

# Shared Stressful Situations and Affiliation in Stranger Dyads: An Experimental Analysis

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According to the *tend-and-befriend* theory, shared stressors may create situations in which the inclination to interact with another person (i.e., immediate affiliative desire) is elevated. This may create a situational context in which sustained affiliative responses towards an interaction partner are more likely to occur in the longer-term. In the present study, we randomly assigned 85 undergraduate stranger dyads ( $N = 170$  participants; all women) to either shared stress or shared control experiences and measured immediate affiliative desire. The strangers in the dyads then interacted with one another in a discussion task, and participants' long-term affiliative responses (liking and future intentions to affiliate) were assessed. The evidence suggested that shared stressful experiences (vs. the shared control experiences) promoted significantly more immediate affiliative desire. Furthermore, immediate affiliative desire mediated the association between shared stress and long-term affiliative responses. These findings offer insight into how shared stress may influence friendship development.

*Keywords:* psychological stress, friendship, tend-and-befriend, affiliation, social bonds

Selon la théorie du *tend-and-befriend*, des stresseurs partagés peuvent créer des situations favorisant l'envie d'interagir avec une personne (c.-à-d. le désir immédiat d'affiliation), ce qui peut ensuite favoriser le désir d'affiliation soutenu à long terme. Dans cette étude, 85 dyades d'étudiantes ne se connaissant pas ( $N = 170$  participantes) ont été assignées aléatoirement aux conditions stress partagé ou de contrôle. Le désir immédiat d'affiliation était ensuite mesuré. Puis, il était demandé aux participantes d'interagir avec leur partenaire de dyade dans une tâche de discussion avant que leurs appréciations et intentions futures d'interagir soient évaluées. Les résultats montrent que les expériences où les stresseurs sont partagés (en comparaison avec le groupe contrôle) favorisaient significativement le désir immédiat d'affiliation qui, lui, agissait comme variable médiatrice entre les stresseurs partagés et les réponses affiliatives à plus long terme. Ces résultats offrent des pistes pour mieux comprendre comment les stresseurs partagés peuvent influencer le développement d'amitiés.

*Mots-clés :* stress psychologique, amitié, tend-and-befriend, affiliation, liens sociaux

Stress has been classified as a 21st-century epidemic by the World Health Organization (WHO) and has been widely implicated in deleterious physical and mental health conditions (Fink, 2016). Therefore, it appears that stress is a pervasive and ubiquitous response that causes problems in daily life. However, the outcomes of stressful experiences might not all be negative. Social bonding and affiliative behaviours have been observed in lab situations involving the completion of physically stressful tasks in the presence of other people sharing similar experiences (Bastian et al., 2014). Similarly, exposure to shared psychological stressors may also promote affiliative responses and, further, facilitate personal friendship development in dyads. In other words, the positive effects of shared stressful situations may not be

limited to physical stressors. In daily life, people typically do not experience shared physical pain conditions. Instead, people in similar situations tend to share similar psychosocial stressors, such as university students in similar programs enrolling in the same challenging math course. The present study, therefore, aims to examine whether experiencing a mild shared psychologically stressful event with another person in a more realistic setting can act to promote affiliative responses.

## Friendship Formation

Friendship development has been described as a process that involves revealing personal information to potential friends and receiving personal information from them in return (Altman & Taylor, 1973). This information sharing process as well as the resulting creation of friendship bonds typically progress slowly and gradually over many repeated interactions. Scholars have noted that sharing exceedingly intimate

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personal information, especially too close to the beginning of a new relationship, is perceived negatively by others and carries potential risks, such as social rejection (Chaikin & Derlega, 1974). However, the contexts surrounding the situations in which people affiliate has been found to modulate whether people feel more inclined to affiliate with each other (i.e., immediate affiliative desire), and this can impact how positively the sharing of information is perceived (Greene et al., 2006). For example, engaging in a positive interaction with a potential friend, such as sharing a pleasant meal, may cause more immediate desire to affiliate. Conversely, engaging in a negative interaction with a potential friend, such as getting into a heated debate, may prompt social withdrawal. In the present study, we examined the role of shared stressful contexts in promoting immediate affiliative desire. We also examined whether elevated feelings of immediate affiliative desire in response to the shared stressful context can impact how information sharing is perceived after a discussion task as measured through the lens of long-term affiliative responses, such as liking the other person and wanting to affiliate with them in the future.

