Cognitive Therapy and Research (2019) 43:419–426
https://doi.org/10.1007/s10608-018-9954-1

ORIGINAL ARTICLE

Incidental Emotion Regulation Deficits in Public Speaking Anxiety

Andrea N. Niles[1] · **Michelle G. Craske**[2]

Published online: 11 August 2018

Abstract
Affect labeling (putting feelings into words) decreases subjective emotional distress and is a form of incidental or unintentional emotion regulation. Anxiety is associated with deficits in explicit emotion regulation, but far less is known about incidental emotion regulation. This study examined whether participants with public speaking anxiety showed deficits in incidental emotion regulation compared to non-anxious participants. Ninety-five public speaking anxious and fifteen non-anxious participants completed an affect-labeling task. They viewed negative images, and on half of the trials, they labeled the content of the image, and on the other half, viewed the image without labeling. They then rated their subjective distress after each image. Following the affect-labeling task, participants gave a brief speech in front of a live audience. Physiological reactivity (heart rate and skin conductance) was assessed prior to and following the speech, and participants reported on speech-related cognitions and fear levels. Incidental emotion regulation deficits were significantly correlated with more depressive symptoms, and more negative and fewer positive speech-related cognitions during the speech task. Further, distress decreased on labeling compared to non-labeling trials for non-anxious participants, but not for participants with public speaking anxiety. This is the first study to show that individuals with public speaking anxiety may not benefit from affect labeling, implying deficits in incidental emotion regulation.

Keywords Social anxiety · Emotion regulation · Affect labeling · Implicit emotion regulation · Incidental emotion regulation · Public speaking anxiety

Introduction

Anxiety disorders are characterized by an inability to down-regulate anxious feelings. One's ability to control emotional responding is broadly termed "emotion regulation," which, depending on one's goals, may involve dampening, intensifying, or maintaining emotional responses (Gross and Thompson 2007). Emotion regulation can occur as an explicit process, meaning a conscious effort to change one's emotional experience, or as an implicit or incidental process, which occurs automatically in response to a stimulus or is not directly intended to change ones emotional state (Gyurak et al. 2011). Most investigations of emotion regulation target explicit processes by asking participants about their deliberate efforts to change emotion or by directly instructing participants to employ a regulation strategy such as cognitive restructuring or suppression. Explicit emotion regulation has been linked to psychopathology (for a meta-analysis see Aldao et al. 2010). However, incidental emotion regulation efforts also play an important role in psychopathology (Gyurak et al. 2011), as has been demonstrated by the link between attentional bias towards negative emotional stimuli and anxiety and depression (Bar-Haim et al. 2007; Dalgleish and Watts 1990). The goal of the current study was to examine whether individuals with public speaking anxiety show deficits in affect labeling (i.e. putting feelings into words), which is an incidental emotion regulation strategy that leads to reduced subjective distress in non-clinical samples (Lieberman et al. 2011).

Explicit emotion regulation difficulties are particularly characteristic of internalizing disorders (as opposed to externalizing disorders; Aldao et al. 2010). In particular, explicit emotion regulation has been linked to generalized anxiety

✉ Andrea N. Niles
andrea.niles@ucsf.edu

Michelle G. Craske
craske@psych.ucla.edu

[1] University of California, San Francisco, 505 Parnassus Ave., San Francisco, CA 94143, USA

[2] University of California, Los Angeles, 1285 Franz Hall, Box 951563, Los Angeles, CA 90095-1563, USA

disorder (Mennin et al. 2005; Salters-Pedneault et al. 2006; Tull et al. 2009), panic disorder (Tull and Roemer 2007), post-traumatic stress disorder (Moore et al. 2008; Tull et al. 2007), and social anxiety disorder (Werner et al. 2011). Although the distinction between incidental emotion regulation, explicit emotion regulation, and cognitive bias is not clearly defined, to our knowledge, there is little research on the association between incidental emotion regulation and psychopathology. Attentional bias, or the tendency to attend more to threat relevant information, occurs in the context of threat, is an unintentional cognitive process, and impacts the level of threat perceived (Bar-Haim et al. 2007). It could therefore be conceptualized as a form of incidental emotion regulation. Hundreds of studies have examined attentional bias in anxiety disorders, and a meta-analysis found convincing evidence for attentional bias across all anxiety disorders with no significant differences in the magnitude of the bias between disorders (Bar-Haim et al. 2007).

