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Social Psychology

# Social Affect Regulation in University Students During the COVID-19 Pandemic

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Given how much time humans spend in social contexts, interest has been growing in socially mediated forms of affect regulation. Historically, though, research on affect regulation has focused on individual forms of regulation, such as cognitive reappraisal. To address this gap, we investigated social affect regulation in university students through an online survey, with a particular focus on social reappraisal. Specifically, we tested whether the frequency with which students communicate with their social contacts is related to how much social reappraisal support they receive from those contacts, and whether social reappraisal support is associated with mental health. Our final sample consisted of 152 undergraduates from across North America who reported on a total of 1,124 social contacts. We consistently found that communication frequency was positively associated with perceived social reappraisal support across several modalities of communication (e.g., text-based, video-based, in-person). However, we observed no associations between levels of social reappraisal support and measures of mental health. This research was part of a preregistered project on social affect regulation in university students in the context of the COVID-19 pandemic (https://osf.io/q7bvw/). Thus, we present findings in relation to this context. These findings underscore that social forms of affect regulation play a significant role in university students' lives, emphasizing the value of further research into their mechanisms and effects.

## 1. Introduction

In affective science, interest has been growing rapidly in socially mediated forms of affect regulation, but basic research in this area is still in early phases (Grecucci et al., 2015; Sahi et al., 2020; Zaki & Williams, 2013). Historically, research on affect regulation has focused heavily on the ways in which individuals can self-regulate. While such research is valuable, humans spend much of their lives in social contexts (e.g., family, school, shared work environments, personal relationships), which can play an important role in affective processes (Gross et al., 2006; Reeck et al., 2016; Rimé, 2009). Therefore, it is also important to understand the ways in which interpersonal interactions are related to affect regulation.

Within the broad scope of affect regulation, reappraisal is one of the most studied strategies (McRae & Gross, 2020). Reappraisal involves generating a new perspective or interpretation of an emotional event to change its emotional impact. While individuals can generate reappraisals for themselves (e.g., Milyavsky et al., 2019; Ochsner et al., 2002; Shiota & Levenson, 2012), reappraisals can also be generated by or with the aid of other individuals (N. Cohen & Arbel, 2020; Powers et al., 2022; Sahi et al., 2020). This social form of reappraisal is likely common in everyday life, as individuals often seek out emotional support through communication with others (Gable & Reis, 2010; Rimé, 2007; Zaki & Williams, 2013). Nevertheless, little is known about social reappraisal and its impact on mental health.

Social affect regulation support, more broadly, has been positively associated with relationship quality and social standing (Niven et al., 2012, 2015); however, some research has found that recipients tend to favor more direct emotional support (e.g., comforting, reassurance), and may even perceive cognitive support (e.g., social reappraisal) negatively in some circumstances (Nils & Rimé, 2012; Niven et al., 2015; Pauw et al., 2018). The importance of communication modality in social reappraisal is also not well understood (e.g., in-person, text-based, video-based, etc.), although some evidence suggests that for emotional

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support more generally, in-person communication may be more effective than remote communication under certain conditions (Holtzman et al., 2017).

In this study, we investigated social affect regulation in university students through an online survey, with a particular focus on social reappraisal. Social interactions play an especially significant role in the experiences and well-being of university students (Brannan et al., 2013; Gray et al., 2013; Wrzus et al., 2013), and individual reappraisal has been studied extensively in this population (e.g., Andreotti et al., 2013; Gross & John, 2003; Krafft et al., 2019; Zarotti et al., 2020), making it an ideal population for early investigations into social reappraisal. Our preregistration of this study (https://osf.io/q7bvw/) included a broad set of hypotheses. In this article, we focus on the following subset of hypotheses: (1) frequency of communication with core social contacts would be positively associated with perceived social reappraisal support from those contacts, and (2) changes in social reappraisal support since the pandemic would be negatively associated with mental health symptoms. These hypotheses were tested separately by several communication modalities. We address all other preregistered hypotheses and describe any deviations from the preregistration in the Supplementary Material.