### **The Role of Shared Stress in Friendship Formation**

Stress has conventionally been studied as a solitary phenomenon with potentially negative consequences. In response to an acute stressor, a person needs to employ their own physical and psychological resources to cope with it (Lazarus & Folkman, 1984). For example, a student who is preparing for a difficult test needs to manage their feelings of perceived stress by mobilizing their internal resources to reduce the negative emotions associated with stress and then engaging in problem-solving coping strategies, such as studying for the test. Although stress has many long-term negative effects (Beauchaine et al., 2011; Gouin, 2011; McEwen, 2000; Repetti & Wang, 2017; Vitaliano et al., 2002), scholars have noted some positive aspects of the stress response, especially on an acute timescale.

Acute stress has been found to promote affiliative behaviours in certain situations. In several different experimental laboratory studies, including psychophysiological experiments, participants individually exposed to stressful situations have exhibited various affiliative responses, such as trust and sharing behaviours, altruistic behaviours (such as allocating more resources to others in dictatorship games), empathy towards others, and even increased desire for social closeness (Takahashi et al., 2007; Vinkers et al., 2013; von Dawans et al., 2012; von Dawans et al., 2019). For example, Bastian et al. (2014) exposed groups of participants to experience

either a painful or a neutral task and observed that participants in the pain condition reported higher levels of group bonding and loyalty compared to participants that completed the neutral task. On a psychophysiological level, the tend-and-befriend response has been found to be somewhat related to the activation of the hypothalamic-pituitary-adrenal axis, though strong inference into examining these biological pathways has been inconclusive as of the current knowledge in the literature (Margittai et al., 2018; von Dawans et al., 2021). Outside of lab experiments, researchers recorded social responses in situations after communities experienced environmental disasters, such as earthquakes and hurricanes (Rao et al., 2011; Rodriguez et al., 2006). In the wake of these disasters, affiliative responses within the affected communities were elevated in the short-term. Taylor et al. (2000) classified these varied affiliative responses to stressful situations as a unified tend-and-befriend evolutionary response to stress. Instead of mobilizing individual resources to manage a stressor alone, the tend-and-befriend stress response encourages people to reach out to others and cope with the stressor together.

Sharing stressful events with other people, therefore, has the well-documented effect of activating the tend-and-befriend stress response to create general affiliative tendencies; however, there are gaps in the literature. For instance, it has not been established whether experiencing a shared stressful event with one other person, as opposed to a group context, elevates immediate affiliative desire in such a way to encourage long-term affiliative responses. Moreover, many studies in the affiliation and stress literature focus primarily on prosocial help and trust behaviour (Takahashi et al., 2007; Vinkers et al., 2013; von Dawans et al., 2012). Experimental research also tends to use unrealistic and intensive lab procedures to induce psychosocial stress in the examination of stress and affiliation (see Kudielka et al., 2007 for a discussion on the *Triers Social Stress Test*) or to maintain a focus on physical pain and group bonding (e.g., Bastian et al., 2014). Therefore, there is a lack of research examining how psychological stressors can affect dyadic friendship formation processes.

### **Overview and Hypotheses**

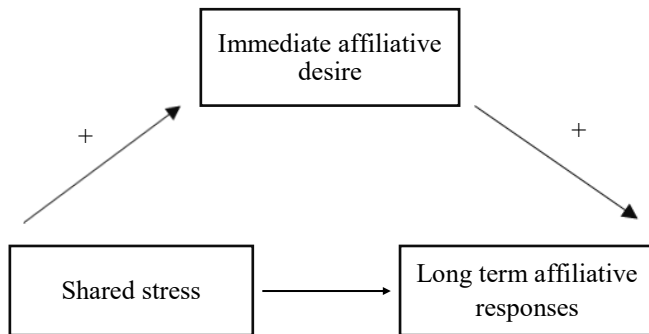
In the present study, we examined whether mild psychological shared stressful experiences in stranger pairs would activate the tend-and-befriend response in a scenario which mimicked a realistic shared stressful event that two university students might experience in their daily lives. This is a novel experiment, as previous research has not assessed whether the tend-and-befriend response can promote the immediate desire to affiliate with another person in the presence