Another form of incidental emotion regulation that has been examined primarily in healthy individuals is affect labeling, or the process of putting ones emotional experience into words. Affect labeling can take many forms and is broadly defined. It can include labeling one's internal emotional experience, labeling characteristics of an emotional scene, or talking about the emotions felt during an experience. In terms of laboratory research on affect labeling, when healthy participants view negative images and label the content of the image, they report less distress than when they view negative images without labeling, suggesting that affect labeling is an effective form of emotion regulation (Lieberman et al. 2011). Because intent to reduce distress is not explicit, affect labeling has been conceptualized as an incidental emotion regulation strategy (Burklund et al. 2014). The neural mechanisms associated with affect labeling have been well researched and support the notion that affect labeling is a form of emotion regulation. Specifically, when healthy individuals label emotions, they show increased activation in areas of the prefrontal cortex, and decreased activation in the amygdala (Gorno-Tempini et al. 2001; Hariri et al. 2000, 2003; Lieberman et al. 2007; Narumoto et al. 2000). Notably, the same pattern of neural activation is observed during explicit emotion regulation (for a review see Ochsner et al. 2012).

To our knowledge, prior studies have yet to explore the effects of affect labeling on subjective distress in individuals with social anxiety disorder. One study that examined effects of affect labeling on neural responses in socially anxious individuals showed greater amygdala activation (despite equivalent prefrontal cortex activation) during affect labeling compared to non-anxious controls. The effect was particularly pronounced for socially anxious participants with comorbid depression (Burklund et al. 2015). Because amygdala activation is associated with distress in response to phobic stimuli (Ahs et al. 2009), these findings suggest that individuals with social anxiety disorder, and particularly those with comorbid depression, may be less likely to experience a reduction in subjective distress when engaging in affect labeling.

The current study had two aims. The first was to examine whether incidental emotion regulation, measured by an affect labeling task, was associated with clinical characteristics among public speaking fearful individuals, including anxiety and depressive symptom severity, negative cognitions, and fear responding during a speech task. We hypothesized that greater deficits in incidental emotion regulation, indicated by less reduction in subjective distress while affect labeling, would be associated with a more severe clinical presentation. The second aim was to evaluate incidental emotion regulation in participants with public speaking anxiety compared to non-anxious controls. Consistent with literature on explicit emotion regulation and the patterns of neural activation during affect labeling, we hypothesized that public speaking fearful participants would show deficits in incidental emotion regulation, indicated by less reduction in subjective distress while affect labeling, compared to non-anxious controls.

Method

Participants

One hundred two participants with public speaking anxiety (PSA) and fifteen control participants were recruited to participate as part of a larger three-day study. Because the primary aims of the larger study (see Niles et al. 2015) and the novel aspect of the current study (i.e. examining incidental emotion regulation in a public speaking fearful sample) were focused on the PSA sample, recruitment of PSA participants was prioritized. Seven PSA participants were excluded from analyses due to missing data on the affect labeling task for reasons of refusal to complete the task and experimenter error. Therefore, the final PSA sample included in analyses was 95. See Niles et al. (2015) for a consort diagram of flow through study procedures for the larger study. PSA participants had a mean age of 26 (SD = 9.2), 77% were female, 94% were university students, and 40% spoke English as a second language. The ethnic breakdown was 60% Asian, 13% Hispanic, 12% White, 4% African American, and 11% other. Control participants had a mean age of 20 (SD = 2.4), 43% were female, 93% were students, and 29% spoke English as a second language. The ethnic breakdown was 43% Asian, 43% White, and 14% Hispanic. The groups differed on the percentage of women χ^2 (1, $n = 106$) = 7.84, $p = .005$, but did not differ on any other demographic characteristics.

To determine eligibility, based on a screening procedure used in previous research (Culver et al. 2012; Tsao and Craske 2000) we asked participants to report anxiety and avoidance of public speaking using two items: "How anxious would you feel giving a formal speech before a live audience?" and "How likely would you be to avoid taking a class that required an oral presentation?" Eligible PSA participants reported a 6 or higher on anxiety and a 5 or higher on avoidance of public speaking on a 0–8 Likert scale. Control participants reported a 2 or lower on anxiety and a 1 or lower on avoidance of public speaking on the same scale. Participants were over 18 years old, fluent in English, free of heart, neurological, or respiratory conditions, physician recommendation to avoid stressful situations, current treatment for public speaking anxiety, or psychotropic medications for an emotional problem. Participants were recruited from the UCLA Psychology Subject Pool and flyers posted around UCLA campus. Participants were given 1 h of research credit per day or were paid $10.00 per day. Although the present study used data collected only on the first day of study participation, the larger study included three days of participation.

Materials

Personal Report of Public Speaking Anxiety (McCroskey 1970)

The Personal Report of Public Speaking Anxiety is a 34-item measure that assesses fear of public speaking. Responders rate their agreement with each statement on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Sample items include "While preparing for giving a speech, I feel tense and nervous," and "My thoughts become confused and jumbled when I am giving a speech." The scale has excellent internal reliability (α = .90) and test–retest reliability (r = .84) (McCroskey 1970). In the current study, α = .97 (α = .92 among PSA participants and α = .93 among non-anxious control participants).

