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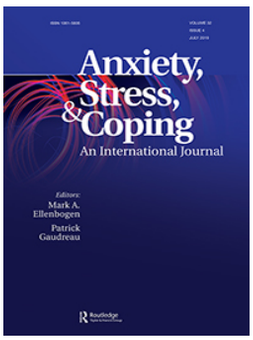

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Social influences on cognitive processing in enacted social support: effects on receivers' cognitive appraisals, emotion, and affiliation

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ABSTRACT

Background and objectives. Social support is linked with psychological health, but its mechanisms are unclear. We examined supporters' influence on recipients' cognitive processing as a mechanism of effects of support on outcomes associated with depression.

Design/methods. 2 × 2 between-subjects experiment. 147 participants (1) experienced a negative event (false feedback); (2) received social support modeling one of two contrasting cognitive processing modes (abstract/evaluative or concrete/experiential); (3) generated explanations for the event, later coded for processing mode and internal/external causal attribution; and (4) reported on emotion, perceptions of self and future, and social affiliation. To examine relational effects, half of participants were led to perceive the supporter as similar to themselves via a shared birthday manipulation.

Results. Support condition influenced participants' processing mode and causal attributions as predicted. Abstract/evaluative support led to more positive emotion and self-perceptions, and less pessimistic expectancies for the future than concrete/experiential support. Perceived similarity moderated effects on beliefs about an upcoming social interaction, magnifying positive affiliation outcomes of abstract/evaluative versus concrete/experiential support.

Conclusions. Processing modes that are generally maladaptive at the intrapersonal level may be adaptive (and vice versa) when they are interpersonally influenced, and perceived similarity may facilitate interpersonal effects of processing mode on affiliation.

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The availability of social support is reliably associated with psychological well-being and physical health (e.g., Lakey & Cronin, 2008; Uchino, 2006), including affective outcomes. Lower levels of perceived support are associated with both negative affect and clinical depression (e.g., George, Blazer, Hughes, & Fowler, 1989; Rueger, Malecki, Pyun, Aycock, & Coyle, 2016; see Lakey & Cronin, 2008, for a review). Notably, however, individuals' perceptions of available support are only modestly correlated with the support they actually receive (Haber, Cohen, Lucas, & Baltes, 2007), and evidence is much more limited as to when and how support provision influences affective outcomes (e.g., mood) and depression specifically (Finch, Okun, Pool, & Ruehlman, 1999; Lakey & Cronin, 2008; Lakey, Orehek, Hain, & VanVleet, 2010; Tanner et al., 2018). Empirical studies show that whether enacted support has beneficial, detrimental, or neutral effects on recipients varies widely and depends largely on features of the relationship (e.g., Frazier, Tix, & Barnett, 2003; Lakey et al., 2010; Maisel & Gable, 2009).

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Research on enacted support is limited by open questions of how support providers directly affect recipients' intrapersonal processes from the outside. Research on potential mechanisms is relatively recent, but suggests that social support can influence recipients' coping behavior, emotion regulation, cognition, and physiological responses to stress (Lakey & Orehek, 2011; Marroquín, 2011; Thoits, 2011; Uchino, 2006; Williams, Morelli, Ong, & Zaki, 2018). In the present study we sought to elucidate the cognitive mechanisms of enacted support. Using core cognitive and affective characteristics of depression as a model, we examined whether particular styles of cognitive processing that are linked with divergent outcomes at the *intrapersonal* level (i.e., adaptive versus maladaptive) can be influenced by *interpersonal* factors during social support (Marroquín, 2011).

Increasingly, researchers of social influences on coping and emotion regulation have emphasized influences of close others on intrapersonal cognitive processes by which people construe, interpret, and process negative events, and which affect mood, adjustment, and well-being (e.g., DeLongis & Holtzman, 2005; Dixon-Gordon, Bernecker, & Christensen, 2015; Marroquín, Tennen, & Stanton, 2017). Whereas unsupportive responses from others increase negative affect (Shenk & Fruzzetti, 2011), supportive responses can reduce emotional distress and promote effective coping (Holtzman, Newth, & DeLongis, 2004; Lepore, Fernandez-Berrocal, Ragan, & Ramos, 2004; Maisel & Gable, 2009). Experimental studies manipulating support provision show that compared to comfort-focused support, cognitively-focused support – like reframing the situation or challenging interpretations – has stronger effects on cognition (e.g., more positive interpretations of emotional stimuli) and emotion (e.g., lower emotional arousal), especially in the long term (Lepore et al., 2004; Nils & Rimé, 2012; Rimé, 2009). This is despite the widespread lay belief that "venting" has ameliorative effects and findings that people prefer comfort and validation (Pauw, Sauter, Van Kleef, & Fischer, 2018).

Studies supporting an active role of cognitive influence in support have used relatively non-self-relevant stimuli, such as emotional movie clips (Lepore et al., 2004; Nils & Rimé, 2012). Moreover, their experimental conditions have emphasized challenging, reframing, or "detached" supporter attitudes (e.g., advocating positive event interpretations; Nils & Rimé, 2012; expressing disagreement and emotional detachment; Lepore et al., 2004), rather than targeting specific cognitive processes in the recipient that are implicated in intrapersonal outcomes (Marroquín, 2011). In this study, we examined more direct aspects of this interpersonal–intrapersonal link, with cognitive processing as a possible conduit through which enacted support affects several domains – emotion, perceptions of self and the future, and social affiliation – as well as the contextual role of similarity of the supporter.

Cognitive processing of negative events: depression as a model

Depression presents an ideal model for the interrelationships of social support, cognition, and emotion in the context of coping. Depression's bidirectional influences with relationships and support suggest interpersonal influence on intrapersonal processes (Marroquín, 2011). Cognitive accounts of depression emphasize biases in interpretation of events – rather than events themselves – as determinants of adaptive or maladaptive outcomes (e.g., Beck & Bredemeier, 2016; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Relative to nondepressed individuals, depressed individuals make internal, stable, and global causal attributions for negative events and negative appraisals of self, world, and future (Abramson, Seligman, & Teasdale, 1978; Mehu & Scherer, 2015). Better understanding of how support affects these cognitive outcomes, along with emotion, can shed light on interpersonal processes of support.

Moreover, in responding to negative events, depressed individuals process information in a ruminative, self-focused, and abstract manner that affects biased appraisals and emotional distress (Joormann & Gotlib, 2010; Nolen-Hoeksema et al., 2008; Watkins, 2008). Watkins (2008) has suggested that it is the *abstract* and *evaluative* nature of ruminative processing that drives maladaptive effects. An abstract and evaluative processing mode (i.e., focusing on "why" events happened, and generating global, decontextualized mental representations of events) is associated with maladaptive

rumination, whereas concrete and experiential processing (i.e., focusing on "how" events unfolded, and generating specific, contextualized, and detailed representations) is associated with more adaptive reflection (Watkins, 2008; see also Trope & Liberman, 2010; Vallacher & Wegner, 1987).[1] For example, a person who unexpectedly loses her job would on average have more positive emotional outcomes if she processes the event in terms of the details of the conversation with her boss (*concrete/experiential*), compared to global questions of why this happened to her (*abstract/evaluative*). These divergent processing modes affect memory (Watkins & Teasdale, 2004), problem solving (Watkins & Moulds, 2005), and emotional reactivity (Watkins, Moberly, & Moulds, 2008), pointing to processing mode as a basic cognitive element of responding to negative events. However, abstract/evaluative processing is not always maladaptive (see Watkins, 2008). In nonclinical samples, people who process information abstractly, compared to concretely, are more willing to seek evaluative feedback, and their self-esteem is less affected by negative feedback (Freitas, Salovey, & Liberman, 2001; Vess, Arndt, & Schlegel, 2011). Thus, although abstract/evaluative processing is linked with depression, both modes may be adaptive or maladaptive depending on context.