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of a shared psychological stressor. To assess our novel research question, we recruited stranger dyads and randomly exposed them to either shared stress or shared control experiences. We then asked participants within the dyads individually how about their propensity to affiliate with one another (i.e., immediate affiliative desire). We hypothesized that if the tend-and-befriend response was activated by the shared stressful environment, participants exposed to the shared stress condition would report higher immediate desire to affiliate with their partners relative to the control condition. Additionally, as a preliminary test of friendship formation likelihood, we wanted to examine whether immediate affiliative desire as prompted through the tend-and-befriend response to the shared stressful situation could alter an initial interaction between stranger dyads and result in the expression of long-term affiliative responses. Based on the literature consulted, immediate affiliative desire is hypothesized to mediate the relationship between shared stress condition and long-term affiliative responses (see Figure 1).

**Figure 1**

*Proposed Mediation Model*



*Note.* This model proposes that immediate affiliative desire will mediate the association between shared stress and long-term affiliative responses after a discussion task.

Our reasoning behind the mediation model was that in reaction to a realistic shared stressor, such as two university students taking a challenging test together, the tend-and-befriend response may promote more immediate desire to affiliate with people who shared the same experience. Therefore, shared stress could potentially create a situation in which people are more inclined to interact with each other, creating a context in which in-depth self-disclosure is appropriate. As a result of this predisposition, self-disclosure interactions between strangers could become more enjoyable and could generate stronger positive feelings within the dyad and more desire to affiliate.

Given that people tend to evaluate positive feelings in relationships (i.e., reciprocal liking) as one of the most important reasons for developing friendships with others (Sprecher, 1998), this immediate affiliative desire caused by the shared stressful situation might contribute to greater long-term affiliative responses, which could be beneficial for friendship formation.

## Method

### Participants

We recruited 180 participants from a large Canadian University ( $N = 170$  participants included in analysis after exclusionary criteria). All participants were taking first and second-year psychology courses. As part of these courses, students could receive extra credit for participating in research studies posted by various university psychology labs. Two students signed up independently for the same timeslot of a research study purporting to examine how cognitive tests affect interaction among Carleton students. Each of the students received one-percent course credit for participating in the study. As we wanted to make sure that the participants in each dyad were not already affiliated with each other, the study recruitment notice asked students not to sign up with their friends. We also asked the participants in the study procedure to confirm that they were not already friends with their partner in the dyad.

Due to previous research indicating intergender interactions function slightly differently from intragender interactions (Dindia & Allen, 1992), and that women are hypothesized to respond more to the tend-and-befriend response in general (Taylor et al., 2000), only participants who identify as women were recruited. We also wanted to focus solely on friendship development, without the confound of romantic attraction. Therefore, our primary exclusionary criterion was romantic attraction expressed by either partner within the dyad.

Three dyads were eliminated from further analyses due to stated romantic attraction within the dyad, as measured by asking participants at the end of the survey, *Do you feel romantically attracted to the other participant?* One dyad was eliminated from further analyses due to errors within the procedure, such as inattention to the presented math test stimulus. An additional dyad was eliminated due to a participant identifying as a gender other than “woman”. Therefore, 170 participants (85 dyads) were examined in the data analyses.

Out of the 170 participants, 55.9% identified as White, 15.9% identified as Black, 9.4% identified as Asian, 5.3% identified as Middle Eastern, 1.2% identified as Latin, 0.6% identified as Indigenous

Peoples, 11.1% identified as multiracial or self-identified as “other”, and 0.6% refused to answer. The participants’ ages ranged from 17 to 46 ( $M_{\text{age}} = 19.27$ ,  $SD = 2.96$ ).

### Procedure and Materials

The present study was implemented in two parts. In part one, stranger dyads were brought into the lab and exposed for five minutes to either a shared stressful experience (i.e., a hard math test) or a shared control experience (i.e., an easy math test). After writing either of the math tests, the participants individually reported how much they were inclined to interact with their partner, as a measure of immediate affiliative desire. In part two, the stranger dyads engaged in a *get-acquainted discussion task* with each other, where they discussed several personal questions for fifteen minutes. Following the discussion task, participants individually reported whether they liked each other and wanted to interact in the future to measure long-term affiliative responses.