## 2. Material and Methods

### 2.1. Participants

Undergraduates across North America ($N$ = 193) were recruited using the Prolific online data-collection service (www.prolific.co). We aimed to achieve a final sample size of approximately 150 participants after all data exclusions based on available funding. Eligibility criteria included current enrollment in an undergraduate degree program at a North American university. Participants completed the study between August 4 and September 7, 2021 and were compensated approximately $10 per hour for participation. All participants completed informed consent, and all study procedures were approved by the Institutional Review Board of the University of Denver.

After data collection, several preregistered exclusion criteria were applied to ensure the quality of the data set. First, data were excluded from participants who exited the survey before completion ($n$ = 14). Second, data were excluded from participants who failed one or both attention check items included in the survey ($n$ = 8; see section 2.2 below for details). Third, data were excluded from participants who completed the survey in less than 20 minutes ($n$ = 19); based on pilot testing, attentive completion of all survey materials was expected to take approximately 30-60 minutes. Therefore, the analyses and results presented below are based on a final sample of 152 participants. See Table 1 for a summary of demographic characteristics.

Sensitivity power analyses were performed with G*Power (version 3.1.9.4; www.psycho.uni-duesseldorf.de/abteilungen/aap/gpower3/). These analyses compute the minimum effect size we had the sensitivity to detect given the sample size ($N$ = 152), testing type (two-tailed), and specified values of alpha (.05) and power (80%). These analyses indicated we had the sensitivity to detect an effect size of $d$ = 0.23 (near the conventional value for a small effect [0.2]) using a one-sample $t$ test. For the set of 20 planned correlation tests, we used a value for alpha adjusted for multiple testing (.002; see section 2.3 below for more details). Thus, using a correlation test, we had the sensitivity to detect an effect size of $r$ = .25.

**Table 1. Demographic Characteristics**

| | |
|---|---|
| Age | 20.4 ± 3.3 |
| Sex | |
| Female | 136 |
| Male | 16 |
| Gender | |
| Man | 17 |
| Non-binary | 3 |
| Woman | 132 |
| Race | |
| African American | 10 |
| American Indian or Alaskan Native | 0 |
| Asian | 5 |
| Caucasian | 123 |
| Multiracial | 8 |
| Native Hawaiian or Pacific Islander | 1 |
| Ethnicity | |
| Hispanic/Latinx | 22 |
| Not Hispanic/Latinx | 129 |

*Note.* Some participants did not report race or ethnicity.

### 2.2. Procedure and Questionnaires

Participants completed all procedures for this study through an online survey in a single session lasting approximately 40 minutes. After completing informed consent, participants completed a demographics questionnaire, a battery of psychometric questionnaires, and two sets of custom items for this study. The battery of psychometric questionnaires included the following measures of mental health: the Perceived Stress Scale (PSS; reliability coefficient alpha of .88 in the current study) assessing perceived stress over the last month (S. Cohen et al., 1983), the Beck Depression Inventory-II (BDI-II; alpha of .88) assessing depressive symptoms over the past two weeks (Beck et al., 1996), the trait scale of the State-Trait Anxiety Inventory (STAI; alpha of .90) assessing trait-level tendencies associated with anxiety (Spielberger et al., 1983), and the 14-item Short Health Anxiety Inventory (SHAI; alpha of .92) assessing recent health anxiety symptoms (Salkovskis et al., 2002).

We refer to the first set of custom items as the Pandemic Coping Questionnaire. Participants were asked to list the 3-5 mental or behavioral actions or experiences they have personally found to be the most helpful for coping with distress during the pandemic. Additional items from this questionnaire are described in the Supplementary Material. We