Interpersonal influences on processing and the role of similarity

If processing mode affects cognitive and affective outcomes following negative events, including in depression, it may be a route through which social supporters influence coping from outside the individual. Experimental findings that supporters' cognitive reframing affects recipients' cognition and emotion (Lepore et al., 2004; Nils & Rimé, 2012) and that encouraging adaptive event interpretations affects depressive attributions (Dobkin, Panzarella, Nesbitt, Alloy, & Cascardi, 2004) support this notion. There is less direct evidence for social influences on abstract/evaluative versus concrete/experiential processing mode specifically, but indirect evidence comes from findings that concrete construal can be trained (Watkins, Baeyens, & Read, 2009) and that friendship dyads who collaborate in ruminative (abstract/evaluative) processing exhibit increased depression over time (Rose, Carlson, & Waller, 2007).

Still, it is not at all clear that cognitive processes that are generally adaptive or maladaptive when viewed through a traditional, intrapersonal lens act similarly when influenced by supportive others. Social support can fall flat – or even backfire – due to uniquely social factors (Frazier et al., 2003; Lakey & Cronin, 2008; Lakey et al., 2010). If cognitive mechanisms are a conduit of support effects, we should expect similar heterogeneity of outcomes, dependent on relationship characteristics like intimacy, interdependence, trust, and responsiveness (Frazier et al., 2003; Maisel & Gable, 2009; Marroquín, 2011; Marroquín & Nolen-Hoeksema, 2015).

Related to these features, which largely define "closeness", is perceived similarity of the supporter, a potential facilitator of social influence across a range of relationship types. Perceiving an interaction partner as similar influences attraction, relationship formation, altruism, cooperation, obedience, persuasion, and perceptions of closeness – even when people are strangers and the similarity is incidental or false (e.g., Burger, Messian, Patel, del Prado, & Anderson, 2004; Miller, Downs, & Prentice, 1998). When advice-givers are perceived as similar, individuals' self-appraisals, coping, willingness to accept support, and intention to act on advice are stronger (Brown, Novick, Lord, & Richards, 1992; Clark, Gotay, & Mills, 1974; Feng & MacGeorge, 2010; Gino, Shang, & Croson, 2009). These findings suggest that similarity is a plausible relationship condition (i.e., moderator) under which social supporters and relationship partners might maximally influence cognitive appraisal processes during support provision.

The present study

The present experiment examined social support effects on cognitive processing, cognitive appraisals, emotion, and affiliation following negative events. Primary outcome variables were chosen due to their roles in depression (e.g., more negative views of self and others and pessimism about

the future; Beck & Bredemeier, 2016). The experiment had a 2 (abstract/evaluative versus concrete/experiential support) × 2 (perceived similarity versus no similarity) between-subjects design. All participants received false negative feedback (with ambiguous causes) about their social intelligence, after which social support was provided by a stranger (the experimenter). The supporter modeled either self-focused, abstract/evaluative processing or externally-focused, concrete/experiential processing. In addition, perceived similarity of the supporter was experimentally manipulated to examine moderating relational effects. After support provision we measured (1) participants' processing mode when responding to the event, (2) causal attributions for the event; (3) emotional state; and (4) adaptive versus maladaptive cognitive outcomes: participants' appraisals of themselves, expectations for future events, and social affiliation. These outcomes are relevant to basic cognition and coping broadly, but they also represent central elements of depressive psychopathology.

Hypothesis 1 was that following ambiguous task feedback, participants would draw on social support resources by applying the processing mode modeled by the supporter.

Hypothesis 2 was that participants exposed to abstract/evaluative processing, versus concrete/experiential processing, would show divergent patterns on all cognitive, emotional, and social outcomes. We tested two competing directions for this hypothesis:

Hypothesis 2a: Abstract/evaluative social support would lead to more *maladaptive* outcomes than concrete/experiential support (i.e., more negative emotion, less positive emotion, more negative self-appraisals, more pessimistic future expectancies, and lower social affiliation). This pattern would support the notion that support providers' modeling of processing affects recipients in the "intended" direction, i.e., supporters' modeling cognitive processes that are generally adaptive at the intrapersonal level also lead to adaptive outcomes in the social context.

Hypothesis 2b: Abstract/evaluative support would lead to more *adaptive* outcomes than concrete/experiential support. This pattern would indicate a distinctly different picture: that processing modes introduced via social support can lead to outcomes in the opposite direction of what is typically found when those approaches are deployed at the intrapersonal level. This pattern would be consistent with notions that the inherent social nature of support can cause paradoxical outcomes of intrapersonal regulation (e.g., Fitzsimons & Finkel, 2011; Maisel & Gable, 2009) and that outcomes of abstract/evaluative processing depend on context (Nelis, Holmes, Palmieri, Bellelli, & Raes, 2015; Vess et al., 2011; Watkins, 2008).

Hypothesis 3 tested the theoretical notion that relational factors amplify effects of external support on internal processes (Maisel & Gable, 2009; Marroquín & Nolen-Hoeksema, 2015). We predicted that supporter similarity condition would moderate support effects such that effects of both support conditions would be stronger under conditions of perceived similarity.

Method

Participants

Participants were recruited from the community surrounding a university in the Northeastern United States, ostensibly for a study on social intelligence. Of 174 participants, data were excluded from analyses for 22 (12.6%) who reported detecting at least one deception during funneled debriefings, and 5 (2.9%) due to session error (e.g., the participant spoke over the manipulation). Exclusions were equitably distributed across conditions. The final sample of 147 participants included 56 men (38.1%) and 91 women (61.9%) with a mean age of 26.2 years (SD = 10.69; range = 18–66). Self-reported ethnicities were White (43.5%), Asian/Asian American (20.4%), Black/African-American (16.3%), mixed ethnicity (10.9%), Hispanic (6.8%), and other (2.1%). Participants were assigned randomly to the abstract/evaluative condition with perceived similarity ($n = 34$) or no similarity ($n = 37$); or to the concrete/experiential condition with perceived similarity ($n = 38$) or no similarity ($n = 38$). Age, gender, and ethnicity did not differ significantly among experimental groups. The study procedure was approved by the Yale University Institutional Review Board and all participants provided informed consent.

Procedure

Upon arrival, participants were told that they would complete questionnaires, take a computerized "social intelligence test," and engage in a social interaction with another participant so that we could examine how social intelligence relates to real interactions. Participants completed measures of demographics, depressive symptoms, and state emotion. The experimenter then delivered either the perceived similarity or no-similarity manipulation (described below). Next, participants completed the sham "social intelligence test" and received false negative/ambiguous feedback about their performance, after which the experimenter provided either the abstract/evaluative or concrete/experiential support manipulation (described below).

