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Brief Report

Emotion regulation and peer-rated social functioning: A 4-year longitudinal study

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ABSTRACT

Different emotion regulation strategies have been linked to distinct social outcomes, but only concurrently or in the short-term. The present research employed a 4-year longitudinal design with peer-reported measures of social functioning to examine the long-term social effects of emotion regulation. Individual differences in suppression before entering college predicted weaker social connections (e.g., less close relationships) at the end of college, whereas reappraisal predicted stronger social connections and more favorable sociometric standing (e.g., higher social status). These effects of emotion regulation remained intact even when controlling for baseline social functioning and Big Five personality traits. These findings suggest that individual differences in the use of particular emotion regulation strategies have an enduring impact, shaping the individual's social environment over time.

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1. Introduction

Our social connections powerfully shape our psychological well-being and even our physical health (Baumeister & Leary, 1995; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Past research on the development of social connections has focused on situational factors, such as proximity (Festinger, 1957), or interpersonal factors, such as similarity (Newcomb, 1961). In the present research, we examined the role of emotion regulation in social functioning over the course of 4 years of college.

1.1. Emotion, emotion regulation, and social functioning

Functionalist approaches to emotion emphasize that emotions play a critical role in communicating important information about internal states to others (e.g., Ekman, 1993; Izard, 1990). Knowing how another person feels is crucial for coordinating social interactions and responding appropriately to other persons' needs (e.g., Zaki, Bolger, & Ochsner, 2008). Thus, emotions are central to forming social connections and maintaining long-term relationships (Keltner & Haidt, 1999).

Recent theorizing and research has emphasized that emotions are not passively experienced and expressed but are often regulated. By regulating emotions, individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998, 2002). Research has

shown that emotion regulation plays an important role in shaping not only momentary emotion experience and behavior, but also broader and more enduring features of psychological functioning (see Gross, 2007). Because emotion regulation often occurs in social contexts (Gross, Richards, & John, 2006) and alters emotion processes that are implicated in social interactions, we investigated whether and how emotion regulation affects social outcomes.

1.2. Social effects of suppression and reappraisal

Although emotion regulation is thought to be important in facilitating social interactions, there are many different ways to regulate emotion, and some may be more beneficial than others. Two forms of emotion regulation have received particular attention recently (Gross, 1998): *expressive suppression* (inhibition of the behavioral component of an emotion after an emotional response has been elicited), and *cognitive reappraisal* (modifying the meaning of an event in order to influence emotion experience). One key finding is that there are systematic individual differences in the use of suppression and reappraisal, and it has been hypothesized that these differences have distinct implications for social functioning (Gross & John, 2003).

In considering the social effects of emotion regulation, we distinguish between social connection (e.g., closeness) and sociometric standing (e.g., liking, social status). Sociometric evaluations from one's social network are theoretically distinct from ratings of social connection, as it is possible to make positive impressions on someone without forming a close relationship with them. Closeness requires sharing important personal information (Reis & Sha-

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ver, 1988), but positive sociometric evaluations do not (Anderson, John, Keltner, & Kring, 2001). For example, liking ratings can reach a reliable social consensus even in “zero-acquaintance” situations, well before closeness is even possible (Back, Schmukle, & Egloff, 2010).

Suppression may be a risk factor for social problems because it interferes with the natural expressions of emotions that signal relational interest and investment (Tickle-Degnan & Rosenthal, 1990). In addition, suppression involves continuously monitoring one's own emotional expressions so it may prevent the regulator from fully attending to their interaction partners and lead to behavior that appears somewhat distracted (Butler et al., 2003). To the extent that suppression interferes with the natural display of emotion, interaction partners may feel they know suppressors less well and feel less close to them, but not dislike them; indeed, on the liking continuum, unfamiliar others tend to be seen as relatively neutral (John, Hampson, & Goldberg, 1991). Thus, we predicted that suppression would interfere with the formation of close social connections, but would not be detrimental for sociometric standing. In contrast, reappraisal may serve as a protective factor because reappraisers experience and express more positive emotions (Gross & John, 2003), and as a result they may be more pleasant to be around (Anderson, Keltner, & John, 2003; Hatfield, Cacioppo, & Rapson, 1994). Consequently, we expected that reappraisal would facilitate social connections and also lead to higher sociometric standing.