refer to the second set of custom items as the Social Network and Reappraisal Questionnaire. This questionnaire first asked participants to identify 5-10 social contacts with whom they communicate regularly or at least occasionally (by any communication modality). Across the 152 participants, 1,124 contacts were identified. For each contact, the participant was asked to rate pre-pandemic and peri-pandemic frequency of communication on a scale from 1 to 7 (1 = *less than once a month*, 2 = *about once a month*, 3 = *a few times a month*, 4 = *about once a week*, 5 = *a few times a week*, 6 = *about once a day*, 7 = *several times a day*). Also for each contact, participants were asked, "How helpful is talking with [contact name] for helping you to find more positive (or less negative) ways to think about negative situations generally?" on a scale from 1 (*never helpful*) to 7 (*very often helpful*; we refer to this rating hereafter as *social reappraisal support*). For each of these questions, participants were asked to provide separate ratings for text-based communication (e.g., texting, instant messaging, email), voice-based communication (e.g., phone calls, voice communication through online gaming), video-based communication (e.g., video conferencing), in-person communication, and overall communication (note, overall communication was a separate rating, not a composite measure). Since ratings were provided separately for each communication modality, a response option of *N/A* was provided for social reappraisal support ratings, if the participant never communicated with the contact via that modality.

Two attention check items were interspersed within the study survey. These items directed participants to select a particular response from the response options. Failing either of these items was taken as evidence of non-conscientious responding and these participants were excluded.

## 2.3. Analyses

For multilevel models and $t$ tests, we used $p < .05$ as the threshold for significance, with all $p$ values computed for two-tailed tests, as stated in the preregistration. The planned correlation analyses included 20 tests (five communication modalities by four mental health measures, see sections 2.2 and 2.3.1 for more details). Therefore, for these correlation analyses, we employed the method of Benjamini and Hochberg (1995) to control for false discovery rate using the p.adjust function in R (part of the base packages of R Version 4.1.1), resulting in a threshold for significance of $p < .002$ (corresponding to $r > .24$) for two-tailed tests. All analyses described below were included in the preregistration unless otherwise noted as exploratory.

### *2.3.1. Social Reappraisal*

Using data from the Social Network and Reappraisal Questionnaire, we first evaluated Hypothesis 1 by analyzing whether ratings of pre-pandemic communication frequency with contacts were related to their social reappraisal support ratings. Pre-pandemic communication frequency ratings were used as an estimate of communication frequency under typical circumstances (i.e., not during a global pandemic). In exploratory analyses requested during peer-review, we also analyzed whether ratings of peri-pandemic communication frequency were related to social reappraisal support. Finally, as preregistered, we analyzed whether change in communication frequency was related to social reappraisal support. Change in communication frequency was computed as the difference between the peri-pandemic and pre-pandemic communication frequency ratings (peri-pandemic minus pre-pandemic; positive values indicating increases in communication). We estimated separate multilevel models using restricted maximum likelihood to test these relationships for each frequency measure and communication modality. Multilevel models were estimated in R using the package lme4 (Version 1.1.21). For these models, social reappraisal support was predicted as a fixed effect of communication frequency with participant entered as a level 2 variable. Communication frequency measures were participant-mean centered. Social reappraisal support and communication frequency measures were always matched for communication modality within each model. Intraclass correlations confirmed that participant explained sufficient variance in the social reappraisal support measures to support the use of multilevel modeling for these analyses (intraclass correlation values ranged between .27 and .43; Meyers et al., 2013). These data and models also passed a variety of checks for other modeling assumptions including linearity, normality of residuals, and homoscedasticity.

We then estimated and tested changes in net social reappraisal support from these core contacts during the pandemic. The computed change in communication frequency described above was multiplied by an adjusted social reappraisal support rating for each contact to estimate change in social reappraisal support for each contact and communication modality. Social reappraisal support ratings were adjusted by subtracting one from the original ratings, such that the adjusted ratings were on a scale of 0-6 rather than 1-7. This adjustment ensured that the scale of the computed measure would have a meaningful zero point; a computed value of zero would reflect either no change in communication frequency multiplied by any social reappraisal support rating, or any change in communication frequency multiplied by a rating of "never helpful" for reappraisal. We then calculated the mean of these computed measures across contacts to generate an index of average estimated change in social reappraisal support for each participant and each communication modality. As exploratory analyses, we used one-sample $t$ tests to test whether these values differed from zero across participants (zero would correspond to no change in estimated social reappraisal support). Finally, as preregistered, we ran correlation tests between these measures of estimated change in social reappraisal support for each of the five communication modalities and scores from the PSS, BDI-II, STAI, and SHAI to evaluate Hypothesis 2.