Immediately afterward, participants reported factors they believed contributed to their test score in free-response format (see below), which served as a codable measure of post-support cognitive processing mode (i.e., abstract/evaluative versus concrete/experiential) and causal attribution (i.e., internal versus external). Participants next completed measures tapping depressive responses to negative events: (1) post-manipulation emotion; (2) appraisals of self; (3) expectancies for future life events; and (4) expectations for the ostensibly-upcoming social interaction. Participants' detection of deception was probed in a stepped interview protocol and they were debriefed. Other than demographics, depressive symptoms, and post-support processing mode, all measures were administered by computer via a secure online survey platform. All experimenters were women, to eliminate potential differential effects of receiving support from male versus female experimenters, and because most people receive most of their social support from women (Flaherty & Richman, 1989; Vandervoort, 2000).

Pre-test measures

Baseline emotion

Baseline state emotion was measured before the social intelligence test, with a series of Likert scales embedded among filler items unrelated to emotion, on a scale of 1–9. Negative emotion and positive emotion composites were created from the averages of *sad* and *depressed* items ($r = .62$, $p < .001$; $\alpha = .76$) and *happy* and *joyful* items ($r = .57$, $p < .001$; $\alpha = .72$), respectively.

Depressive symptoms

Symptoms of depression were measured with the 21-item Beck Depression Inventory, Second Edition (BDI-II; Beck, Steer, & Brown, 1996), which has good reliability and validity in clinical and nonclinical samples and a possible range of 0–63. The BDI-II was administered prior to any experimental manipulation and was included in analyses as a covariate due to its expected association with dependent variables. Mean score was 7.67 (SD = 6.94; range = 0–43), typical of a general population, and internal consistency was good ($\alpha = .88$).

Perceived similarity manipulation

Participants in the similarity condition were led to believe they shared a birthday with the experimenter. Sharing a birthday is an effective manipulation of similarity, with effects on request compliance, persuasion, and cooperation (e.g., Burger et al., 2004; Miller et al., 1998), and has the methodological advantage of inducing perceived similarity through incidental features rather than features that are legitimately informative (e.g., it provides no diagnostic information about the supporter's values or expertise). Upon retrieving the demographics form from the participant, the experimenter "noticed" the participant's date of birth. In the similarity condition, she said, "Oh, that's funny, [*participant birthday*] is my birthday too". In the control condition, she said, "Oh, that's funny, [*participant birthday*] was the last participant's birthday too". The latter condition was designed to control for any phenomena other than similarity that might be affected by the active condition (e.g., social interaction with the experimenter).

"Social intelligence" test

Instructions for the social intelligence test were administered visually and aurally via computer. Social intelligence was described to participants as "your ability to understand how other people think, feel, and interact with each other." High social intelligence was described as an important asset in daily life across domains, and low social intelligence was described as interfering with effectiveness across domains.

The task was adapted from the Interpersonal Perception Task-15 (IPT-15; Costanzo & Archer, 1993). The IPT-15 is a stimulus set of 15 brief videos that show real people interacting in ways that are open to interpretation. In the original IPT-15, each video is followed by a multiple-choice question that has an objectively true answer (e.g., "Which person is the other person's boss?"). In the current study, a subset of the 15 videos was shown, and 2–3 novel questions were asked after each video, none of which had an objectively correct answer. This task thus had no actual validity regarding social skills. After the final question, the computer "calculated" and presented the participant's results, again both on the screen and aurally. Results were designed to provide feedback that most participants would construe as negative, but ambiguous enough in their causes and consequences to be susceptible to different cognitive processing approaches. All participants received the same results, as follows:

> Understanding the meaning of social interactions and reading other people's signals is inherently challenging. Your final score on this measure of social intelligence was 8 correct answers out of 15. This indicates that some of the time, you can read social situations accurately, but a significant percentage of the time, you have difficulty reading social situations or social communications. You may have failed to spot some of the relevant nonverbal cues in the videos, such as the cues provided by facial expressions, hand gestures, or tone of voice. Or you may have paid attention to the wrong cues in making your decisions. People who receive a score of 8 out of 15 sometimes struggle to understand other people's motives, feelings, and responses and why others behave the way they do. This can make social situations stressful, and can make it difficult to act appropriately or effectively in social situations. People with your score sometimes find social situations perplexing, find it hard to understand and predict other people's behavior, and struggle to respond the way they want to with other people. At other times they find social situations satisfying, and feel they understand other people's behavior and their own behavior well. Many factors may contribute to your score. It may reflect your overall social intelligence, suggesting that such difficulties pervade many situations in your life. These difficulties could also have to do with these specific videos, or something about the circumstances of the testing.

Processing support manipulation

Upon re-entering the room, the experimenter "noticed" the results, still displayed on screen, and reflected on the score in a casual, supportive tone. In the *abstract/evaluative* condition, she said, "You know, I did this study last year, and I got a similar score. I guess it made sense to me though, when I thought about *why I am the way I am*." In the *concrete/experiential* condition, she said, "You know, I did this study last year, and I got a similar score. I guess it made sense to me though, when I thought about *how unclear those test questions were*." If participants verbally responded to the experimenter, she ended conversation as politely as possible by orienting them to the next task. Although support statements were designed to target processing mode, their content also reflected internal versus external causal attributions, which are clearly implicated in adaptive versus maladaptive event appraisals but are distinct from processing mode. Therefore, participant responses were coded for both constructs (see below). Pilot testing indicated that versions of the manipulation that more explicitly targeted processing mode raised risks of detection and experimental demand to unacceptable levels.

Manipulation checks

Perceived similarity

Participants were presented with a questionnaire explaining that our lab was evaluating its procedures and research assistants. Among filler items, participants rated the degree to which the

experimenter was *similar* to them, on a single-item measure with a scale of 1–9. This measure was administered at the end of the session so as not to affect manipulations or outcomes.

Processing mode and causal attribution

Following support delivery, the participant was left alone in the room to respond on a blank page to the following instructions: "We are interested in learning more about what contributes to people's social intelligence. Please list as many reasons you can think of for your performance and your score on the social intelligence test." All participants' responses were later coded by two independent raters trained to assess (1) abstract/evaluative versus concrete/experiential processing, and (2) internal versus external attribution. Coders were blind to both condition and hypotheses.

Following definitions set by Stöber and Borkovec (2002), each reason was coded as either *abstract/evaluative* if it was "indistinct, cross-situational, equivocal, unclear, or aggregated", or *concrete/experiential* if it was "distinct, situationally specific, unequivocal, clear, or singular" (see also Behar et al., 2012; Stevens et al., 2018). Coders also considered whether reasons were more representative of a "why" orientation (abstract/evaluative) versus a "how" orientation (concrete/experiential), consistent with Watkins (2008). Representative examples from participants' responses include "I am never very good in social situations" (abstract/evaluative) and "I wasn't sure what I should be looking for in the videos" (concrete/experiential). Reasons were coded as *internal* if the causal emphasis was on the self, and *external* if the causal emphasis was on other people, the environment, the test itself, cultural differences, or temporary internal states not associated with one's view of self (e.g., tired, hungry). Representative examples include "Me not being observant" (internal) and "The sound was not very good on the videos" (external). Codes for "neither" abstract/evaluative nor concrete/experiential and "neither" internal or external were applied in infrequent cases where responses did not include sufficient information to determine category.