**Shared Stressful Experience Manipulation and Manipulation Check.** Two strangers arrived at the lab for a study they were told was examining how cognitive tests affect social interaction. The participants sat side-by-side at a station with two computers. After completing initial consent forms, the participants filled out basic demographic information and *Positive and Negative Affect Schedule* (PANAS) questionnaires (Mackinnon et al., 1999) assessing their moods. Participants then attempted one of two math tests on the computers for five minutes: both participants completed either easier or more difficult math tests while, regardless of the condition, they were told the tests were very simple (i.e., the difficult math test was used for the stress induction procedure, while the easy math test was used for the control procedure).

The two different versions of tests were created on *Qualtrics*. The easy math test was based on questions from the standardized *Ontario Education Quality and Accountability Office* (EQAO) grade six assessment. The more difficult math test was based on questions from the quantitative section of the *Graduate Record Examinations* (GRE). The easier math test consisted of questions such as, *What is the mean of the following seven numbers?* The harder math test consisted of questions such as, *A hat contains 18 raffle tickets, numbered 1 through 18. If two raffle tickets are chosen at random from the hat, what is the probability that both tickets are even numbers?* The difficult test also included a salient timer for participants, whereas the easier test was only timed by the researcher. Participants were provided with calculators for both versions of the test, and their answers on the tests were not recorded during data collection.

Participants completed the PANAS for a second time after the five minutes had elapsed. The PANAS questionnaire was used as a manipulation check. The questionnaire was comprised of two scales (five positive arousal items and five negative arousal items), with positive items including emotions such as *determined* and *alert*, and negative arousal items including emotions such as *scared* and *nervous*. Participants answered whether they were feeling each of the listed emotions both before and after the math tests on a 5-point Likert scale from 1 (*not at all*) to 5 (*extremely*). Within the present study, Cronbach’s alpha for positive arousal before and after the math test was .82 ( $\omega = .82$ ) and .81 ( $\omega = .86$ ), respectively. Cronbach’s alpha for negative arousal before and after the math test was .75 ( $\omega = .74$ ) and .79 ( $\omega = .88$ ), respectively. Mean positive arousal for the entire experimental sample ( $N = 170$  participants) before the math test was 2.70 ( $SD = 0.80$ ) and after the math test was 2.38 ( $SD = 0.80$ ). Mean negative arousal for the entire experimental sample before the math test was 1.51 ( $SD = 0.56$ ) and after the math test was 1.73 ( $SD = 0.73$ ).

**Immediate Affiliative Desire.** After the shared experiences, participants’ immediate affiliative desire was measured via a modified questionnaire from a previous study on affiliative tendencies (Okken et al., 2013). This measure was modified to conform to participants’ feelings in the current study, as the original measure was more concerned about physical space (e.g., *I felt uncomfortable in sharing personal information inside this room*). The modified questionnaire contained the following four items: *I want to know more about my partner, I feel that I would be comfortable sharing information about myself with my partner, I feel that it would be hard for me to speak about myself with my partner, and I want my partner to know more about me*. Cronbach’s alpha for this measure was .68 ( $\omega = .69$ ). All items were measured on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Mean affiliative desire for the entire experimental sample was 3.38 ( $SD = 0.67$ ).

**Get-Acquainted Task and Affiliation Questionnaires.** The participants were then asked to move to a table where they could engage in a brief discussion session based on a modified version from Aron et al. (1997) *Fast Friends* procedure. In the original *Fast Friends* procedure, participants are asked to talk to each other in a *get-acquainted task* which consists of several questions about themselves that slowly get more personal (low, medium, and high disclosure) over the span of 45 minutes. In this modified task, participants were given a total of fifteen minutes to complete a shorter version of the *Fast Friends* discussion task, which only included low and

medium disclosure questions. This modification was made to decrease the length of the study and, therefore, consider participants' fatigue. The average discussion time for the discussion task for the entire experimental sample ( $N = 85$  dyads) was 8.89 minutes ( $SD = 3.89$ ). When comparing the different conditions ( $N = 43$  shared stress dyads), there was no significant difference between the mean discussion time for the shared stress condition ( $M = 9.35$  minutes,  $SD = 3.60$ ) and the mean discussion time for the shared control condition ( $M = 8.43$  minutes,  $SD = 3.84$ ),  $t(83) = 1.14$ ,  $p = .26$ , 95%  $CI [-41.00, 151.44]$ .

