

Spontaneous Suppression of Sad Expressions: Are We Aware of Our Facial Expressions?

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Abstract

The suppression of emotional facial expressions has typically been studied by *instructing* participants to suppress their expressions. However, little is known about participants' *spontaneous* suppression of their emotional expressions. The goal of the present experiment is to determine how well participants can report on their spontaneous suppression of facial expressions to a short video that evokes sadness. Fifty-nine participants were randomly assigned to be in either a private condition, in which they watched the video alone, or a public condition, in which participants believed they were being observed while watching the sad video. Participants' sad expressivity was measured by attaching facial electromyography (EMG) electrodes to their left *corrugator supercilii* muscle. After watching the film, participants reported their negative affect, suppression of emotional expressions, and amplification of their emotional expressions. Participants in the private and public groups did not differ in how much expressive suppression they reported, but those in the public group had less sad expressions despite reporting marginally more negative affect. Furthermore, in the private condition, participants' reports of suppression and sad expressions were in the expected direction: as suppression increased, sad expressions decreased ($r = -.328$). In contrast, in the public condition, as participants' reports of suppression increased, their sad expressions also increased ($r = .127$). These data suggest that participants in the public condition were not able to accurately report when they were suppressing their sad facial expressions.

Keywords: facial emotions; expressive suppression; *corrugator supercilii*

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Facial expressions are an essential tool people use to communicate their thoughts and feelings with others, often as a way to garner social and interpersonal support. Van Kleef (2010) has described emotional expressions as being a communicatory interaction that expresses the desires and goals of the expresser. Self-disclosure of emotion has been shown to have many positive benefits including increased self-esteem (O'Connor et al., 2011), distress reduction (Nils & Rime, 2012), reduction in depression (Kahn & Garrison, 2009), and higher subjective well-being (Saxena & Mehrotra, 2010).

Whereas uninhibited emotional expression provides information about the goals, motives, and intentions of the expresser to others, suppression of emotional expressions limits this information and, thus, might result in long term negative outcomes for the individual. Although suppressing emotional expression may be adaptive in some instances, much research has examined the costs of expressive suppression. Gross and Levenson's (1997) findings suggest that for negative emotions, such as sadness, suppressing their expression does not provide relief from the subjective experience of that emotion. In fact, hiding one's negative emotions tends to amplify these negative emotions. They also note that when suppression is habitual, chronic, and inflexible to the social environment, it may affect cognitive processing and compromise an individual's ability to manage challenges. In addition, suppression limits the ability of our social partners to track our needs and desires in our interactions with them. This causes a miscommunication between social partners as normative facial information about our feelings is not shared. Research on emotional suppression has generated many interesting results showing that husbands' habitual use of suppression is a predictor of lower marital quality over time, whereas similarity in emotional suppression between couples was a significant predictor of

marriage satisfaction (Velotti et al., 2016). Furthermore, suppression increased blood pressure responses for both expressor and observer, disrupted communication, reduced rapport and inhibited relationship formation (Butler et al., 2003). Emotional suppression has also been found to be related to anxiety (Dennis, 2007), poor interpersonal functioning (Gross & John, 2003), higher stress-related symptoms including PTSD, anxiety, and depression (Moore, Zoellner & Mollenholt, 2008). In addition, higher levels of suppression predicted lower social support, less closeness to others, and lower social satisfaction during a transition to college (Srivastava et al., 2009).

Factors that Modulate Emotional Expression: Type of Emotion and Relationship to Observer

Although there is much evidence that suppressing our emotional expressions can cause harm, in some instances it can be seen as adaptive to suppress, rather than express emotion (Cosedine, Magai, & Bonanno, 2002). The ability to hide one's feelings is useful in select social situations such as suppressing fear while public speaking, suppressing anger when a policeman pulls you over, and similar situations.

How an individual decides to modulate their emotion is partly determined by their cultural display rules. People in all cultures have display rules (Ekman & Friesen, 1969). These rules help individuals manage and modify their emotional expressions depending on social circumstances. They act as a guide to how to display each type of emotional expression depending on the situation. Whether it is adaptive or maladaptive to suppress emotional expression depends on the type of relationship the observer has to the expresser, and the type of emotion being expressed.