Patient Health Questionnaire (Spitzer et al. 1999)

The Patient Health Questionnaire is a widely used and well validated (Löwe et al. 2004) 9-item questionnaire used to assess symptoms of depression. Patients report the frequency of experiencing each symptom on a four-point Likert scale, and higher scores indicate more depressive symptoms. In the current study, α = .84.

Self Statements During Public Speaking (Hofmann and DiBartolo 2000)

This 10-item questionnaire assesses negative and positive cognitions about a speech performance; participants rate the extent to which they experienced five negative and five positive thoughts during a speech. For negative cognitions, higher scores indicate more negative cognitions, and for positive cognitions, higher scores indicate more positive cognitions. The measure shows good internal consistency (α = .86) and test–retest reliability (r = .80; Hofmann and DiBartolo 2000). In the current study α = .78 for positive cognitions and .84 for negative cognitions.

Performance Rating Form (Rapee and Lim 1992)

The 17-item Performance Rating Form assesses self-reported public speaking performance. The scale includes 12 specific items to represent individual behaviors or reactions necessary to good public speaking (e.g. kept eye contact with audience, had a clear voice), and 5 global items to assess overall evaluations of performance (e.g. generally spoke well). Participants rate items on a 5-point Likert scale from 0 (not at all) to 4 (very much) and higher scores indicate better-rated performance. In the current study, α = .91.

Physiological Activity

Physiological activity was recorded using a Biopac system, an IBM Pentium II, and AcqKnowledge software (AcqKnowledge 4.1 for Windows; BIOPAC Systems, inc). Non-specific skin conductance responses (SCR-NS), and heart rate (HR) were recorded as measures of fear arousal. All physiological data were first visually inspected to ensure proper measurement. For HR, one participant, and for SCR-NS, nine participants were excluded from analyses because the signal was not recorded properly or no variations in signal were observed.

To assess HR, electrocardiogram signals were collected from electrodes on the right clavicle and below the bottom left front rib. HR was defined as the number of heart beats per minute. SCR-NS was recorded from electrodes attached to the medial phalanges of the second and third fingers of a participant's non-preferred hand. SCR-NS was assessed by calculating the frequency of non-specific skin conductance responses per minute. A skin conductance response was defined by a minimum increase of .02 μs. Data were analyzed using built in analysis tools in AcqKnowledge software for HR and SCR-NS.

Behavioral Avoidance Test

Participants completed a one-minute speech in front of an audience of three undergraduate research assistants. Speech topics were health care, president Obama, and global warming, and speech topics were assigned and counterbalanced for equal representation across participants. Participants then had the option of speaking on an

additional speech topic to receive $5.00. Dependent measures included distress levels (subjective units of distress) and whether they completed an additional speech (all participants completed the first speech).

Incidental Emotion Regulation

Incidental emotion regulation was defined as the reduction in subjective distress while affect labeling. Incidental emotion regulation was assessed using the Affect Labeling Task (Lieberman et al. 2011), described below. Although emotionally expressive faces are also used in affect labeling studies to produce reliable amygdala activation, such stimuli are unlikely to produce subjective distress in study participants (Lieberman et al. 2011). Therefore, the current study used negative images from the International Affective Picture System. For our second research question, incidental emotion regulation effectiveness scores were calculated by subtracting the average level of distress when labeling negative images from the average level of distress when viewing negative images without labeling. Scores ranged from −1.36 to 2.01 ($M = .12$, $SD = .63$) with higher scores indicating more effective emotion regulation.

Procedure

Behavioral Avoidance Test

After informed consent, electrodes were attached for continuous physiological measurement. Participants reported on demographic characteristics and completed the Personal Report of Public Speaking Anxiety, and the Patient Health Questionnaire. Participants then sat still for a 1-min baseline period followed by instructions for completing a speech (i.e., Behavioral Avoidance Test). When ready to begin, participants sat behind a screen for a 1-min anticipation period, then stood in front of an audience of three undergraduate research assistant confederates sitting in chairs. Confederates wore lab coats, maintained neutral facial expressions, and were non-responsive to participants during the speech. The beginning of the speech task was signaled by a computer-generated tone, and the first speech topic was displayed on a computer screen. Participants spoke for 1 min then were given the option of giving an additional speech in exchange for $5.00. After speaking, participants completed the Self Statements During Public Speaking questionnaire then sat still for a 1-min recovery period. Physiological responding was assessed during the 1-min baseline, 1-min anticipation, and 1-min recovery periods.