After the task had been completed, participants were instructed to move back to their original seats and complete questionnaires assessing how much they liked their partners and whether they wanted to affiliate with their partners in the future. The affiliative responses measure was a composite of these two different measures. The liking portion of the questionnaires (Montoya & Insko, 2008) presented participants with items such as *I feel warm about my partner* and *I feel friendly towards my partner*, while the future affiliation section consisted of items such as *I would like to keep the conversation going* and *I would like to study with my partner in the future*. Both questionnaires were assessed via a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's alpha for the composite scale was .80 ( $\omega = .82$ ), suggesting substantial internal consistency. Mean affiliative responses for the entire sample was 5.88 ( $SD = 0.71$ ).

### Statistical Analysis

To ensure that the shared stress condition was successful in increasing negative arousal, while either decreasing or not affecting positive arousal, the participants' mood was assessed before and after both the shared stress and control conditions as a manipulation check. This was examined as two separate factorial ANOVA analyses (shared condition X mood pretest/post-test).

For the first analysis, we wanted to examine whether the shared stress condition (relative to the shared control condition) caused participants to individually report more immediate affiliative desire<sup>1</sup>. We used multilevel modeling, specifically the *Actor Partner Interdependence Model* (APIM) (Kashy & Kenny, 1999; Kenny, 1996) to account for the

interdependence of our data (i.e., participants sorted into stranger dyads). This analysis was conducted in R using the "nlme" package (Pinheiro et al., 2021).

For the second analysis, we wanted to test whether there was an association between stress induction and long-term affiliative responses, mediated by immediate affiliative desire. To account for the non-independent dyadic data structure, we used multilevel modeling statistical techniques. As the sample size was low ( $N = 85$  dyads) and the intraclass correlation ( $ICC$ ) for the affiliative responses null model was also low ( $ICC = 0.09$ ), we decided to use *unconflated multilevel modeling* (UMM) instead of *multilevel structural equation modeling* (MSEM) to increase the power of our analysis (Preacher et al., 2011). We also chose to estimate the UMM with random slopes (Bauer et al., 2006) as we had two experimental conditions and we wanted to test whether the conditions would differently impact immediate affiliative desire and, subsequently, long-term affiliative responses. The UMM analysis was conducted using *Mplus* (Muthén & Muthén, 1998-2017). There was no missing data in this sample.

## Results

### Manipulation Check

The 2X2 mixed factorial ANOVA indicated that the interaction between mood pretest/post-test and stress task had a significant effect on negative arousal,  $F(1, 168) = 33.80$ ,  $p < .001$ ,  $\eta^2 = .17$ . Specifically, the shared stress condition produced an increase in participants' negative arousal levels from the pretest to the post-test,  $MD = 0.44$ ,  $SE = .06$ ,  $t(168) = 7.85$ ,  $p < .001$ , while the shared control condition did not produce a pronounced change in participants' negative arousal levels from the pretest to the post-test,  $MD = -0.02$ ,  $SE = .06$ ,  $t(168) = -0.42$ ,  $p = .68$ . A similar 2X2 mixed factorial ANOVA was performed for positive arousal; the results indicated that both conditions decreased positive arousal from pre-to post-test (although the shared stress condition decreased positive arousal by a greater amount). Therefore, the manipulation succeeded in producing psychological stress for the shared stress condition only, while not producing confounding positive arousal emotions in either of the experimental conditions.

### Shared Stressful Experiences and Immediate Affiliative Desire

Consistent with our hypothesis, there was a significant association between shared stress condition and immediate affiliative desire,  $b = 0.28$ ,  $SE = .09$ ,  $t(168) = 3.08$ ,  $p = .002$ , 95%  $CI [0.11, 0.47]$ . Specifically, participants' immediate affiliative desire in the shared stress condition ( $M = 3.51$ ,  $SD = 0.72$ )

<sup>1</sup>We initially tested two serial mediation models, where we separated affiliative responses into liking and future affiliation intentions. However, we could not determine the directionality of the serial mediation. Therefore, we went with the most parsimonious model and combined both liking and future affiliation into a single composite element: long term affiliative responses.

was significantly higher compared to the control condition ( $M = 3.24$ ,  $SD = 0.58$ ). Therefore, there is direct evidence to suggest that shared stress activated the tend-and-befriend response to promote participants' preferences to affiliate in the immediate short-term.

