $d = -0.37$, corrected originality, $t(115) = -3.35$, $p = 0.001$, Cohen's $d = -0.63$, and elaboration, $t(115) = -3.08$, p=0.003, Cohen's $d = -0.58$. It did not, however, influence fluency $t(115) = 0.91$, $p = 0.36$ or flexibility, $t(115) = 1.36$, $p = 0.18$. We further examined feasibility for ideas generated in the FPT to examine whether the idea can be implemented for a moderate cost; 1 point was assigned to a moderately to highly feasible idea. Sympathy did not affect the feasibility of ideas, $t(115) = 0.45$, $p = 0.66$, suggesting that increased originality under sympathetic feelings is not necessarily attained at the expense of an idea's feasibility.

In sum, induced sympathy facilitated more original ideas, demonstrating sympathy's robust effects on originality. This observed effect held true even when fluency was taken into account, and was observed across three different measures of creativity that require either domain-general knowledge (i.e., the UUT and WKCT) or domain-specific knowledge (i.e., the FPT). Moreover, induced sympathy facilitated elaboration but this effect was found in the content-specific creativity task (i.e., FPT) only. In contrast, induced sympathy did not affect the other dimensions of creativity, i.e., fluency and flexibility.

6.3. The mediating role of persistence

We tested the prediction of the dual-pathway model (Nijstad et al., 2010), which postulates that activating negative mood states increases originality via persistence. Although Nijstad et al. operationalized persistence as an increased category depth (i.e., the tendency to generate ideas within the same category), our dataset was not coded to index persistence in the same manner. Therefore, we approximated persistence by the average amount of spontaneous elaboration per category, since greater elaboration is likely driven by persistence in providing details. Consistent, in part, with the dual-pathway model, we found that persistence fully mediated the effect of sympathy on originality, whereas flexibility did not (Fig. 1). The direct effect of sympathy on creative originality was reduced to nonsignificance ($\beta = 0.25$, $p > 0.05$) when persistence was included in the analyses, and persistence was a significant predictor of originality ($\beta = 3.14$, $p < 0.05$). This mediation effect was not found in the domain-general creativity tasks, i.e., the unusual uses and Wallach-Kogan tasks.

6.4. Individual differences in trait empathy

To examine the relationship between induced sympathy and trait empathy, multiple moderation analyses were performed using the regression model with respect to originality scores obtained from three kinds of creativity tasks. In these analyses, sympathy was entered as an independent variable, trait empathy as a moderator, and originality scores as an outcome variable (Hayes, 2013).

Regarding originality scores assessed by domain-general tests of creativity (UUT and WKCT), the moderating effect of trait empathy was significant: for UUT, $\beta = 2.71$, $p = 0.004$, 95% confidence interval (.89–4.53); for WKCT, $\beta = 3.17$, $p = 0.01$, 95% confidence interval (.73–5.61). Further analyses revealed that sympathy facilitated originality, especially among participants high in trait empathy: for UUT, $\beta = 2.02$, $p < 0.001$; for WKCT, $\beta = 2.68$, $p < 0.001$. However, this effect was not found among those low in trait empathy: for UUT, $\beta = -0.38$, $p = 0.50$; for WKCT, $\beta = -0.14$, $p = 0.86$.

On the other hand, trait empathy did not moderate the effect of sympathy on originality measured by the domain-specific test of creativity (FPT). Further analyses, however, revealed patterns similar to those shown above. The conditional effects of induced sympathy on originality were still significant when participants' empathy trait was high – $\beta = 0.91$, $p = 0.01$, 95% confidence interval (0.20–1.61) – or moderate – $\beta = 0.51$, $p = 0.04$, 95% confidence interval (0.02–1.00) – but not when it was low, $\beta = 0.11$, $p = 0.75$, 95% confidence interval (−0.59–0.82). Together, our moderation analyses showed that the beneficial

Table 5
Results of hierarchical regression analyses in Study 2.

Hierarchical step	Originality			Corrected originality			Fluency			Flexibility		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
The Unusual Uses Task												
S1: Gender	0.009	−0.09	−0.99	0.003	−0.06	−0.61	0.012	−0.11	−1.18	0.03	−0.16	−1.77
S2: Trait Empathy	0.012	0.16	1.55	0.02	0.16	1.52	0.014	−0.13	−1.3	0.014	−0.13	−1.29
S3: Induced Sympathy	0.039	0.19	2.18*	0.07	0.27	2.95**	0.001	−0.03	−0.35	0.01	−0.11	−1.14
The Wallach-Kogan Creativity Test												
S1: Gender	0.00	0.03	0.27	0.001	−0.01	−0.05	0.01	0.15	1.49	0.011	0.16	1.55
S2: Trait Empathy	0.01	−0.08	−0.82	0.00	0.002	0.02	0.01	−0.12	−1.23	0.009	−0.11	−1.03
S3: Induced Sympathy	0.04	0.21	2.29*	0.09	0.31	3.39**	0.002	−0.05	−0.52	0.014	−0.12	−1.29
The Floor Flan Task												
S1: Gender	0.00	0.08	0.81	0.015	0.14	1.41	0.009	−0.02	−0.21	0.001	0.02	0.23
S2: Trait Empathy	0.04	−0.21	−2.1*	0.01	−0.11	−1.09	0.02	−0.16	−1.56	0.01	−0.11	−1.08
S3: Induced Sympathy	0.03	0.18	1.96*	0.08	0.29	3.23**	0.006	−0.08	−.85	0.02	−0.13	−1.34