### *2.3.2. Coping Responses*

The free-response coping actions and experiences from the Pandemic Coping Questionnaire were coded into categories by two independent coders. The set of categories was

developed in response to the nominated actions and experiences, in an attempt to balance the number of categories with descriptive specificity (see Figure 2). Initially, many responses were coded as *Other*. Groups of responses from the Other category were then coded into their own categories if their nomination frequency was at least equal to the least nominated named category, until a final set of categories was reached. While most responses were ultimately coded into a single category, responses were coded into all applicable categories. For example, the response, "watch movies with my family" was coded into both the Family and Media categories. For more information on the set of categories, see Supplementary Material. The coders had an initial, independent agreement rate of 78%. Discrepancies between the two coders were first resolved through discussion between the coders. After discussion, the agreement rate reached 99%. Remaining discrepancies were resolved by executive decision of the first author (J. P. P., who was not one of the primary coders). For each category, the percentage of participants who gave any response in that category was computed.

## 3. Results

### 3.1. Social Reappraisal

Multilevel models testing the relationship between communication frequency and social reappraisal support are summarized in Table 2. These models indicated that higher communication frequencies both prior to and during the pandemic were associated with greater social reappraisal support ratings during the pandemic, as demonstrated by significant, positive predictor coefficients for all models. Note that the models using peri-pandemic communication frequency as predictors were exploratory and not originally specified in the preregistration. Changes in communication frequency since the pandemic also tended to be positively associated with social reappraisal support. These results support Hypothesis 1. In another exploratory set of analyses, we found significant increases in estimated social reappraisal support during the pandemic across all modalities: overall ($t(151) = 6.57$, $p < .001$, $d = 0.53$), text ($t(151) = 9.68$, $p < .001$, $d = 0.79$), voice ($t(148) = 6.02$, $p < .001$, $d = 0.49$), video ($t(148) = 6.17$, $p < .001$, $d = 0.51$), and in-person ($t(150) = 1.98$, $p = .049$, $d = 0.16$; Table 3 and Figure 1). Preregistered correlation tests between the measures of estimated change in social reappraisal support and measures of mental health yielded no significant associations, demonstrating a lack of support for Hypothesis 2. The full correlation table of these results can be found in the Supplementary Material (Table S3).

### 3.2. Coping Responses

The distributions of free-response coping actions and experiences across categories are presented in Figure 2. Media consumption, social interactions, and exercise were among the most frequently nominated activities. We also collapsed the Family and Non-Family Social categories to examine all socially mediated affect regulation. This combined All Social category (green bar in Figure 2) indicated that 58.9% of participants nominated at least one social action or experience.

## 4. Discussion

These findings bring new insight into the role of social reappraisal and social affect regulation more broadly in the lives of university students. Consistent with Hypothesis 1, we found a positive association between social reappraisal support and communication frequency with regular social contacts. Thus, despite some evidence that cognitive forms of social affect regulation can be received negatively in some circumstances (Nils & Rimé, 2012; Niven et al., 2015; Pauw et al., 2018), social reappraisal seems more prevalent between close contacts who communicate more often in this population. Hypothesis 2 was not supported, as we observed no associations between social reappraisal support and mental health meeting our threshold for significance. Nevertheless, students reported through free response that social interactions generally played a prominent role in their affect regulation during the pandemic.

One of the most novel aspects of this study was its exploration of social reappraisal support in everyday life. Multilevel models consistently identified positive associations between communication frequency and perceived social reappraisal support across communication modalities. These findings support a general association between how often students interact with their social contacts, and how much those contacts provide affect regulation support via reappraisal, although, the direction of causality cannot be inferred from these cross-sectional data. It is conceivable that individuals are inclined to interact more with contacts who provide them with better affect regulation support; or reversing the causal direction, it is also conceivable that more frequent interactions, and potentially deeper relationships, enable more effective social reappraisal support. Longitudinal designs may provide further insight into which causal mechanisms underlie this association.