There is some initial evidence in support of these predictions about the effects of suppression and reappraisal on social functioning. Butler et al. (2003) found that experimentally induced suppression disrupted social interactions with a previously unacquainted partner, leading to increased blood pressure in the suppressor's partner and reduced rapport, but found no such effects for reappraisal. Using an individual differences approach, Gross and John (2003) found that habitual use of suppression was correlated with lower levels of social connection, such as social support and relationship closeness, but not with liking. In contrast, reappraisal was positively correlated with peer-rated social connection and likeability. In addition to these concurrent effects, Srivastava, Tamir, McGonigal, John, and Gross (2009) found that suppression predicted lower levels of social connection (e.g., social support, closeness) 3 months later, but did not predict liking; the longitudinal effect of reappraisal were not examined.

Overall, there is growing evidence suggesting that emotion regulation can have various social consequences. However, because past work has focused on concurrent (Butler et al., 2003; Gross & John, 2003) or short-term (3-months later; Srivastava et al., 2009) effects, it remains unclear whether there are *enduring* effects of emotion regulation on social functioning. In addition, although reappraisal seems to be less social costly than suppression, more evidence is needed to determine whether reappraisal has a positive social impact. In order to better test these ideas, it is critical to get data from actual social networks members (e.g., peers) rather than relying on self-reports of social functioning.

Self and peer reports each provide valid but complementary information (Vazire & Mehl, 2008). Unlike independent observers or strangers in the lab, peers have the unique opportunity to observe the target in a wide range of settings in day-to-day life, providing an important window into the social functioning of the target. One of the limitations of self-reports is that they may reflect, in part, the perceptions of the individual rather than the “reality” of the social environment. In addition, it is difficult to accurately gauge sociometric standing through self-reports; peer-reports are needed to assess this important dimension of social functioning. Although past work has examined how emotion regulation is linked to a variety of social connection variables, liking is the only sociometric variable that has been examined so far. Reap-

praisal has been found to predict liking, and suppression has not, but it is unclear whether these effects extend to other core sociometric variables, such as social status, which is conferred to the individual by the group (Anderson et al., 2001).

1.3. Present research

In the present research, we report results from a 4-year longitudinal study of the role of suppression and reappraisal for social functioning. We studied the social effects of emotion regulation in a theoretically meaningful developmental period that marked the beginning and end of a major life stage for these participants, namely college. During this time, students must create a new social network while learning to deal with a novel set of emotional challenges. We expected that emotion regulation would act as a risk (or protective) factor for social maladjustment during college.

We focused on peer-reports of two core aspects of social functioning: social connection (closeness to others and interpersonal warmth) and sociometric standing (liking and status in their peer group). We expected suppression to predict weaker social connections, but not sociometric standing. In contrast, we expected reappraisal to predict higher levels of both aspects of social functioning. Finally, in terms of the Big Five personality traits (John, Naumann, & Soto, 2008), individual differences in reappraisal use tend to be modestly correlated with low neuroticism and suppression use with low extraversion (Gross & John, 2003). Therefore, we tested whether the link between emotion regulation and social functioning could be explained by these broader personality dispositions.

2. Method

2.1. Participants

From a larger study of personality and adjustment to college, we studied a subset of $N = 276$ students (61% female; time 1 mean age = 18 years) who completed an emotion regulation measure during the summer before their freshman year of college and had at least one peer-report of social functioning during their senior year of college. They were diverse in terms of ethnicity (African American 6%, Asian-American 36%, Caucasian 60%, Latino 9%, Native American 5%, and Other 4%); these percentages sum to over 100% because some participants self-identified as more than one ethnicity.