To examine inter-coder reliability, Krippendorff's alpha (Hayes & Krippendorff, 2007) was calculated across the full sample regarding total number of reasons generated and number of reasons in each category. Reliability was good for total reasons ($\alpha = .86$) and processing mode (abstract/evaluative $\alpha = .83$; concrete/experiential $\alpha = .84$), and moderate for causal attribution (internal $\alpha = .70$; external $\alpha = .68$). Coder disagreement was resolved during consensus meetings led by the first author, who was blind to participant condition. Because participants varied in the number of reasons they generated, their use of list versus narrative format, and how long they spent on the task, scores used in analyses were the percentage of reasons in each category relative to their total number of reasons generated.

Post-test measures

Post-support emotion

Negative and positive emotion were measured using the same scales as at baseline. Constituent items for each scale were significantly correlated (negative $r = .49$, $\alpha = .66$; positive $r = .60$, $\alpha = .75$; $ps < .001$).

Self-perceptions

Participants rated their views of themselves along 23 dimensions that have been shown to differ in the self-perceptions of people high versus low in depressive symptoms (e.g., *confident/unconfident, likeable/unlikeable*; Dykman, Abramson, Alloy, & Hartlage, 1989), on scales from 1 to 9. These items were embedded among filler items shown to not differ depending on depressive symptoms (e.g., *honest/dishonest*; Dykman et al., 1989) and items with less evaluative focus (e.g., *musical/unmusical*). The 23 items of interest were averaged to create a self-perception composite score, which showed excellent internal consistency ($\alpha = .93$). Higher scores indicated more positive self-perceptions.

Future expectancies

To capture depression-relevant views of the future (e.g., pessimism), expectancies for six positive and six negative future events were measured with items adapted from Gasper and Clore (2000, Study 2). Participants rated the likelihood that events would occur "within the next few months" from 1 (*extremely unlikely*) to 9 (*extremely likely*). Negative and positive composite scores were created by averaging across negative events (e.g., *Do something you regret or are embarrassed about*) and positive events (e.g., *Be acknowledged by others for something you have worked hard on*), respectively. Both scores showed acceptable internal consistency (negative $\alpha = .77$; positive $\alpha = .71$).

Expectations for upcoming social interaction

To measure social affiliation, participants also made shorter-term predictions for the social interaction that they were told was coming up in the session. On single-item scales from 1 to 9, participants rated how difficult they expected it would be to initiate and maintain the conversation (*very easy* to *very difficult*), and how confident they felt about the interaction (*not at all confident* to *very confident*).

Analytic approach

Hypotheses were tested using 2 (abstract/evaluative versus concrete/experiential support) × 2 (perceived similarity versus no similarity) between-subjects analyses of covariance (ANCOVA), with depressive symptoms as a covariate. Depressive symptoms were covaried because the primary dependent variables were designed specifically around a depression model; indeed, depressive symptoms predicted dependent variables, potentially obscuring experimental effects. As expected from random assignment, and meeting assumptions of ANCOVA, depressive symptoms did not differ among conditions and associations between symptoms and outcomes did not differ significantly among conditions, indicating homogeneity of slopes.

Results

Observed means and standard deviations for all outcome variables are presented in Table 1. Descriptive statistics in the text are estimated marginal means and standard errors corresponding to statistically significant terms in ANCOVA models. Effect sizes (η_p^2) can be compared to Cohen's (1988) benchmarks for small (.01), medium (.06), and large (.14) effects.

Baseline emotion

We first examined whether groups differed on emotional state prior to the social intelligence test and support provision. As expected, groups were in equivalent emotional states prior to the test. Groups did not differ on negative mood: support condition main effect $F(1, 142) = 2.08$, $p = .15$, $\eta_p^2 = .01$; similarity condition main effect $F(1, 142) = .08$, $p = .78$, $\eta_p^2 = .001$; interaction $F(1, 142) = 1.03$, $p = .31$, $\eta_p^2 = .01$. They also did not differ on positive mood: support $F(1, 142) = 1.48$, $p = .23$, $\eta_p^2 = .01$; similarity $F(1, 142) = .26$, $p = .61$, $\eta_p^2 = .002$; interaction $F(1, 142) = 0.10$, $p = .75$, $\eta_p^2 = .001$.

Perceived similarity

Confirming that our manipulation of perceived similarity was effective, participants in the similarity condition perceived the experimenter as more similar to them ($M = 6.23$, $SE = 0.23$) than participants in the no-similarity condition did ($M = 5.34$, $SE = 0.22$), $F(1, 142) = 7.95$, $p = .006$, $\eta_p^2 = .05$. There were no significant effects of support condition, $F(1, 142) = 0.73$, $p = .39$, $\eta_p^2 = .005$, or the support × similarity interaction, $F(1, 142) = 0.03$, $p = .86$, $\eta_p^2 < .001$.

Table 1. Observed means and standard deviations for outcome variables by experimental condition.

	Abstract/evaluative support condition ($n = 71$)		Concrete/experiential support condition ($n = 76$)	
	Similarity condition ($n = 34$)	No similarity condition ($n = 37$)	Similarity condition ($n = 38$)	No similarity condition ($n = 38$)
Perceived similarity	6.39 (1.84)	5.46 (2.12)	6.05 (1.56)	5.24 (1.86)
Processing mode				
Abstract/evaluative	50.7% (35.7%)	50.0% (40.0%)	35.3% (34.4%)	43.0% (30.8%)
Concrete/experiential	49.4% (35.7%)	50.0% (40.0%)	64.7% (34.4%)	56.1% (31.0%)
Causal attributions				
Internal	53.1% (33.7%)	62.4% (32.1%)	44.0% (28.9%)	50.1% (30.6%)
External	43.0% (33.1%)	32.9% (31.7%)	51.1% (31.4%)	41.9% (27.9%)
Post-test emotion				
Negative emotion	2.97 (1.44)	3.11 (1.61)	3.11 (1.79)	3.33 (1.84)
Positive emotion	6.01 (1.42)	5.97 (1.42)	5.68 (1.40)	5.36 (1.25)
Self-perceptions	7.00 (0.98)	7.03 (1.13)	6.49 (1.03)	6.81 (0.82)
Future expectancies				
Negative events	5.05 (1.51)	5.33 (1.50)	5.42 (1.43)	5.85 (1.50)
Positive events	6.38 (1.14)	6.46 (1.55)	6.25 (1.05)	6.21 (1.38)
Upcoming interaction				
Difficulty	3.91 (1.84)	5.00 (2.30)	4.76 (2.05)	3.97 (2.16)
Confidence	6.24 (1.99)	5.38 (2.15)	5.29 (1.89)	5.87 (1.93)

Note: All variables measured after task feedback and social support provision; presented values are means and standard deviations. See text for measure details and for descriptive statistics of pre-manipulation variables.