Zemun and Garber (1996) found display rules to be learned in childhood, with children reporting suppression of negative emotions, such as sadness, for self-protection in anticipation of negative interpersonal reactions. This display rule of modulating negative emotions is also seen in adults, with self-reports showing happiness to be the least masked emotion, and sadness to be the most (Matsumoto, Yoo, Hirayama, & Petrova, 2005). Additionally, the relationship one has with an observer is also a consideration. Adults have been found to vary the modulation of their emotions due to their interaction partner (Diefendorff & Greguras, 2009). This is also seen with children, who report that they are more likely to modify emotional expression in the presence of a peer versus being alone or with someone they have a close relationship with, such as a mother or father (Zemun & Garber, 1996). Additionally, a good amount of research has found people express fewer negative emotions with strangers than when alone (Kleck et al., 1976; Kraut, 1982; Yarczower & Daruns, 1982).

There has also been some evidence to suggest that amplification of emotional expression also depends on emotion type and the relationship to the observer. When there is a high level of closeness between the expresser and observer, there was greater amplification of emotions compared to when closeness was low (Diefendorff, Morehart, & Gabriel, 2010). This is also seen in research by Matsumoto et al. (2005) and Matsumoto (1990) who found that expressing emotions was more acceptable when the observers were family and close friends, as compared to when they were casual acquaintances and strangers.

Emotion theorists have viewed the expression of emotions as a balancing act between suppression and amplification. Healthy expression of emotions is linked to flexibility in amplification and suppression of emotional expressions. This ability to be flexible was found to predict long-term adjustment, and although chronically suppressing emotion has adverse

consequences, it can be adaptive in certain situations. The adverse consequences of suppression may stem from a failure to be flexible, leading to habitual suppression (Bonanno, Papa, Lalande, Westphal, & Coiman, 2004).

Instructed Suppression versus Spontaneous Suppression of Emotional Expressions

It would seem that successful flexibility in emotional expression is dependent on knowing what one's face is physically expressing, but are we really able to do that? Much research, (see, e.g., Butler et al., 2003; Gross & John, 2003; Dixon-Gordon, Turner, Rosenthal & Chapman, 2017; Gračanin, Kardum & Hudek-Knežević, 2017; Ehring, Tuschen-Caffier, Schnülle, Fischer & Gross, 2010; Evans, Howard, Dudas, Denman & Dunn, 2013), instructs participants to suppress their expressions, which doesn't tell us about people *spontaneously* suppressing expressions (i.e., doing it without being told). Do people even know when they're spontaneously suppressing emotional expressions? There is some evidence, at least for surprise, that people are not good at knowing their intensity of emotional expression (Reisenzein et al., 2006, 2007).

These questions are important for self-report measures of expressive suppression. To measure this construct, researchers typically ask participants to report on their own expressive suppression. For example, a widely-used measure, the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), taps expressive suppression with items such as, "I control my emotions by not expressing them." However, when using any self-report measure of suppression, researchers are assuming people know they are suppressing their emotional expressions and, therefore, can accurately report on them. However, this critical assumption has never been tested. The goal of the present experiment is to determine whether people can accurately report how well they are suppressing their emotional expressions.

The Present Experiment

This project will focus on participants' spontaneous expressions of sadness. We chose to examine sadness because positive emotions tend to be more freely expressed and, therefore, less likely to be voluntarily suppressed (for a review, see Reisenzein et al., 2013). In addition, we recruited women as participants because they are more likely to report suppressing their emotional expressions (Gross & John, 2003). Finally, we examined whether our participants were more likely to suppress negative emotional expressions under private or public conditions. Researchers have consistently found that people express fewer negative emotions with strangers than when alone (Kleck et al, 1976; Kraut, 1982; Yarczower & Daruns, 1982). Jakobs, Manstead, and Fischer (2001) describe this as a "general display rule" (p. 64).

The purpose of this study was to assess whether participants were able to accurately report on their emotional expressions. Participants were randomly assigned to be in either the public or private conditions while watching a video that has been shown to reliably induce sadness (Gross & Levenson, 1995). They reported their negative affect, suppression of emotional expressions and amplification of emotional expressions. Participants' facial expressions were measured using facial electromyography (EMG). We hypothesize that participants in the public and private conditions will not differ in the amount of negative affect they report. However, we predict that participants will report more suppression of their facial expressions--and actually have less negative expressions--in the public condition than the private condition, because people express fewer negative emotions with strangers than when alone (Kleck et al., 1976; Kraut, 1982; Yarczower & Daruns, 1982).