We did not find any associations between social reappraisal support and mental health symptoms in university students meeting our threshold for significance. Social support, in general, has previously been associated with better mental health in response to stress, although it has not been clear whether such support can be as effective through remote interactions as in-person interactions (Cole et al., 2017; Padfield, 2021; Ybarra et al., 2015). Previous reports have indicated increases in mental health symptoms in undergraduate students during the pandemic (Chirikov et al., 2020), consistent with findings we report on the current sample in the Supplementary Material. Thus, it is possible that any positive influences of social reappraisal on mental health may have been largely outweighed by other negative influences during this unique period. Furthermore, social reappraisal captures only a specific subset of behaviors within the broader affect regulation category of social support. Therefore, it is possible that associations with social reappraisal specifically may have been too small to reach significance in the current sample, whereas associations with social support more broadly might have reached significance, consistent with the previous research noted

**Table 2. Summary of Multilevel Models of Social Reappraisal Support by Communication Frequency**

| Predictor | *b* [95% confidence interval] | *p* |
|---|---|---|
| Prior-pandemic communication frequency—overall | 0.134 [0.092, 0.177] | < .001 |
| Prior-pandemic communication frequency—text | 0.191 [0.143, 0.238] | < .001 |
| Prior-pandemic communication frequency—voice | 0.282 [0.224, 0.340] | < .001 |
| Prior-pandemic communication frequency—video | 0.379 [0.311, 0.448] | < .001 |
| Prior-pandemic communication frequency—in-person | 0.087 [0.043, 0.131] | < .001 |
| Since-pandemic communication frequency—overall | 0.264 [0.214, 0.315] | <.001 |
| Since-pandemic communication frequency—text | 0.377 [0.324, 0.430] | < .001 |
| Since-pandemic communication frequency—voice | 0.382 [0.326, 0.438] | < .001 |
| Since-pandemic communication frequency—video | 0.511 [0.447, 0.575] | < .001 |
| Since-pandemic communication frequency—in-person | 0.126 [0.083, 0.169] | <.001 |
| Change in communication frequency—overall | 0.048 [0.002, 0.094] | .040 |
| Change in communication frequency—text | 0.090 [0.038, 0.142] | <.001 |
| Change in communication frequency—voice | 0.123 [0.056, 0.189] | <.001 |
| Change in communication frequency—video | 0.156 [0.076, 0.236] | <.001 |
| Change in communication frequency—in-person | 0.039 [-0.002, 0.080] | .063 |

*Note*. The outcome variable for each model was the social reappraisal support rating for the same communication modality as the predictor.

**Table 3. Score Means and Standard Deviations**

| | |
|---|---|
| PSS | 21.16 (6.91) |
| BDI-II | 14.67 (8.59) |
| STAI-Trait | 50.30 (11.80) |
| SHAI | 13.51 (7.44) |
| Change in estimated social reappraisal support | |
| Overall | 2.34 (4.39) |
| Text | 2.92 (3.71) |
| Voice | 1.69 (3.43) |
| Video | 2.09 (4.13) |
| In-person | 0.89 (5.55) |

above; however, we were not positioned to test associations with the broader construct of social support in this study.

One of the primary limitations of this study was its cross-sectional design. Having data from this same sample from before the pandemic would have allowed for direct within-subject comparisons and stronger interpretations regarding the effects of the pandemic. The unexpected nature of the pandemic precluded this possibility, making it more difficult to determine which effects may have been influenced by the pandemic and in what ways. Nevertheless, the pandemic constituted a large-scale, natural stressor, providing an especially relevant ecological context in which to study affect regulation processes. The survey for this study also utilized several custom items which have not been previously validated. While the reliability of these items has not been specifically investigated, these items were not developed as scales, but as individual items with high face validity. In other words, these items directly queried the feature of interest rather than trying to assess a latent construct. For example, we asked participants to provide free-response descriptions of how they have coped with stress, and to rate how frequently they communicate with particular social contacts. We have made all of our custom items available with the publicly shared materials for this project.

### 4.1. Conclusions

Although social forms of affect regulation have been studied less than individual forms, they are a substantial component of university students' responses to real-world stressors. Students appear to spend more time interacting with social contacts from whom they receive more social reappraisal support, although the causal direction of this association remains unclear. Students also commonly reported social interactions and activities among their most effective methods for regulating affect during the COVID-19 pandemic. Overall, these findings highlight the relevance of social reappraisal and social affect regulation more broadly in real-world contexts, and underscore the value of further research on these topics.