Cognitive processing mode

Indices of processing mode and causal attributions were represented as proportions – i.e., the number of abstract, concrete, internal, and external reasons participants generated as a proportion of the total number of reasons generated. Therefore, an arcsine transformation was applied to these scores for inferential statistics, as recommended to correct for characteristics of proportional data (e.g., preponderance of values near 0 and 1) in order to meet assumptions of ANOVA/ANCOVA (e.g., Sokal & Rohlf, 2011). Figure 1 depicts participants' processing modes (upper panel, a) by experimental condition, as percentages of their total responses.

As predicted, participants in the abstract/evaluative support condition generated significantly more abstract/evaluative reasons (left side of Figure 1a) for their performance ($M = 50.3\%$, $SD = 37.8\%$) compared to those in the concrete/experiential condition ($M = 39.1\%$, $SD = 32.6\%$), support $F(1, 142) = 4.42$, $p = .037$, $\eta_p^2 = .03$; similarity $F(1, 142) = 0.07$, $p = .068$, $\eta_p^2 < .001$; interaction $F(1, 142) = 0.57$, $p = .450$, $\eta_p^2 = .004$. Correspondingly, participants' reasons were significantly more concrete/experiential (right side of Figure 1a) in the concrete/experiential condition ($M = 60.4\%$, $SD = 32.8\%$) versus the abstract/evaluative condition ($M = 49.7\%$, $SD = 37.8\%$), support $F(1, 142) = 4.19$, $p = .042$, $\eta_p^2 = .03$; similarity $F(1, 142) = 0.10$, $p = .757$, $\eta_p^2 = .001$; interaction $F(1, 142) = 0.65$, $p = .42$, $\eta_p^2 = .005$.

Internal versus external attribution

Figure 1 (lower panel, b) depicts internal versus external causal attributions. Participants in the abstract/evaluative condition generated significantly more internal attributions for their test score ($M = 57.9\%$, $SD = 33.0\%$) compared to those in the concrete/experiential condition ($M = 47.0\%$, $SD = 29.7\%$), support main effect $F(1, 142) = 5.07$, $p = .026$, $\eta_p^2 = .03$; similarity $F(1, 142) = 1.79$, $p = .183$, $\eta_p^2 = .012$; interaction $F(1, 142) = 0.05$, $p = .829$, $\eta_p^2 < .001$ (left side of Figure 1b). With respect to external attributions (right side of Figure 1b), a marginally significant main effect indicated that participants in the concrete/experiential condition made more external attributions ($M = 46.5\%$, $SD = 29.9\%$) versus those in the abstract/evaluative condition ($M = 37.8\%$, $SD = 32.5\%$), $F(1, 142) = 3.09$,

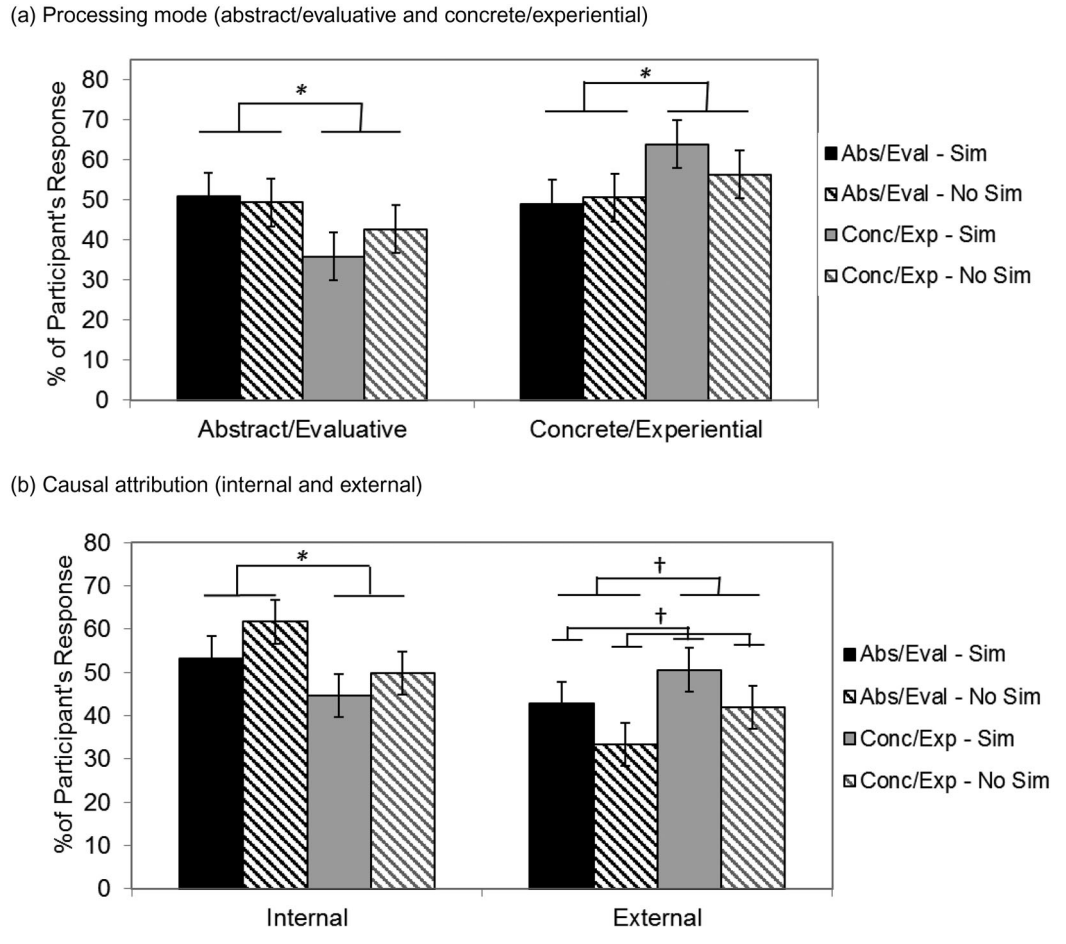

Figure 1. Processing mode and causal attribution following social support provision ($N = 147$). Values are percentages of participant's reasons for social intelligence test score that reflected (a) abstract/evaluative versus concrete/experiential processing, and (b) internal versus external causal attribution, displayed as estimated marginal means and standard errors from the factorial ANCOVA models covarying depressive symptoms. Black bars and gray bars indicate participants in the abstract/evaluative support and concrete/experiential support conditions, respectively. Solid and striped bars indicate participants in the similarity and no-similarity conditions, respectively. * $p < .05$, † $< .10$.

$p = .081$, $\eta_p^2 = .02$. In addition, participants led to perceive the supporter as similar generated marginally more external attributions ($M = 47.3\%$, $SD = 32.2\%$) than participants in the no-similarity condition ($M = 37.5\%$, $SD = 30.0\%$), $F(1, 142) = 3.20$, $p = .076$, $\eta_p^2 = .02$. There was no significant interaction, $F(1, 142) = .005$, $p = .942$, $\eta_p^2 < .001$. Thus, as predicted, following randomized support delivery and preceding primary dependent measures, participants in the abstract/evaluative social support condition, relative to the concrete/experiential condition, displayed significantly more abstract/evaluative processing, significantly less concrete/experiential processing, and significantly more internal causal attribution for their score.