Affect Labeling Task

Following the Behavioral Avoidance Test, physiological equipment was disconnected and the participant was taken to another room to complete the Affect Labeling Task as described by Lieberman et al. (2011) with slight modifications to reduce the length of the procedure. Participants viewed negative images from the International Affective Picture System (Lang et al. 1999). Images were organized into eight blocks of four images each. Each block included two moderately negative, and two extremely negative images. Prior to each block, participants were prompted by cues that said either "scene description" (labeling) or "look and let yourself respond naturally" (watching). All participants experienced both conditions meaning that all participants received both labeling and watching blocks. Four blocks included labeling, and four included watching for a total of eight blocks. To circumvent order effects, the eight blocks were sorted into two random orders, and each participant was assigned to complete the task in one of the two orders. Pictures appeared for 5 s. For labeling blocks, participants were asked to choose from three labels that appeared at the bottom of the screen (e.g., attack, tornado, sitting). One label was relevant to the image, and the other two were not. Two of the labels were negative, and one was neutral. Participants chose a word by pressing a key on the keyboard that corresponded to the position of the word on the screen. For watching blocks, participants simply viewed each image for 5 s. Following the presentation of each image, regardless of block condition, participants were asked "How distressed did you feel while looking at the picture?" and responded on a 9-point Likert scale with 0 being not distressed, and 8 being very distressed.

Results

Does Incidental Emotion Regulation Effectiveness Relate to Clinical Characteristics?

We used correlation analyses to examine the association between effectiveness of incidental emotion regulation with clinical characteristics and fear responding to a public speaking task in PSA participants. Measures examined included the Performance Rating Form, Self Statements During Public Speaking (negative and positive subscales), Personal Report of Public Speaking Anxiety, Patient Health Questionnaire, HR and SCR-NS during anticipation of the speech and recovery following the speech, subjective units of distress ratings, and whether or not the participant gave an optional speech (0 = no, 1 = yes). For heart rate and nonspecific skin conductance response, we examined the single-order semi-partial correlation with incidental emotion

Table 1 Correlations between clinical characteristics and incidental emotion regulation

	IER	PRF	SSPS-neg	SSPS-pos	PRPSA	PHQ	SCR antic	HR antic	SCR recov	HR recov	SUDS
PRF	−.02										
SSPS-negative	−.25*	−.57***									
SSPS-positive	.26*	.27**	−.37***								
PRPSA	−.02	−.44***	.50***	−.29**							
PHQ	−.22*	−.16	.27**	−.12	.25*						
SCR anticipation	−.15	−.14	.11	−.09	.17	.19^					
HR anticipation	.06	−.05	.05	−.09	.08	−.07	.11				
SCR recovery	−.20^	.05	.04	−.05	−.15	.19^	.20^	−.17			
HR recovery	.07	.09	−.02	−.06	.03	.13	.02	.45***	.01		
SUDS	−.15	−.29**	.36***	−.08	.26*	.20^	.15	.18^	.14	−.04	
Optional speech	.07	.15	−.18^	.20^	.06	−.18^	−.20^	−.02	−.44***	.06	−.20^

IER incidental emotion regulation (higher values indicate more effective regulation), *PRF* performance rating form, *SSPS* self-statements during public speaking, *PRPSA* personal report of public speaking anxiety, *PHQ* patient health questionnaire, *SCR* skin conductance response, *HR* heart rate, *SUDS* subjective units of distress scale

^$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

regulation by controlling for baseline physiological arousal and using the residuals in the correlation analysis.

Results are displayed in Table 1. We found that greater incidental emotion regulation effectiveness was significantly associated with fewer negative self-statements ($p = .018$) and more positive self-statements ($p = .014$) during public speaking, as well as fewer reported depressive symptoms on the Patient Health Questionnaire ($p = .034$) with small to medium effect sizes. Additionally, greater incidental emotion regulation effectiveness was marginally significantly associated with less physiological reactivity during recovery following the speech in terms of SCR-NS ($p = .064$) with a small to medium effect size. All additional variables were not significantly associated with incidental emotion regulation effectiveness ($ps > .181$).

Do PSA Participants Show Deficits in Incidental Emotion Regulation?

We first examined whether PSA participants differed from non-anxious controls in reactivity to the negative images. Using a two-sample t-test with a Satterthwaite correction for unequal variances, we tested the effect of Group (PSA vs. control) on distress ratings during the watch condition. We found a significant effect of Group $t(17.09) = -2.63$, $p = .017$, *Cohen's* $d = .78$, such that PSA participants ($M = 5.58$, $SD = 1.63$) had distress ratings that were 1.43 points (95% Confidence Interval = .28–2.57) higher than controls ($M = 4.15$, $SD = 2.00$). Achieved power for the between group effect, computed using G*Power 3.1, was estimated at .80.