Note: $^*p < 0.05$, $^{**}p < 0.01$.

effect of sympathy on originality was most evident among those with high trait empathy, which highlights the moderating role of individual differences in one's empathic characteristics (i.e., trait empathy).

6.5. Predictive relationship between induced sympathy and creativity

Multiple hierarchical regression analyses were performed to examine the predictive relationship of induced sympathy and creativity, as assessed by three measures (Table 5). We entered gender, trait empathy, and induced sympathy, in that order, into the hierarchical regression model with respect to originality, fluency, and flexibility scores as the dependent variables, respectively. We found that when the effects of both gender and trait empathy were controlled for, only induced sympathy emerged as a significant predictor of originality, as assessed by all measures of creativity. When corrected originality was entered as a dependent variable, sympathy emerged as a more pronounced predictor across all creativity tasks. However, when the same regression model was applied with respect to either fluency or flexibility as a dependent variable, induced sympathy predicted neither fluency nor flexibility. Together, this suggests that induced sympathy is particularly beneficial for originality in creative performance.

7. Discussion

Sympathy has typically been acknowledged to be, and has been widely studied as, a prosocial and moral emotion in a social domain. Little is known, however, about its cognitive benefits; it will therefore be valuable to gain a better understanding of the potential benefits of sympathy in a cognitive domain. Given the lack of studies of the cognitive consequences of sympathy, our most noteworthy finding is that regardless of the content domain, sympathy influences originality but does not affect fluency or flexibility. In addition, our findings demonstrate an important interaction between state sympathy and trait-level empathy in influencing originality in creative performance. Consistent with the feeling-as-information model and the mood-as-input model (e.g., Schwarz & Clore, 2003; see also the mood-as-input model, Martin & Stoner, 1996), our results suggest that sympathy – as a discrete negative emotion that is construed as socially desirable and adaptive in a given context – promotes creativity.

It is important to consider potential mechanisms for the link between sympathy and originality. We believe that the most plausible pathways may be related to both affective and motivational routes. Because sympathy arises from sorrow or concern for a person who is suffering (Coke, Batson, & McDavis, 1978), sympathy is considered to be a negative emotion that stresses a situation's drawbacks and stimulates heightened attention to a socially desirable and altruistic solution. As a result, sympathy is likely to enhance intrinsic motivation to pursue a creative and original solution that helps alleviate others' distress (Eisenberg et al., 1989; Watt, 2005). The literature consistently suggests that other-oriented emotions such as sympathy tend to promote prosocial tendencies and moral and altruistic actions such as helping, comforting, and sharing, all of which are driven by intrinsic motivation (e.g., Hepach, Vaish, & Tomasello, 2012). Moreover, consistent in part with the dual-pathway model (Nijstad et al., 2010), our preliminary analysis suggests that cognitive persistence partially mediates the effect of sympathy on creative performance especially in the content-specific creativity task (i.e., FPT). A solid link, therefore, appears to exist between sympathy and intrinsic motivation, which in turn promotes creativity via exploration and persistence (Amabile, 1996; Grant & Berry, 2011; Shalley et al., 2004).

Moreover, sympathy may implicate regulatory controls that are conducive to creativity; research has documented a positive association between sympathy and self-regulation. For example, sympathetic reactions are linked to high attentional and emotional regulation and coping behaviors (Eisenberg & Fabes, 1998; Okun, Shepard, & Eisenberg, 2000; Rothbart, Ahadi, & Hershey, 1994). Given the literature that has demonstrated self-regulatory behaviors as resources for achieving creative

outcomes (Chiu, 2014; De Stobbeleir, Ashford, & Buyens, 2011), it is possible that sympathy facilitates creativity through its regulatory mechanisms, which help to guide and monitor goal-directed activities.