Post-test emotion

Figure 2 (panel a) displays outcomes of emotion. Following support provision, participants' negative mood did not differ based on support condition, $F(1, 142) = 1.34$, $p = .25$, $\eta_p^2 = .01$, similarity condition, $F(1, 142) = 0.01$, $p = .92$, $\eta_p^2 < .001$, or their interaction, $F(1, 142) = 0.03$, $p = .87$, $\eta_p^2 < .001$. However, a

significant main effect of support condition indicated that participants in the abstract/evaluative condition ($M = 6.02$, $SE = 0.16$) experienced more positive mood following support than those in the concrete/experiential condition ($M = 5.50$, $SE = 0.15$), $F(1, 142) = 5.83$, $p = .017$, $\eta_p^2 = .04$. There was no main effect of similarity, $F(1, 142) = 0.15$, $p = .70$, $\eta_p^2 = .001$, or the interaction, $F(1, 142) = 0.43$, $p = .51$, $\eta_p^2 = .003$, on positive mood.

Self-perceptions

Figure 2 (panel b) reports self-perceptions. There was a significant main effect of support condition: participants in the abstract/evaluative condition ($M = 7.03$, $SE = 0.11$) reported more positive self-perceptions than those in the concrete/experiential condition ($M = 6.63$, $SE = 0.11$), $F(1, 142) = 6.46$, $p = .012$, $\eta_p^2 = .04$. There was no significant effect of similarity condition, $F(1, 142) = 2.33$, $p = .13$, $\eta_p^2 = .02$, and no interaction, $F(1, 142) = 0.89$, $p = .35$, $\eta_p^2 = .01$.

Future expectancies

Figure 2 (panel c) reports future expectancy outcomes. Participants in the abstract/evaluative condition rated future negative events as significantly less likely to occur ($M = 5.16$, $SE = 0.16$) than those in the concrete/experiential condition ($M = 5.67$, $SE = 0.16$), $F(1, 142) = 5.14$, $p = .025$, $\eta_p^2 = .04$. There was no difference between similarity conditions, $F(1, 142) = 0.93$, $p = .34$, $\eta_p^2 = .01$, and no interaction, $F(1, 142) = 0.12$, $p = .73$, $\eta_p^2 = .001$. Participants' predictions for positive events did not differ depending on support condition, $F(1, 142) = 0.94$, $p = .33$, $\eta_p^2 = .01$, similarity condition, $F(1, 142) = 0.07$, $p = .80$, $\eta_p^2 < .001$, or their interaction, $F(1, 142) = 0.07$, $p = .79$, $\eta_p^2 = .001$.

Expectations for upcoming social interaction

Difficulty of conversation

Expected difficulty of and confidence about the upcoming social interaction are depicted in Figure 3. There were no statistically significant main effects of support condition or similarity condition on participants' expectations for expected difficulty, support $F(1, 142) = 0.04$, $p = .85$, $\eta_p^2 < .001$, similarity $F(1, 142) = 0.09$, $p = .76$, $\eta_p^2 = .001$. However, the interaction between support and similarity conditions was statistically significant, $F(1, 142) = 7.30$, $p = .008$, $\eta_p^2 = .05$. Follow-up tests within similarity conditions indicated that when similarity was induced, abstract/evaluative support led to perceiving the upcoming interaction as marginally *less* difficult ($M = 3.92$, $SE = .33$) than did concrete/experiential support ($M = 4.79$, $SE = .31$), $t(69) = 1.93$, $p = .06$, $\eta_p^2 = .05$. When similarity was not induced, abstract/evaluative support led to *higher* perceptions of difficulty ($M = 5.00$, $SE = 0.37$) than concrete/experiential ($M = 3.97$, $SE = 0.36$), $t(72) = 1.98$, $p = .052$, $\eta_p^2 = .05$.

Confidence

Similarly, although there were no significant main effects of either manipulation on ratings of confidence, support $F(1, 142) = 0.75$, $p = .39$, $\eta_p^2 = .01$, similarity $F(1, 142) = 0.01$, $p = .92$, $\eta_p^2 < .001$, there was a significant interaction, $F(1, 142) = 5.05$, $p = .026$, $\eta_p^2 = .04$. Participants in the similarity condition expressed significantly more confidence in the abstract/evaluative condition ($M = 6.29$, $SE = 0.32$) than the concrete/experiential condition ($M = 5.27$, $SE = 0.31$), $t(69) = 2.31$, $p = .02$, $\eta_p^2 = .07$, whereas participants in the no-similarity condition did not differ based on support condition: abstract/evaluative $M = 5.40$, $SE = 0.33$, concrete/experiential $M = 5.85$, $SE = 0.32$, $t(72) = 0.96$, $p = 0.34$, $\eta_p^2 = .01$.

Discussion

This study tested the hypothesis that social support provision affects individuals' responses across multiple domains following a negative event, including emotional responses, cognitive appraisals