We then tested whether PSA participants differed from controls in the effectiveness of incidental emotion regulation (affect labeling) on reducing distress while viewing negative IAPS images. Results are shown in Fig. 1. Using a multilevel model to account for repeated measurements within individuals, we tested the interaction between Group (PSA vs. Control) and Condition (Label vs. Watch). Analyses revealed a significant interaction ($b = -.35$; 95% Confidence Interval = −.64 to −.07; $p = .016$; *Cohen's* $d = .21$[1]). Tests of simple effects showed that Control participants had a reduction in distress on Label trials compared to Watch trials (difference = −.42, $p = .001$), whereas PSA participants showed no difference in distress between Label and Watch trials (difference = −.07, $p = .303$). Achieved power for the cross-level interaction, computed using G*Power 3.1 (Effect size $f = 0.1$, $\alpha = 0.05$, groups = 2, measurements = 2, correlation among repeated measures = .94, nonsphericity correction = 1), was .99 with a total sample size of 110 participants and .86 with a total sample size of 30 participants (assuming just 15 participants per group). However, given the small sample of control participants, to provide greater confidence in the results, we followed up with additional analyses using random sampling. For the control group, we used a paired samples t-test with bootstrapping (i.e. sampling with replacement) to compare the Label and Watch conditions in 1000 random samples of 15 participants, and the results previously reported were replicated ($t = -3.11$, 95% confidence interval = −5.67 to −.55, $p = .017$). For the PSA group, we chose 1000 random samples of 15 participants, and used a paired samples t-test in each sample

[1] Effect sizes are calculated based on the method described by Feingold (2009) that produces estimates analogous to Cohen's *d* for multilevel models.

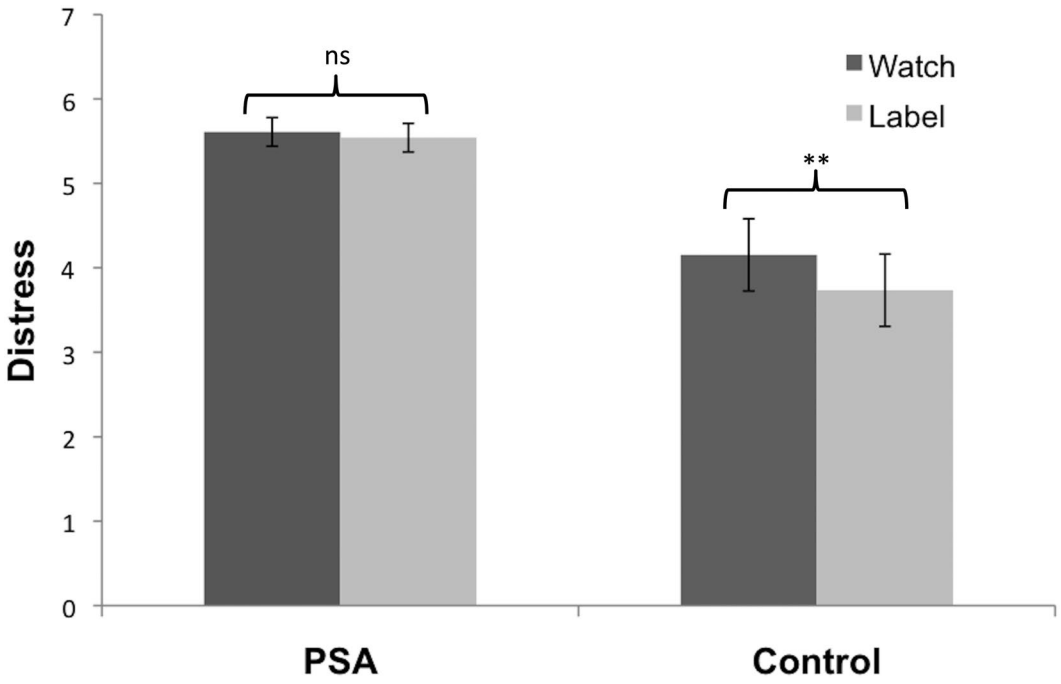

Fig. 1 Subjective distress during watch and label conditions among PSA and control participants

to compare the Label and Watch conditions. Out of 1000 analyses, 20 (2%) resulted in a significant condition difference with 18 showing less distress in the Label compared to the Watch condition, and 2 showing less distress in the Watch compared to the label condition. Given an α of .05, the percentage of samples showing significant condition differences is less than would be expected by chance.

Discussion

The current study had two goals. First, we examined associations between clinical characteristics and incidental emotion regulation effectiveness. Second, we tested whether participants with PSA showed deficits in incidental emotion regulation (assessed by affect labeling) compared to non-anxious controls. Public speaking fearful participants who had less effective incidental emotion regulation reported more negative cognitions and fewer positive cognitions during public speaking, had more depressive symptoms, and had marginally significantly higher physiological reactivity during recovery following public speaking. Further, we found that public speaking fearful participants did not report a reduction in distress when labeling negative images while non-anxious participants did.