Method

Participants

Participants were 59 undergraduate students recruited in the psychology department of a mid-sized west coast public university in exchange for extra credit in their courses. Only women were recruited because men and women report differences in how much they suppress their emotional expressions (Gross & John, 2003). Their ages ranged from 18 to 52 ($M = 22.17$, $SD = 5.656$). In this sample, 61% were White, 18.6% were Hispanic or Latino, 8.5% were Asian, 1.7% were native Hawaiian/ Pacific Islander, 1.7% were African American, and 8.5% were more than one race. Participants were randomly assigned to either the public or private condition, which resulted in 29 participants in the public condition and 30 in the private condition. Although they were randomly assigned, participants in the public condition ($M = 20.73$, $SD = 1.741$) were significantly younger than those in the private condition ($M = 23.66$, $SD = 7.659$), $t(57) = -2.036$, $p < .05$. This research was approved by the university's Institutional Review Board.

Materials and Apparatus

Facial electromyography. A Biopac MP 150 data acquisition system with an EMG100C amplifier (Biopac Systems, Inc., Santa Barbara, CA) was used to record EMG signals. Two Ag-AgCl 4mm shielded electrodes were connected to the amplifier and attached to each participant's left *corrugator supercilii* muscle. The AcqKnowledge data acquisition program's sample rate was set to 2000 samples/s.

Video clips. Participants were shown two videos, "Sticks" and "The Champ." The first clip shown was "Sticks." It is 1 min 33 seconds in length and shows an abstract display of colored sticks that pile up. It was used to establish baseline EMG values because it has been shown to elicit minimal emotional response (Fredrickson & Levenson, 1998). The second video clip shown was a 2 minute 44 second long clip called "The Champ" (MGM, 1979). During this

clip, a father is shown dying while his young grieving son cries and frantically asks others to wake up him up. This clip has shown to be reliable in eliciting sadness by Gross and Levenson (1995).

Procedure

Participants were recruited during their psychology classes. During class they reported their demographic information (including age, ethnicity, etc.) and an attachment measure, the Experiences in Close Relationships Revised (ECR-R) by Fraley, Waller & Brennan (2000). Participants were not aware that their demographic information was later used in the experimental manipulation. Participants were scheduled to meet individually at the lab and were randomly assigned to either the private or public condition.

Once at the lab, participants were told that the purpose of the experiment was to understand how people get to know each other when they have a shared experience. For participants in the public condition, several cues were provided to suggest that there was another participant in the adjacent room. The first cues were given when they were waiting in the hallway for the experimenter to bring them in, the adjacent room had a sign that read “Study in Progress” and the sign in the hallway read “Please Do Not Speak to the Other Participant.” Once they were brought in, consent forms were filled out and the head researcher asked the research assistant for the “demographics sheet from the other participant.” When the research assistant gave the demographics form to the participant to fill out, the sheet had spaces for two participants to fill out demographic information and the top half was filled in with confederate demographics that were the same as the participant’s, but showing her age at one year younger. Participants were informed they were in the public condition, meaning there was another person in the adjacent room who would be watching the participant’s face during the duration of the

experiment and that during the second part of the experiment they would discuss the videos. Participants in the private condition did not receive any of these cues suggesting there was another participant. These participants were told they were in the private condition while, right in front of the participant, the researcher checked to make sure the small window connecting the two rooms was closed. Electrodes were attached to participants' left corrugator muscle and they were told they would watch two short videos. For those in the public condition, the experimenter opened the one-way mirror in front of participants so that the other participant would be able to observe. They were told not to interact with the other participant and the experiment began when the experimenters left the room.

The first video clip shown was "Sticks" (1min 33 sec) which was followed by a 30 sec break. They were then shown a video clip from "The Champ" (2 min 44 sec). After *The Champ* finished playing, a screen was shown instructing participants to knock on the table, at which point the researchers came in and removed the facial electrodes. Participants were asked to fill out a survey to indicate how much negative affect they felt to "The Champ" from "no negative emotion" to "extreme negative emotion" (7-point Likert scale). They were also asked how much they suppressed their facial expressions with two items: "I tried not to let my feelings show" and "I tried to suppress my emotions" (both using a 7-point Likert scale) from "strongly agree" to "strongly disagree." Additionally, they were asked how much they amplified their facial expressions with two items: "I tried to amplify my emotional expression", and "I tried to turn up my expression of emotion" (both using a 7-point Likert scale) from "strongly agree" to "strongly disagree". Lastly, participants were asked to fill out post-experiment control questions. Most items were bogus (e.g., asking about whether the temperature of the room was comfortable), but the real item of interest was "I suspect there was not another participant in the other room" using

a 7-point Likert scale. Participants who responded with 6 or 7, indicating significant suspicion, were removed from all later data analyses. Participants were thanked, debriefed, and given extra credit slips.