### Shared Stressful Experiences and Affiliative Responses Mediated by Immediate Affiliative Desire

Also consistent with our hypothesis, the unconfated multilevel model produced a significant mediation indirect effect,  $b = 0.19$ ,  $SE = .08$ , 95%  $CI [0.03, 0.34]$ . Shared stress condition significantly predicted more immediate affiliative desire,  $b = 0.28$ ,  $SE = .09$ ,  $p = .002$ , 95%  $CI [0.11, 0.47]$ . Immediate affiliative desire, in turn, significantly predicted more long-term affiliative responses,  $b = 0.38$ ,  $SE = .13$ ,  $p = .004$ , 95%  $CI [0.12, 0.64]$ . However, interestingly, neither the total effect nor the direct effect of shared stress condition on long-term affiliative responses was significant,  $b = 0.20$ ,  $SE = .13$ ,  $p = .12$ , 95%  $CI [-0.05, 0.45]$  and  $b = 0.01$ ,  $SE = .12$ ,  $p = .92$ , 95%  $CI [-0.21, 0.24]$ , respectively. Regardless, as the indirect effect was significant, there was evidence to suggest that immediate affiliative desire was a significant mediator in this model.

### Discussion

The present research is one of the first studies to examine how mild shared psychological stressful experiences can promote affiliative responses specifically within the domain of friendship. Within the present study, we randomized 85 stranger dyads to experience either shared stress or control situations in an experimental lab setting to examine whether shared stress conditions could influence immediate desire to affiliate and, in turn, affiliative tendencies after a discussion task. We first hypothesized that participants in the shared stress condition would express greater immediate affiliative desire tendencies relative to the control condition. We also hypothesized that immediate affiliative desire would mediate the association between shared stress and long-term affiliative responses, such as liking and future affiliation intentions.

#### Immediate Affiliative Desire

In line with our initial hypothesis, the evidence obtained from the present study suggested that participants were more inclined to immediately affiliate with each other in the shared stress condition relative to the shared control condition. Therefore, the shared stressful condition directly impacted immediate affiliative tendencies. According to Taylor et al.'s (2000) tend-and-befriend response, in the presence of

stressors, people reach out to others as a coping strategy to mobilize resources from social allies and maximize their ability to deal with the stressor. However, there may be alternative explanations as to why shared stressful conditions promote more immediate affiliative desires, especially related to attraction and liking. Psychological arousal inherent to the stress response has been found in previous research to affect first impressions regarding attraction and liking (Foster et al., 1998). Although the literature in this area is focused on romantic attraction, stress has been implicated somewhat in influencing non-romantic attraction. If feelings of psychological arousal caused a small boost in attraction (i.e., liking) during the shared stressful condition, this increased attraction may have been driving the desire to be affiliative, not stress itself. Moreover, perceptions of similarity have been shown to predict attraction and liking (Montoya et al., 2008). As both participants within the dyads were experiencing similar situations and were in similar emotional states, the similarity between participants could have been salient and, therefore, provided an initial jumpstart in liking, which could then have acted to promote immediate affiliative desire. Consistent with the concept of emotional similarity, Gump and Kulik (1997) found participant dyads that experienced similar threat situations exhibited more affiliate behaviour (e.g., more eye contact, more mimicry of expressions and body language) than participant dyads that experienced dissimilar threat situations.

#### Long Term Affiliative Responses

Consistent with our second hypothesis, we found evidence to suggest that there was a significant indirect effect such that immediate affiliative desire was a mediator in our model. However, we did not find evidence to suggest that the shared stress condition was directly associated with long-term affiliative responses, such as liking and future affiliative intentions. There were significant differences in negative arousal levels between conditions, suggesting that participants reported experiencing more negative arousal in the shared high stress condition than in the shared low stress condition. However, the absolute value of negative arousal in the shared stress condition was low when considering the 1-5 Likert scale measurement ( $M = 1.90$ ,  $SD = 0.68$ ). The stress induction procedure was possibly not powerful enough to directly predict differences in long-term affiliative responses over time. It is notable, therefore, that the indirect effect was detected and could predict differences in these responses at all. It could be the case that stress directly affected immediate affiliative desire, which then translated behaviourally into more affiliative behaviours during the discussion task. However, the

content of the discussion tasks was not recorded nor assessed in the present study and, therefore, we do not know specifically what occurred during the discussion tasks.