We found evidence for a relationship between affect labeling and clinical characteristics including negative and positive cognitions and depression. One's ability to control negative and positive thoughts during an anxiety-provoking task is akin to cognitive restructuring or explicit emotion regulation. Therefore, the significant association between affect labeling and cognitions in relation to public speaking suggests that incidental and explicit emotion regulation may be related, and that deficits observed in one domain may be related to deficits in the other. The finding that incidental emotion regulation was significantly associated with depressive symptoms is consistent with previous findings showing that socially anxious individuals with comorbid depression show the least amygdala reduction during affect labeling (Burklund et al. 2015). These findings indicate that deficits in incidental emotion regulation may be particularly pronounced for anxious individuals with comorbid depression.

Additionally, we showed that public speaking fearful participants reported more distress in response to viewing negative images, showing evidence for greater emotional reactivity to negative stimuli unrelated to social rejection. This finding is consistent with previous research showing that socially anxious individuals show greater reactivity to non-social negative stimuli (Niles et al. 2013). Consistent with hypotheses, public speaking fearful participants did not report a reduction in distress when affect labeling while non-anxious participants did. These findings align with previous research showing poorer explicit emotion regulation skills (Werner et al. 2011) and incidental emotion regulation deficits (Bar-Haim et al. 2007) among socially anxious individuals. Although there is often discord between neural mechanisms and conscious output of emotion (LeDoux 2015), these findings are also consistent

with previous research showing greater amygdala activation during affect labeling in individuals with social anxiety compared to non-anxious controls (Burklund et al. 2015). Because affect labeling reliability involves recruitment of prefrontal regions and reduced amygdala activity in healthy participants (Gorno-Tempini et al. 2001; Hariri et al. 2000, 2003; Lieberman et al. 2007; Narumoto et al. 2000), the current findings provide further albeit indirect evidence for prefrontal amygdala circuitry deficits among socially anxious individuals. A number of studies have shown that including affect labeling alongside exposure for spider phobia and public speaking anxiety lead to greater fear reduction in terms of physiological reactivity (Kircanski et al. 2012; Niles et al. 2015; Tabibnia et al. 2008). In addition, participants with the greatest deficits in incidental emotion regulation benefited more from exposure combined with affect labeling than from exposure alone (Niles et al. 2015), suggesting that targeting incidental emotion regulation deficits in treatment may lead to improved treatment outcomes more so for those with the greatest deficits. The current findings provide additional support for the role of incidental emotion regulation in social anxiety.

The current study had a few notable limitations. Because the majority of participants were students in psychology courses at a University, it is possible that the current findings will not generalize to more diverse or more clinically severe samples. Replication in a sample more representative of the population is necessary. In addition, the sample of control participants recruited was small, again possibility limiting generalizability beyond the current sample. However, the effect of affect labeling on subjective and neural responding has been found consistently in small samples. The four studies conducted by Lieberman and colleagues (2011) in which the effect of affect labeling was found for negative (studies 1–3) and positive (study 4) stimuli included samples of 22, 25, 28, and 31 participants. Studies of neural activation in response to affect labeling have found reductions in amygdala activation while labeling for samples of 16 participants (Hariri et al. 2000) and 11 participants (Hariri et al. 2003). The replication of previous findings in such a small sample can be interpreted as providing particularly strong support for the benefit of affect labeling on subjective distress (Bakan 1966). Finally, because participants cannot be randomly assigned to the high and low anxiety groups, there could be other differences between these groups that explain the different effects of affect labeling including differences in English fluency, educational attainment, or attention to the affect labeling task.

In conclusion, the current study tested whether individuals with public speaking anxiety show deficits in incidental emotion regulation as assessed by an affect labeling task. Participants who reported more maladaptive cognitions and more depressive symptoms showed greater deficits in affect labeling. These findings provide support for a relationship between incidental emotion regulation and other markers of psychopathology. Further, we found that public speaking fearful participants did not show a reduction in distress when affect labeling whereas non-anxious controls did. This is the first study to show that individuals with elevated anxiety may not show benefit from affect labeling, implying deficits in implicit emotion regulation.

Compliance with Ethical Standards

Conflict of Interest Drs. Niles and Craske have no potential conflicts of interest pertaining to this submission to *Cognitive Therapy and Research*.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

Ahs, F., Pissiota, A., Michelgård, A., Frans, O., Furmark, T., Appel, L., & Fredrikson, M. (2009). Disentangling the web of fear: Amygdala reactivity and functional connectivity in spider and snake phobia. *Psychiatry Research, 172*(2), 103–108. https://doi.org/10.1016/j.pscychresns.2008.11.004.