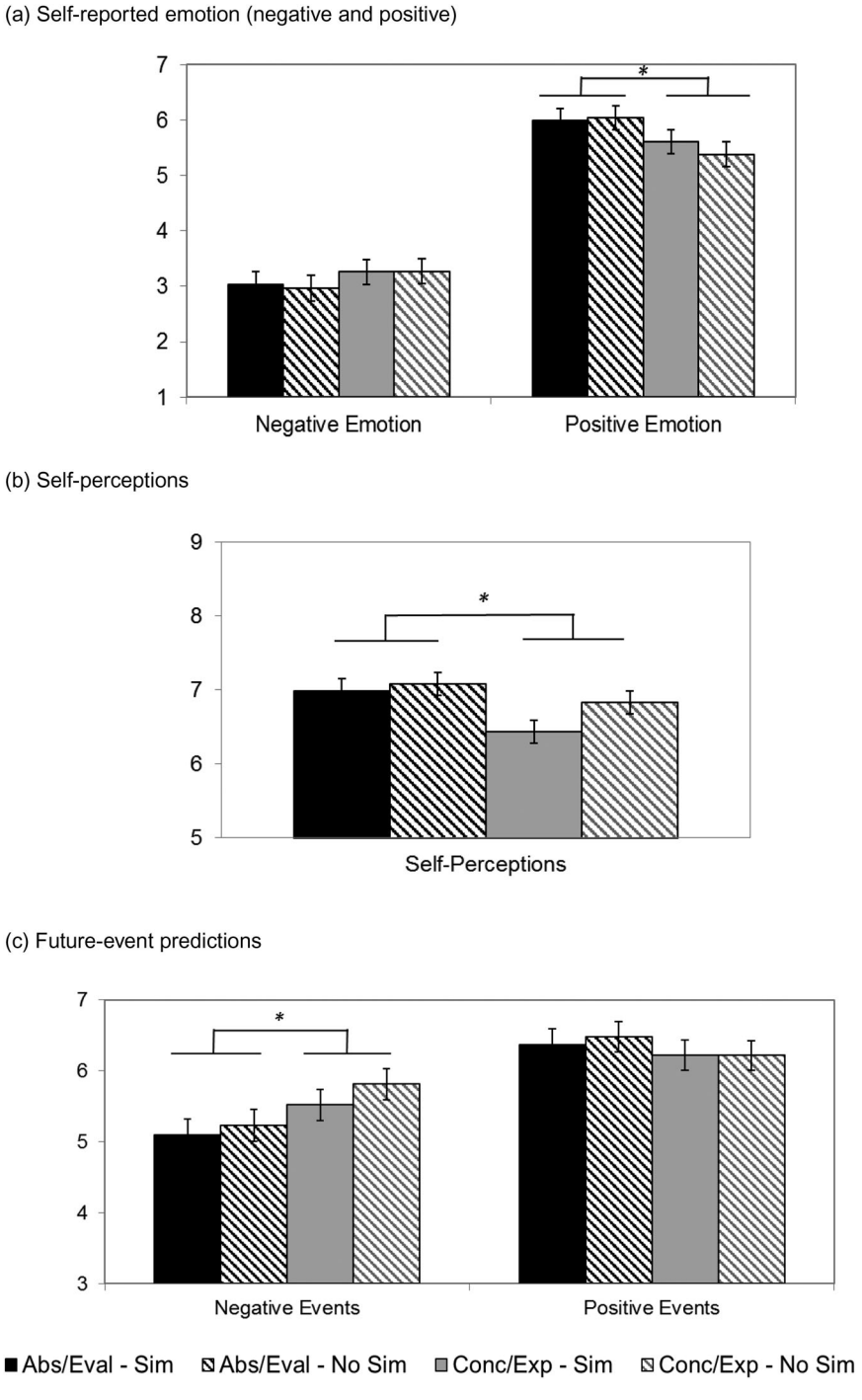

Figure 2. Effects of social support and perceived similarity manipulations on (a) self-reported emotion, (b) self-perceptions, and (c) expectancies for the future following negative task feedback ($N = 147$). Displayed are estimated marginal means and standard errors from the factorial ANCOVA models covarying depressive symptoms. Black bars and gray bars indicate participants in the abstract/evaluative support and concrete/experiential support conditions, respectively. Solid and striped bars indicate participants in the similarity and no-similarity conditions, respectively. *$p < .05$.

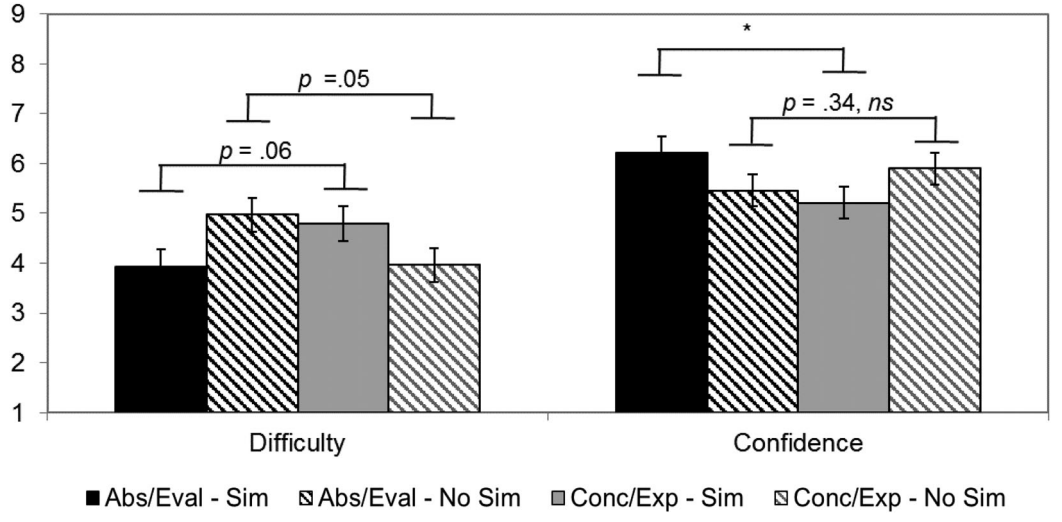

Figure 3. Effects of social support and perceived similarity manipulations on social affiliation (expectations of difficulty and confidence for an upcoming social interaction; $N = 147$). Significance levels reported represent follow-up comparisons for significant support condition × similarity condition interactions reported in the text. Displayed are estimated marginal means and standard errors from the factorial ANCOVA models covarying depressive symptoms. Black bars and gray bars indicate participants in the abstract/evaluative support and concrete/experiential support conditions, respectively. Solid and striped bars indicate participants in the similarity and no-similarity conditions, respectively. *$p < .05$.

of themselves and the future, and social affiliation, by affecting cognitive processing. Participants adopted cognitive processing modes modeled by supporters, and two contrasting modes had different effects on participants' responses following false negative feedback. Supporting our first hypothesis, abstract/evaluative versus concrete/experiential support led to corresponding cognitive processing mode in the individual, as well as more internal causal attributions. Supporting Hypothesis 2b over Hypothesis 2a, abstract/evaluative support led to significantly more positive mood, more positive self-perceptions, and less pessimistic expectancies for the future than did concrete/experiential support. Hypothesis 3 – that perceived similarity of the supporter would amplify effects on processing mode – was partially supported. Only among participants led to perceive the supporter as similar, abstract/evaluative support led to more positive expectations for an upcoming social interaction than concrete/experiential support did. Contrary to predictions, perceived similarity did not moderate influences of support on individuals' emotions, self-perceptions, or expectations for the future.

These findings provide evidence for the notion that cognitive approaches modeled by supporters causally influence individuals' cognitive and emotional responses to negative events. As such, they build on evidence of effects of supporters' broader cognitive reframing approaches (e.g., Dobkin et al., 2004; Lepore et al., 2004; Nils & Rimé, 2012) to suggest that supporters can influence specific modes of processing ambiguous, self-relevant events. They extend evidence that intrapersonal processes of adjustment to negative events – including cognitive appraisal – are influenced by social resources (Dixon-Gordon et al., 2015; Marroquín & Nolen-Hoeksema, 2015; Zaki & Williams, 2013). More specifically, our findings suggest that social resources directly influence whether individuals' responses to negative events result in the constellation of cognitive appraisals of self and future, emotional states, and social tendencies that characterize depression (Abramson et al., 1978; Beck & Bredemeier, 2016; Mehu & Scherer, 2015).

In this study, supporters' modeling of abstract/evaluative processing led to more "adaptive" (less depressogenic) outcomes, relative to concrete/experiential processing, which counters the direction found in most intrapersonal research (see Watkins, 2008). There are several potential explanations for

this effect. First, abstract processing may act more "positively" when delivered interpersonally, specifically because of the social element. Generalized, abstract processing during a support interaction may lead to positive outcomes in a way it does not when deployed on one's own. The positive experience of support might broaden through abstract processing to affect other construals (such as perceptions of self and future), capitalizing on initial affective benefits of support such as soothing and validation (Nils & Rimé, 2012; Rimé, 2009) in ways that the concrete/experiential mode does not.