## Contributions

The authors confirm contribution to the paper as follows: study conception and design: JPP, MB, HF, KM; acquisition of data: JPP, MB; analysis and interpretation of data: JPP, MB, HF, KM; article drafting and revision: JPP, KM. All authors reviewed the results and approved the final version of the article for publication.

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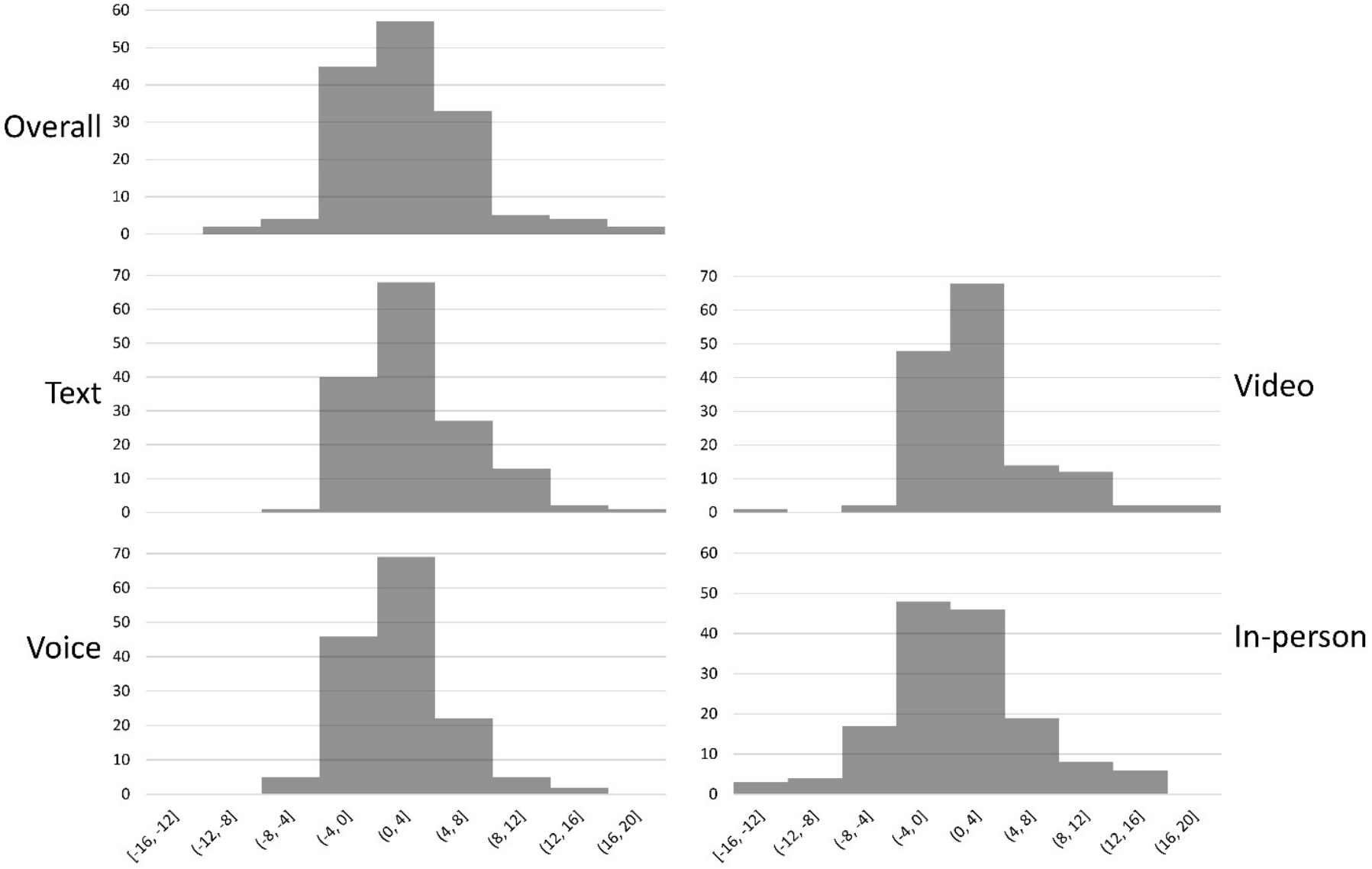


**Figure 1. Histograms of Changes in Estimated Social Reappraisal Support from Core Contacts During the Pandemic**

*Note.* The means of all distributions were significantly greater than zero, indicating average increases in estimated social reappraisal support. See Table 3 for means and standard deviations.