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004.

Bakan, D. (1966). The test of significance in psychological research. *Psychological Bulletin, 66*(6), 423–437.

Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin, 133*(1), 1.

Burklund, L. J., Craske, M. G., Taylor, S. E., & Lieberman, M. D. (2015). Altered emotion regulation capacity in social phobia as a function of comorbidity. *Social Cognitive and Affective Neuroscience, 10*(2), 199–208. https://doi.org/10.1093/scan/nsu058.

Burklund, L. J., Creswell, J. D., Irwin, M. R., & Lieberman, M. D. (2014). The common and distinct neural bases of affect labeling and reappraisal in healthy adults. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2014.00221.

Culver, N. C., Stoyanova, M., & Craske, M. G. (2012). Emotional variability and sustained arousal during exposure. *Journal of Behavior Therapy and Experimental Psychiatry, 43*(2), 787–793. https://doi.org/10.1016/j.jbtep.2011.10.009.

Dalgleish, T., & Watts, F. N. (1990). Biases of attention and memory in disorders of anxiety and depression. *Clinical Psychology Review, 10*(5), 589–604. https://doi.org/10.1016/0272-7358(90)90098-U.

Feingold, A. (2009). Effect sizes for growth-modeling analysis for controlled clinical trials in the same metric as for classical analysis. *Psychological Methods, 14*(1), 43–53. https://doi.org/10.1037/a0014699.

Gorno-Tempini, M. L., Pradelli, S., Serafini, M., Pagnoni, G., Baraldi, P., Porro, C., … Nichelli, P. (2001). Explicit and incidental facial

expression processing: An fMRI study. *NeuroImage, 14*(2), 465–473. https://doi.org/10.1006/nimg.2001.0811.

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In *Handbook of emotion regulation* (pp. 3–24). New York: Guilford Press.

Gyurak, A., Gross, J. J., & Etkin, A. (2011). Explicit and implicit emotion regulation: A dual-process framework. *Cognition & Emotion, 25*(3), 400–412. https://doi.org/10.1080/02699931.2010.544160.

Hariri, A. R., Bookheimer, S. Y., & Mazziotta, J. C. (2000). Modulating emotional responses: Effects of a neocortical network on the limbic system. *Neuroreport, 11*(1), 43–48.

Hariri, A. R., Mattay, V. S., Tessitore, A., Fera, F., & Weinberger, D. R. (2003). Neocortical modulation of the amygdala response to fearful stimuli. *Biological Psychiatry, 53*(6), 494–501.

Heeren, A., Reese, H. E., McNally, R. J., & Philippot, P. (2012). Attention training toward and away from threat in social phobia: Effects on subjective, behavioral, and physiological measures of anxiety. *Behaviour Research and Therapy, 50*(1), 30–39. https://doi.org/10.1016/j.brat.2011.10.005.

Hofmann, S. G., & DiBartolo, P. M. (2000). An instrument to assess self-statements during public speaking: Scale development and preliminary psychometric properties. *Behavior Therapy, 31*(3), 499–515.

Kircanski, K., Lieberman, M. D., & Craske, M. G. (2012). Feelings into words: Contributions of language to exposure therapy. *Psychological Science, 23*(10), 1086–1091. https://doi.org/10.1177/0956797612443830.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1999). *International affective picture system (IAPS): Technical manual and affective ratings*. Gainesville: The Center for Research in Psychophysiology, University of Florida.

LeDoux, J. (2015). *Anxious: Using the brain to understand and treat fear and anxiety*. New York: Viking.

Lieberman, M. D., Eisenberger, N. I., Crockett, M. J., Tom, S. M., Pfeifer, J. H., & Way, B. M. (2007). Putting feelings into words: Affect labeling disrupts amygdala activity in response to affective stimuli. *Psychological Science, 18*(5), 421–428. https://doi.org/10.1111/j.1467-9280.2007.01916.x.

Lieberman, M. D., Inagaki, T. K., Tabibnia, G., & Crockett, M. J. (2011). Subjective responses to emotional stimuli during labeling, reappraisal, and distraction. *Emotion, 11*(3), 468–480. https://doi.org/10.1037/a0023503.

Löwe, B., Spitzer, R. L., Gräfe, K., Kroenke, K., Quenter, A., Zipfel, S., … Herzog, W. (2004). Comparative validity of three screening questionnaires for DSM-IV depressive disorders and physicians' diagnoses. *Journal of Affective Disorders, 78*(2), 131–140.

McCroskey, J. C. (1970). Measures of communication-bound anxiety. *Speech Monographs, 37*(4), 269–277. https://doi.org/10.1080/03637757009375677.

Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2005). Preliminary evidence for an emotion dysregulation model of generalized anxiety disorder. *Behaviour Research and Therapy, 43*(10), 1281–1310. https://doi.org/10.1016/j.brat.2004.08.008.

Moore, S. A., Zoellner, L. A., & Mollenholt, N. (2008). Are expressive suppression and cognitive reappraisal associated with stress-related symptoms? *Behaviour Research and Therapy, 46*(9), 993–1000. https://doi.org/10.1016/j.brat.2008.05.001.

Narumoto, J., Yamada, H., Iidaka, T., Sadato, N., Fukui, K., Itoh, H., & Yonekura, Y. (2000). Brain regions involved in verbal or non-verbal aspects of facial emotion recognition. *Neuroreport, 11*(11), 2571–2576.

Niles, A. N., Craske, M. G., Lieberman, M. D., & Hur, C. (2015). Affect labeling enhances exposure effectiveness for public speaking anxiety. *Behaviour Research and Therapy, 68*, 27–36. https://doi.org/10.1016/j.brat.2015.03.004.

Niles, A. N., Mesri, B., Burklund, L. J., Lieberman, M. D., & Craske, M. G. (2013). Attentional bias and emotional reactivity as predictors and moderators of behavioral treatment for social phobia. *Behaviour Research and Therapy, 51*(10), 669–679. https://doi.org/10.1016/j.brat.2013.06.005.

Ochsner, K. N., Silvers, J. A., & Buhle, J. T. (2012). Functional imaging studies of emotion regulation: A synthetic review and evolving model of the cognitive control of emotion. *Annals of the New York Academy of Sciences, 1251*, E1–E24. https://doi.org/10.1111/j.1749-6632.2012.06751.x.

Rapee, R. M., & Lim, L. (1992). Discrepancy between self-and observer ratings of performance in social phobics. *Journal of Abnormal Psychology, 101*(4), 728.

Salters-Pedneault, K., Roemer, L., Tull, M. T., Rucker, L., & Mennin, D. S. (2006). Evidence of broad deficits in emotion regulation associated with chronic worry and generalized anxiety disorder. *Cognitive Therapy and Research, 30*(4), 469–480. https://doi.org/10.1007/s10608-006-9055-4.

Spitzer, R. L., Kroenke, K., & Williams, J. B. W. (1999). Validation and utility of a self-report version of PRIME-MD. *JAMA: The Journal of the American Medical Association, 282*(18), 1737–1744.

Tabibnia, G., Lieberman, M. D., & Craske, M. G. (2008). The lasting effect of words on feelings: Words may facilitate exposure effects to threatening images. *Emotion, 8*(3), 307–317.

Tsao, J. C. I., & Craske, M. G. (2000). Timing of treatment and return of fear: Effects of massed, uniform-, and expanding-spaced exposure schedules. *Behavior Therapy, 31*(3), 479–497. https://doi.org/10.1016/S0005-7894(00)80026-X.

Tull, M. T., Barrett, H. M., McMillan, E. S., & Roemer, L. (2007). A preliminary investigation of the relationship between emotion regulation difficulties and posttraumatic stress symptoms. *Behavior Therapy, 38*(3), 303–313. https://doi.org/10.1016/j.beth.2006.10.001.

Tull, M. T., & Roemer, L. (2007). Emotion regulation difficulties associated with the experience of uncued panic attacks: Evidence of experiential avoidance, emotional nonacceptance, and decreased emotional clarity. *Behavior Therapy, 38*(4), 378–391. https://doi.org/10.1016/j.beth.2006.10.006.

Tull, M. T., Stipelman, B. A., Salters-Pedneault, K., & Gratz, K. L. (2009). An examination of recent non-clinical panic attacks, panic disorder, anxiety sensitivity, and emotion regulation difficulties in the prediction of generalized anxiety disorder in an analogue sample. *Journal of Anxiety Disorders, 23*(2), 275–282. https://doi.org/10.1016/j.janxdis.2008.08.002.

Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin, 138*(4), 775–808. https://doi.org/10.1037/a0027600.

Werner, K. H., Goldin, P. R., Ball, T. M., Heimberg, R. G., & Gross, J. J. (2011). Assessing emotion regulation in social anxiety disorder: The emotion regulation interview. *Journal of Psychopathology and Behavioral Assessment, 33*(3), 346–354. https://doi.org/10.1007/s10862-011-9225-x.

Williams, L. E., Bargh, J. A., Nocera, C. C., & Gray, J. R. (2009). The unconscious regulation of emotion: Nonconscious reappraisal goals modulate emotional reactivity. *Emotion, 9*(6), 847–854. https://doi.org/10.1037/a0017745.