It is worthwhile to discuss why sympathy did not influence flexibility dimension of creativity. Given the literature that suggests that perspective taking promotes creativity by integrating diverse views (Gardner, Gino, & Staats, 2011; Hoever, Knippenberg, van Ginkel, & Barkema, 2012), we expected that sympathy – which facilitates perspective taking – would enhance the flexibility aspect of creativity. However, given that sympathy is more usually evoked by affective perspective taking – i.e., understanding the feelings of the stimulus person – than cognitive perspective taking – i.e., the thoughts of the stimulus person – sympathy's null effect on flexibility suggests that affective perspective taking may play a less critical role in fostering flexibility in creative performance. Future studies are therefore warranted to illuminate the effects of affective vs. cognitive perspective taking on creative flexibility.

Our study is not without drawbacks, which should be addressed in future work. First, it was designed to examine the immediate effect of induced sympathy on creativity, and therefore the facilitating effect of sympathy is likely short-lived. Although it would be intriguing to examine how long this observed effect of sympathy lasts, it is beyond our intended goal and should be pursued in future studies. Our findings, therefore, should not be generalized to the long-term effects of sympathy or trait sympathy. Second, it is possible that young college students may have felt suspicious about being asked about ageism. It is noteworthy, however, that we tried to minimize participants' awareness and suspicions about the scale's purpose by adding unrelated filler items to the ageism scale. When the funnel questionnaire was administered at the end of the study – in which we asked participants what they believed the study's purpose to be and whether any part of the study seemed suspicious – we found that none of our participants correctly guessed the hypothesis or reported feeling suspicious about the ageism scale. Third, the typical pretest-posttest design was not employed for creativity assessment because of the constraints associated with administering multiple domain-general and domain-specific tests of creativity within a limited time frame. We acknowledge, however, that the pretest-posttest design will provide a clearer and more accurate view of the effect of sympathy on creativity; therefore, future studies that employ a careful pretest-posttest control are warranted. Lastly, although we used the avoidance subscale as a manipulation check on induced sympathy, we acknowledge that it is still an indirect measure of sympathy. Specifically, one could argue that mitigated avoidance tendency in the sympathy condition may not necessarily stem from sympathetic feelings toward the distressed elderly. We believe that this is a legitimate concern that must be addressed since the images of afflicted elderly may have induced more generically negative feelings, rather than a specific emotion such as sympathy. However, our data suggest that this is not the case. Specifically, if negative moods were induced, significant group differences should have been observed in participants' self-reported ratings of unpleasantness. Instead, we found that the two groups did not differ in reported negative mood (Table 2). In addition, we found that the images of distressed elderly showed a discriminant validity, such that those images influenced avoidance tendency – which is viewed as a more malleable state characteristic – but not the other subscales, which are more closely related to trait-like characteristics (i.e., antilocution and discrimination). Therefore, reduced avoidance tendency in the sympathy condition can be attributed to the experience of sympathy.

In conclusion, given that sympathy is usually evoked by heightened awareness of and concern for others' suffering by perceiving or reacting to their distress or need, our study suggests that sympathetic feelings enhance originality, especially via its affective and motivational routes. Although our test of the dual-pathway model suggests that sympathy enhances originality via persistence, it is unclear why this effect was found only in the context-specific creativity task. Given that various factors (e.g., age, gender, test item, training) influence content-specific creative ideation (Agogué, Poirel, Pineau, Houdé, & Cassotti, 2014; Hong, Peng, O'Neil, Wu, 2013), future research is warranted on specific individual-difference factors which may modulate the persistence pathway to creative performance. Importantly, more studies are needed to investigate cognitive mechanisms (e.g., heuristics, inhibitory control, and expansion) that drive the effects of sympathy on creative processes (Agogué et al., 2014). Especially given that sympathy involves motivational, affective, and regulatory aspects (Lamm et al., 2007), future work should identify the specific pathways by which sympathy promotes creativity. It will also be worthwhile to examine the effects of other related (empathic) feelings (e.g., compassion or pity), various distinct and specific emotions (e.g., gratitude or anger), and the moderating role of individual differences (e.g., personality traits) on creative performance.

This study has important implications for many settings in which creativity is considered vital. Teachers, parents, and employers strive to stimulate creativity in their students, children, and employees through various cognitive activities and exercises. Although the effectiveness of these cognitive approaches has been widely studied, little is known about the important role emotional factors play in promoting creativity. Given that sympathy has typically been acknowledged to be a prosocial and moral emotion in a social domain, it will therefore be valuable to gain a better understanding of the potential link between sympathy and creative cognition in many areas (including education, development, and organization). Specifically, fostering sympathy toward needy individuals in the classroom or organization may facilitate one's creative thinking. Similarly, the school curriculum that is designed to develop and promote sympathy among young children may make a meaningful contribution to boosting creativity in classroom practices. Given the scarcity of research on sympathy, we must continue to expand our understanding of how the emotional experience of sympathy can positively affect our cognitive, social, and organizational lives.

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