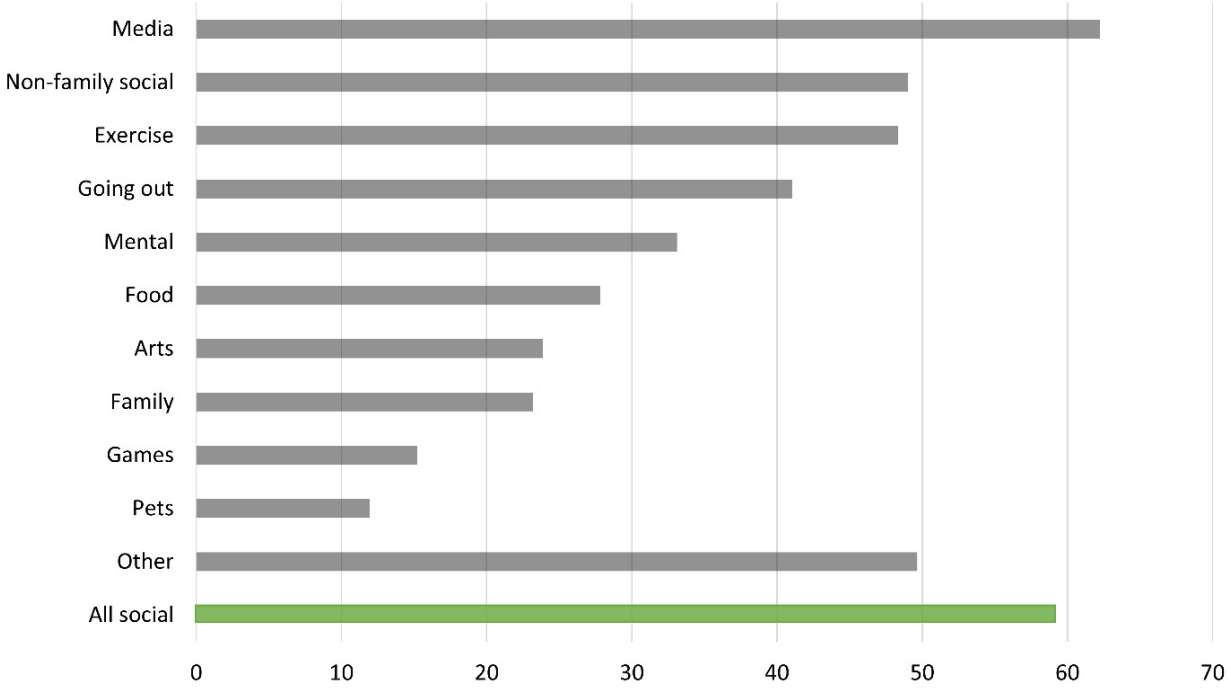


**Figure 2. Coping Nominations as Percentage of Participants Per Category**

*Note.* Values reflect the percentage of participants with at least one response coded into the given category. Responses were coded into all applicable categories. All Social represents the combination of the existing Family and Non-Family Social categories into a single category.

the Pandemic Coping Questionnaire. The research reported here was preregistered with an analysis plan in an independent, institutional registry (https://osf.io/q7bvw/), and this preregistration adheres to the disclosure requirements of the institutional registry.

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## Competing Interests

The corresponding author states on behalf of all authors that no authors have competing interests to declare.

## Data Accessibility Statement

The data sets generated and analyzed in this study are available on the Open Science Framework project page (https://osf.io/q7bvw/). The custom survey items developed for this project, the R code for the multilevel modeling analyses, and the SPSS syntax and output for the correlation and t tests are also available to view at this location. README files are also provided at this location which provide more details about the publicly available data, materials, and code.

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## Peer Review History

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