Results

Mean corrugator activity at baseline (during the neutral “Sticks” video) was not significantly different between the public and private groups, $t(57) = -.336, p = .738$. Mean corrugator activity significantly increased for all participants from baseline ($M = 5.90 \mu\text{V}, SD = 3.57$ for the neutral video) to the sad video ($M = 8.51 \mu\text{V}, SD = 4.47$ for *The Champ*), $t(58) = 7.996, p < .001$, suggesting that the video was effective in evoking sad facial expressions under both public and private conditions.

Data were analyzed with a repeated-measures ANCOVA. The within-subjects factor (i.e., repeated-measure) was *mean corrugator activity during the baseline video* (neutral video) and *mean corrugator activity during the sad video* (*The Champ*). The between-subjects factor was *public vs. private conditions*. The three covariates were how much *negative affect*, *expressive suppression*, and *expressive amplification* participants reported to the sad video.

Within-subjects Effects

There was a significant within-subjects (baseline video to *The Champ*) main effect on corrugator activity, $F(1,54) = 4.497, p < .05$. Participants in the private condition had a significantly greater increase in corrugator activity ($M_{\text{increase}} = 3.165 \mu\text{V}, SD = 1.127$) than those in the public condition ($M_{\text{increase}} = 2.063 \mu\text{V}, SD = 0.5$) (see Figure 1).

Between-groups Effects

Although participants in the private condition had a significantly greater *increase* in corrugator activity than those in the public condition (see above), participants in the private

condition reported slightly less negative affect ($M = 4.52$, $SD = 1.184$) than those in the public condition ($M = 5.13$, $SD = 1.33$), although these results were only marginally significant, $t(57) = 1.875$, $p = .066$. Corrugator change and negative affect in the public ($r = .234$) and private ($r = .269$) conditions were both weakly related, but not to a significant degree. There were no differences between public ($M = 5.67$, $SD = 2.746$) and private groups ($M = 5.55$, $SD = 2.983$) in self-reported suppression of emotional expressions, $t(57) = .145$, $p = .88$. There also were no differences between public ($M = 4.47$, $SD = 2.460$) and private groups ($M = 4.48$, $SD = 2.44$) in self-reported amplification of emotional expressions, $t(57) = -.025$, $p = .98$.

Interactions

When the between-subjects factor (public vs. private conditions) and all covariates (negative affect, suppression, and amplification) were entered into the model, only suppression had a significant interaction with between-subjects effects, $F(1,54) = 4.399$, $p < .05$. Given this effect for suppression, its' interactions with other variables were examined more closely.

Near-significant three-way interaction of corrugator change, public vs. private conditions, and reported suppression.

There was an interaction between public vs. private conditions and suppression that was marginally significant, $F(2,54) = 2.91$, $p = .063$, partial eta squared = .097. In the public condition, suppression was positively correlated with change in corrugator activity ($r_{\text{suppression} \times \text{corrugator change}} = .127$). In other words, participants who reported *more* expressive suppression had *greater* sad expressions. In the private condition, suppression was negatively correlated with change in corrugator activity ($r_{\text{suppression} \times \text{corrugator change}} = -.328$). This suggests that expressive suppression reduced sad expressions *only* for those in the private conditions. In contrast, for participants in the public condition, self-reported suppression was associated with *increased* corrugator activity

suggesting they were unable to report accurately on how effectively they were suppressing their facial expressions.

Discussion

The current research examined participants' suppression of sad facial expressions. Whereas most research instructs participants to suppress emotional expressions, the current project examines participants' spontaneous suppression of their expressions. This approach replicated some research, but also produced some novel findings.

Consistent with other research, we found that participants expressed less of a sad expression under a public condition (when they believed they were being observed by a stranger) than when they were in private (Kleck et al., 1976; Kraut, 1982; Yarczower & Daruns, 1982). Unexpectedly, despite expressing less sadness in the public condition, those participants reported slightly more negative affect than those in the private condition, although only to a marginally significant degree. These data support previous research that finds shared experiences are experienced more strongly (Boothby, Clark, & Bargh, 2014). Combined, we found that participants in public condition expressed *less* sadness while reporting *more* negative affect, suggesting they were spontaneously suppressing their sad expressions.

However, the key question is understanding whether participants in the public condition knew they were suppressing their sad expressions. Remarkably, the answer seems to be no. Participants in private and public groups did not differ in how much expressive suppression they reported. Additionally, the data within groups also suggest that participants in the public condition did not know when they were suppressing their expressions. In the private condition, there was a weak relationship between how much participants reported suppressing their sad expression and how much they actually displayed a sad expression ($r = -.328$). Although this

relationship is small, it is in the “right” direction (i.e., as participants increased suppression, their expression of sadness decreased). However, the results for participants in the public condition were different. In that group, perceived suppression of sad expressions was related to increased sad expressions ($r = .127$). Again, although this relationship is small, it is in the “wrong” direction, suggesting that when participants in the public conditions thought they were suppressing their sad expressions, they were actually increasing them.