2.2. Procedure

Individual differences in emotion regulation use and in personality were assessed in a questionnaire that was mailed to participants the summer prior to freshman year. In the last term of senior year, participants nominated up to three peers who knew them well; peers were then contacted directly to obtain ratings of the target person. On average there were two peer ratings per participant. Over 90% of peer ratings came from participants' social networks at their home university (i.e., fellow students). Peer reports were also available at the first term of freshman year for a subsample of 68 participants, allowing us to control for baseline social functioning. Those with peer data at both time points scored higher on conscientiousness than those with peer data only during senior year, $t(274) = 2.57, p < .05$. Otherwise, there were no other significant differences between these groups in terms of baseline emotion regulation, baseline Big 5 personality, or end-college social functioning.

Table 1
Descriptive statistics and zero-order correlations among emotion regulation and peer-rated social functioning variables.

Social functioning at end of college	Emotion regulation before college		Peer-rated social connection		Peer-rated sociometric standing	
	Suppression	Reappraisal	Interpersonal warmth	Closeness to others	Social status	Likeability
<i>Social connection</i>						
Interpersonal warmth	-.16	.24	–	–	–	–
Closeness to others	-.25	.16	.49	–	–	–
<i>Sociometric standing</i>						
Social status	-.23	.18	.34	.31	–	–
Likeability	-.08	.17	.44	.33	.48	–
Mean	35.7	62.5	77.3	82.9	71.9	84.9
SD	16.2	16.8	14.7	17.1	16.4	15.2

Note: Primary analyses using multi-level modeling are presented in Table 2. The correlations reported here are across 4 years for emotion regulation assessed before college and peer-rated social functioning at the end of college. To obtain reliable estimates, peer-rated social functioning variables reflect composites created by averaging across all available peers for each individual with at least two peer reports ($N = 178$). Correlations with absolute values greater than .15 were significant at $p < .05$. Scores on all measures were rescaled to be comparable, with a theoretical range from 0 to 100 (Cohen, Cohen, Aiken, & West, 1999).

3. Measures

3.1. Emotion regulation

Individual differences in reappraisal and suppression were measured with the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), a brief research instrument that has been widely used and extensively validated (see also John & Gross, 2004). The ERQ items were carefully constructed to focus solely on the intended emotion regulation process and to avoid confounding with consequences for affect, well-being, or social functioning. The reappraisal scale includes six items (e.g., “I control my emotions by *changing the way I think* about the situation I'm in”), and the suppression scale includes four items (e.g., “I control my emotions by *not expressing them*”). Participants rated their agreement with each item on scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). For reappraisal, alpha was .83; for suppression, alpha was .69.

3.2. Social connection

Interpersonal warmth was assessed with the item “To what extent has X felt affectionate, loving, warm/caring towards others over the past 2 months?” using a scale from 0 (*not at all*) to 4 (*extremely*). *Closeness to others* was assessed by having peers rate their agreement with the item “X has close relationships with others” on a scale from 1 (*disagree strongly*) to 5 (*agree strongly*). To index agreement among peer ratings we calculated intraclass correlations (ICCs) from the intercept and residual variances in the baseline model (i.e., including the random effect of intercept but no predictors). These ICCs, which are comparable to pairwise inter-rater agreement correlations in a classical reliability analysis, suggest there was moderate agreement among the peers for interpersonal warmth (ICC = .23) and closeness to others (ICC = .35).

3.3. Sociometric standing

Following Anderson et al. (2001), *social status* was assessed with the item “X has high social status (commands respect and influences others).” Agreement with this statement was rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Following Gross and John (2003), *likeability* was assessed by averaging the items “(X) is the kind of person almost everyone likes” and “(X) is someone people really enjoy spending time with”. Agreement with each item was rated on a scale from 1 (*disagree strongly*) to 5 (*agree strongly*). These two likeability items were averaged to form a peer-rated

likeability index; alphas were .84 in the first assessment and .72 in the second. ICCs were .33 for social status and .49 for likeability.