Second, it is likely that the support content delivered in the present study had effects other than those targeted. Content intended to promote abstract/evaluative versus concrete/experiential processing may also have had the effect of promoting adaptive emotional approach over maladaptive emotional avoidance (Stanton, Kirk, Cameron, & Danoff-Burg, 2000), especially in a nonclinical sample without a predisposition toward rumination. Indeed, some studies show negative effects of abstract/evaluative processing only among individuals high in depressive symptoms or trait rumination (see Nelis et al., 2015; Watkins, 2008). Importantly, the processing mode conditions also differed in their emphasis on internal versus external attributions for the negative event (i.e., the test feedback). Self-focus and abstract/evaluative mode often co-occur as they did in this study (Nolen-Hoeksema et al., 2008; Watkins, 2008). Although the current findings cannot adequately determine which of these dimensions is most directly responsible for maladaptive responses to negative events, they demonstrate that both dimensions of cognition can be influenced by a supporter.

More broadly, our findings are consistent with the notion that processing modes may have different effects depending on whether they are intrapersonally versus interpersonally generated. "Outside perspectives" of partners can have stronger effects than intrapersonally-selected strategies, but also introduce additional factors, including supporters' personality characteristics and empathic capacities, and the dyad's relationship (Levy-Gigi & Shamay-Tsoory, 2017; Winterheld, 2016). The present findings suggest that a given cognitive process at the individual level could have opposite effects when it is influenced by others, complicating the assumption that the most helpful support should "look like" the internal processes known to be adaptive. It may be that inconsistent findings on enacted support partly reflect a mismatch between support content and the assumed direction of its intrapersonal effects.

In addition to relationship factors and other components of support (e.g., emotional responsiveness; Maisel & Gable, 2009), other plausible contributors to our findings include social comparison and emotional validation. Participants may have judged the supporter's abstract/evaluative statement as "worse" than their own pre-existing response and benefitted from downward comparison, versus perceiving the concrete/experiential statement as "better" and suffering negative effects of upward comparison (Suls, Martin, & Wheeler, 2002; Wills, 1981). Alternatively, support may have operated not so much as a *model* of processing mode, but rather as an external source of validation or invalidation of the individual's own response to the negative feedback, with abstract/evaluative support being more validating and comforting. Validation and comfort have primarily affective consequences (Rimé, 2009; Shenk & Fruzzetti, 2011) but may also facilitate cognitive effects (Fruzzetti & Worrall, 2010; Marroquín, 2011). Participants who received the supporter's disclosure of self-focused, abstract/evaluative processing may have received a clearer signal that they were not alone in their experience, and/or viewed the supporter more positively. In this study the supporter's statement was delivered in the first person, and communicated the supporter's own supposed past responses. Although intended to facilitate modeling and minimize demand effects, this models only one type of support, and could amplify social comparison or validation effects. Friends trained in providing active suggestions (rather than self-reflections) that more directly counter the depressogenic attributional style positively influence individuals' depressive symptoms and attributions for negative events (Dobkin et al., 2004; Panzarella, Alloy, & Whitehouse, 2006).

In this study, similarity led participants receiving abstract/evaluative support to expect an upcoming interaction to be easier, and to approach it with more confidence, than those receiving concrete/experiential support. If similarity between strangers functions as a proxy for relational factors within support relationships (e.g., intimacy or interdependence), this finding suggests that relationship factors facilitate beneficial *affiliative* effects of abstract/evaluative versus concrete/experiential processing modes. Findings regarding affiliation are consistent with affiliative functions of social sharing (Rimé, 2009; Rose et al., 2007) and with validation and social comparison explanations. If the abstract/evaluative condition communicated validation or social comparison, then a similar supporter should strengthen its effects, because similarity is a cue to relevance and shared experience (e.g., Suls et al., 2002). The pattern of findings suggests that similarity – and potentially other relational factors – is important uniquely for social consequences of social support. Future work might consider whether more substantive manifestations of similarity (e.g., in life experiences or values) exert more powerful influences. In such cases, similarity likely carries more relevant information regarding how much to incorporate one's supporter into one's own processing. It is also likely that perceived similarity and other interpersonal phenomena play more influential roles in existing or potential relationships than in passing interactions.

Although this study identifies causal influences of support on important outcomes following a negative event, it has clear limitations to be addressed in future work. Supporters affected intrapersonal processes, but directions of primary findings argue against the notion that supporters directly influence outcomes in the way they intend to. Moreover, most statistically significant effects were in the small to medium range of effect size. These findings may shed light on inconsistencies in studies of social support but also indicate a need for further investigation. They present further evidence of substantial complexities introduced by interpersonal frameworks of coping and emotion regulation (Aldao, 2013; Marroquín et al., 2017; Zaki & Williams, 2013) and social support (Lakey et al., 2010). Future work should experimentally manipulate factors that vary across support interactions (e.g., validation).

Second, the present study lacked a no-manipulation control condition for support content; we cannot conclude whether relative to intrapersonal processes alone, differences between processing modes were due to the abstract/evaluative condition, the concrete/experiential condition, or both. Third, we used a social intelligence score as a negative event; participants may have experienced support differently than after an event without social implications (e.g., with increased susceptibility to social influence; Carter-Sowell, Chen, & Williams, 2008). Although a social event represents an ecologically-relevant experience for support provision, future studies should examine non-social negative feedback (e.g., failing an anagram task). Moreover, the predetermined test results may have been more accurate for some participants than for others. We would expect related effects to be modest due to random assignment, but some within-condition variance might be expected (e.g., in the level of ambiguity the individual must process). Finally, future studies should examine dyadic interactions among actual social supporters and relationship partners in and outside of the lab and over time. Using experimenters as supporters has methodological benefits, but constrains the types of relationships about which conclusions can be drawn (e.g., by using a supporter in a position of authority).[2] Moreover, in reducing one type of experimental demand, our simple manipulation may have left open another. Conflating experimenter and supporter roles may have led participants to complete the processing mode task as suggested without truly adopting the specific processing mode.

Although future work is needed, the present study demonstrates that the types of support people receive after negative events causally affects not only *how* they process those negative events, but also their subsequent emotions, views of themselves, and expectations for the future, and also that interpersonal factors (e.g., similarity) moderate effects of support content on affiliative outcomes. Future work approaching cognition as a route through which social supporters affect recipients' responses to negative events can help resolve open questions of when social support helps or

hurts, as well as of basic mechanisms through which relationships influence individual adjustment, psychopathology, and well-being.

Notes

1. The constructs of abstract/evaluative and concrete/experiential processing, as defined and applied by Watkins (2008) and others, rest heavily on abstract versus concrete levels of cognitive construal (see Trope & Liberman, 2010; Vallacher & Wegner, 1987). Given their characteristics, it is unlikely that processing mode is frequently abstract but experiential, or concrete but evaluative, but it should be noted that the terms used here reflect the compound terms used in most related studies of processing mode.
2. In this study, social support was provided by female supporters only. Social support processes may differ in same-gender versus other-gender dyads in ways relevant to our hypotheses (e.g., heterosexual attraction, gender roles and expectations, or gender-cued perceptions of similarity) and to future work. Participant gender was examined as a potential moderator in all study analyses, and in all cases, there were no 2-way interactions between gender and either support condition or similarity condition, and no 3-way interactions.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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