Methodological Implications

The current research suggests that participants are unable to accurately report on what their own face is doing. Therefore, research based on self-report of emotional expressions is called into question, especially when involving self-report of expressive suppression in public situations (i.e. in the presence of another). As discussed previously, emotional suppression has been linked to many negative life outcomes, but if people can't track their expressive suppression, why are researchers finding so many negative consequences of suppression? It is possible that although participants are not accurate in their self-reported use of expressive suppression, that their attempts to regulate negative emotional expressions (i.e. suppress) when interacting with another person is what is leading to the negative consequences. By attempting to suppress emotional expressions, you are trying to not communicate your emotion, thus removing the possibility of social and interpersonal support. Even if you are indeed still expressing, having removed the possibility of support—at least in the person's view—might contribute to negative consequences such as anxiety, depression, and lower self-esteem.

Theoretical Implications

However, the bigger implication of this research suggests a startling possibility: what if each of us is poorly suited to knowing what our own face is doing in our day-to-day lives? I

probably see my face producing emotional reactions far less than everyone around me. Although I see my face in the bathroom mirror every day, I'm rarely expressing much emotion. Even most photos are carefully posed. Additionally, as discussed above, emotion theorists have viewed the expression of emotions as a balancing act between suppression and amplification, with healthy expression of emotions being linked to flexibility in amplification. The research from this study indicates that maybe we aren't really aware of the amount we are suppressing or amplifying. In this case, how are we able to become flexible in amplification and suppression if we aren't actually aware of our expressions?

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Figure 1:

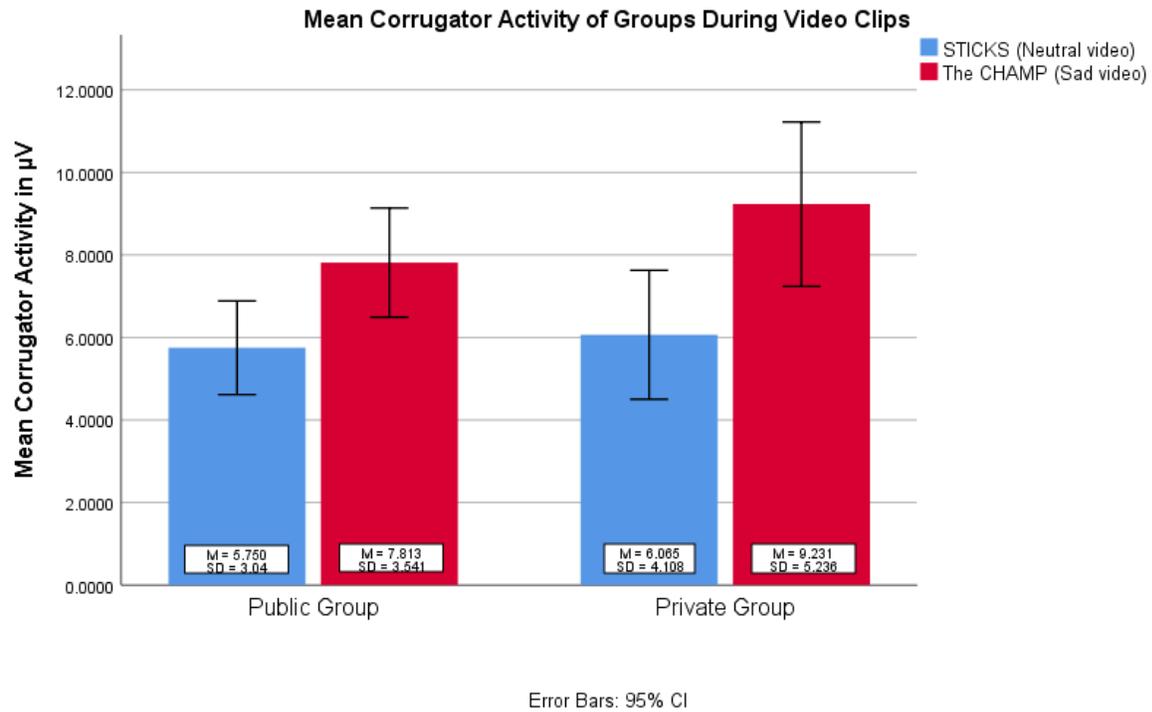


Figure 1. Average corrugator activity in microvolts of the private and public condition groups across both film clips. Error bars are +/- one standard deviation.