3.4. Big Five personality

The Big Five Inventory (BFI; John, Naumann, & Soto, 2008) was used to assess the Big Five personality dimensions during the summer before college. Participants were asked to indicate their agreement with each item on a scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). Alphas were .89 for extraversion, .79 for agreeableness, .78 for conscientiousness, .85 for neuroticism, and .78 for openness.

4. Results

Descriptive statistics and zero-order correlations among the main study variables (i.e., emotion regulation before college and social functioning at the end of college) are reported in Table 1.

To test whether emotion regulation predicted future social functioning, we used a two-level model in HLM, in which peers were nested within persons, using maximum likelihood (ML) estimation to account for missing baseline data. For each outcome variable, we first fit a Model 1 predicting the end-college social indicator from suppression and reappraisal assessed 4 years earlier, before even entering college.¹ In Model 2, we controlled for baseline peer-ratings of the relevant social indicator. The simple cross-time associations from Model 1 and the cross-lagged regression coefficients from Model 2 for each outcome variable are both reported in Table 2. In addition, in a Model 3 we also controlled for baseline Big Five personality in order to take into account any potential overlap between emotion regulation and broader personality dimensions prior to college (see Table 2).

4.1. Social connection

As expected, suppression prior to college predicted lower peer-rated social connection 4-years later (i.e., at the end of college), whereas reappraisal predicted better social connections across this time period. Notably, there were significant effects of suppression and reappraisal on social connection even when controlling for baseline social connection, suggesting these emotion regulation

¹ To take into account the potential overlap between the emotion regulation strategies and test for interactive effects, we initially included reappraisal, suppression, and their interaction as predictors. Consistent with previous research (e.g., Gross & John, 2003), none of the interaction effects were significant, so we report the results of analyses without the interaction term included.

Table 2
4-Year longitudinal effects of emotion regulation assessed before college on peer-rated social functioning at the end of college.

Social functioning outcomes	Emotion regulation	
	Suppression	Reappraisal
<i>Social connection</i>		
Interpersonal warmth		
Model 1: Simple cross-time effects	-.15 (.06) [*]	.16 (.05) [*]
Model 2: Controlling for baseline interpersonal warmth	-.21 (.08) [*]	.25 (.10) [*]
Model 3: Controlling for baseline warmth and Big 5	-.20 (.09) [*]	.25 (.12) [*]
Closeness to others		
Model 1: Simple cross-time effects	-.15 (.06) [*]	.13 (.06) [*]
Model 2: Controlling for baseline closeness to others	-.21 (.10) [†]	.37 (.12) [*]
Model 3: Controlling for baseline closeness and Big 5	-.24 (.10) [*]	.41 (.14) [*]
<i>Sociometric standing</i>		
Social status		
Model 1: Simple cross-time effects	-.09 (.06)	.14 (.06) [*]
Model 2: Controlling for baseline social status	-.02 (.10)	.37 (.12) [*]
Model 3: Controlling for baseline social status and Big 5	-.06 (.09)	.59 (.13) [*]
Likeability		
Model 1: Simple cross-time effects	.06 (.06)	.10 (.06) [*]
Model 2: Controlling for baseline likeability	.09 (.10)	.22 (.12) [*]
Model 3: Controlling for baseline likeability and Big 5	-.01 (.08)	.40 (.11) [*]

Note: Unstandardized HLM coefficients (with standard errors listed in parentheses) from analyses predicting social functioning at the end of college from suppression and reappraisal assessed before college (i.e., simple cross-time effects), after controlling for the peer-rated social indicator at baseline, and after controlling for both baseline social and Big 5 personality. Scores on all measures were rescaled to have a theoretical range from 0 to 100 (Cohen, Cohen, Aiken, & West, 1999) in order to transform the HLM coefficients into a more interpretable metric.

^{*} $p < .05$.

[†] $p < .10$.

processes were associated with changes in social functioning across college. These effects remained intact when controlling for Big Five personality.

4.2. Sociometric standing

As expected, reappraisal prior to college was associated with higher end-college sociometric standing. These effects remained largely intact when controlling for baseline sociometric standing and Big 5 personality, suggesting habitual use of reappraisal was associated with improvements in social status and likeability. In contrast, suppression did not relate to sociometric standing ($ps > .14$). Thus, although peers felt less warmth and closeness with participants using suppression, they did not dislike them or afford them lower status.

5. Discussion

These findings provide evidence that emotion regulation at the start of college, when new social connections are forming, can predict the quality of those connections 4 years later. Specifically, suppression predicted decline in some aspects of social functioning, while reappraisal predicted improvements. By examining a range of social functioning indicators, the present research revealed the unique long-term effects of reappraisal and suppression on different social outcomes. Suppression predicted poorer social connection 4 years later, but it was not related to sociometric standing. Thus, suppression seems to interfere with the development of close bonds, but does not necessarily hinder an individual's ability to make a positive impression on others or attain social status. In contrast, reappraisal was associated with beneficial outcomes for both social connection and sociometric standing. Thus, chronic reliance on suppression may reduce an individual's chances of making close friendships during college, whereas habitual use of reappraisal may facilitate the development of close bonds and increase the

individual's chances of being seen favorably by their peers. Notably, these long-term effects of individual differences in emotion regulation were evident even when taking into account the broader personality factors represented by the Big Five.

Future research is now needed to isolate the mechanisms responsible for the distinct patterns of interpersonal effects of reappraisal and suppression identified here. Other research has suggested that reappraisal may facilitate social bonding as a result of increased experience or expression of positive emotion, whereas the adverse social effects of suppression may be due to the mismatch between inner experience and outer expression of emotion (i.e., authenticity; English & John, in press). More work is also needed to explore whether emotion regulation has similar effects in different parts of the lifespan, or whether the effects described here are limited to young adulthood or other transitions when social functioning may be particularly malleable.

In addition, it will be important to take into account the regulation context, especially characteristics of others present and the specific emotions being regulated, because some strategies might be better suited for specific contexts or emotions. For instance, there are likely times when suppression may promote more harmonious interactions (e.g., when suppressing anger with your boss). Although our results suggest that suppression can erode relationship quality when it is used chronically, suppression may not have the same negative consequences if it used sparingly and in the appropriate contexts (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004). Similarly, reappraisal may not always be beneficial for social functioning (e.g., when it chronically interferes with realistically processing important relationship problems). Experience sampling designs may be particularly useful for examining these contextual effects.

It should be noted that these findings are potentially limited by the fact that participants nominated the peers. The peer-ratings may be positively biased, thus restricting the negative range of peer ratings and potentially underestimating the effect sizes observed here (Leising, Erbs, & Fritz, 2010). In addition, the design

we used does not allow for absolute causal claims but it does demonstrate how emotion regulation can predict important long-term adjustment outcomes. Future studies with more assessment points that have shorter time intervals are needed in order to fully understand the links between emotion regulation and social functioning.

In sum, the present research provides evidence that emotion regulation processes can powerfully shape the social environment. Early emotion regulation efforts can set the stage for later social experiences, either (in the case of suppression) putting the individual at risk for social maladjustment or (in the case of reappraisal) facilitating their chances of making close friendships and being seen favorably by their peers. Social connections provide an important means of support to cope with the inevitable stressors of college. Students who are unable to develop and maintain social bonds may fair worse in terms of overall well-being. Our findings suggest that emotion regulation may prove to be a key factor in predicting which students will do well and which will not.

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