### Strengths of the Present Research

The present study suggests, through the means of a novel experiment, that sharing stressful situations with other people promotes the inclination to affiliate with others. The proposed mediation pathway in the present study provides a broader understanding of how shared stressful situations can prompt long-term affiliative behaviours by examining the mediating role of this elevated immediate affiliative desire. The findings of this study suggest that shared stress can provide valuable and advantageous opportunities to create affiliative bonds with others. A large body of research is dedicated to analyzing the negative effects of stress (Beauchaine et al., 2011; Gouin, 2011; Vitaliano et al., 2002). Although that work is important and can help to improve quality of life and health outcomes, it is also important to recognize that stress is a ubiquitous part of life. It is, therefore, crucial to find and examine any positive consequences and silver linings that may be present from experiencing stressful situations, especially in social contexts.

### Limitations and Future Research

There were several limitations that can be identified in the present study. The dyads were drawn from a convenience sample of students taking similar courses. Although we attempted to recruit random strangers in this study, as these students were taking similar classes, it could have been the case that they interacted with each other, albeit briefly, before the study occurred. As previously discussed, the math test paradigm was not very effective in inducing negative affect. Although the aim of this study was to induce mild, shared stress, it may be the case that long-term affiliative responses require a greater induction of stress to see stronger affiliative impacts. Stress was also operationalized via the PANAS questionnaire to assess high arousal of positive and negative emotions. However, the present study did not measure subjective feelings of stress (e.g., perceived stress) nor how anxiety disorders such as social anxiety that could have impacted the results. Moreover, liking as part of long-term affiliative responses was only measured after the discussion task. The shared stress induction condition may have enhanced liking before the discussion task occurred, which may have acted as a confounding factor involved in experiencing immediate affiliative desire. The measures of the present study could also be improved. These measures were either created or modified for the purpose of the present study and, therefore, have not been rigorously tested for validity. Additionally, the tested internal

reliability and consistency of some of these measures were slightly lower than the thresholds that are usually accepted. Finally, the present research only examined stress and affiliative responses in the short-term related to a single university-specific context.

To address these limitations, there are many avenues for future research. First, it would be beneficial to attempt to find more effective stress induction techniques in the future. For example, dyads may be asked to watch movie clips together or the *Triers Social Stress Test* (TSST) might be modified as a procedure to accommodate milder shared stressful experiences. Additionally, as the present study only examined shared stressful situations, future studies should clarify whether sharing the stressful experience with another person is necessary to promote immediate inclinations to affiliate. Moreover, as the shared stress induction experiment may have enhanced liking and other affiliative responses even before the discussion task occurred, future research should further examine whether shared stress can impact these factors as an alternative explanation to increasing immediate affiliative desire. As responses to Likert scales can be subjective, future research should also aim to record both the discussion tasks and affiliative behaviours after the tasks to analyze if observable behaviours such as body language is different based on shared stress experiences. In addition to recording behaviour during the discussion tasks, future research should seek to replicate the findings of the current study using validated measures for affiliation, such as the inclusion of other in the *self-closeness scale* (Aron et al., 1992). Future research should also aim to expand the scope of the findings, specifically examining whether the affiliative responses predicted the formation of long-term friendships (e.g., 3-months after the experiment), how different people create new friendships (e.g., intergender friendships, same-sex friendships among men, nonbinary and trans-friendships, samples beyond university students, clinical settings), and whether the findings of the present study replicate in different shared and unshared stress contexts (e.g., walking home at night with or without another person present). Finally, as the tend-and-befriend response has been demonstrated to promote immediate affiliative desire, the present study may aid in informing future psychological studies in similar fields that examine connections between individuals, such as loneliness research.

### Implications and Conclusion

Findings from the present study may improve the understanding of how strangers can create high-quality, long-lasting friendships, especially in the face of the increasing stress levels of modern life.

Specifically, how elevated affiliative desire experienced during shared stressful events could act as a spark to facilitate new friendships. Ensuring people have access to friendships and social networks is a valuable strategy to mitigate stress, as friendships can provide people with the social support resources they need to cope with stress (Cohen, 2004). Sias and Bartoo (2007) go as far as to insinuate that social support is the fundamental function of friendship and that interventions to create and bolster friendships should be implemented as health regimens, especially for populations that are vulnerable to the negative effects of stress and/or have difficulties maintaining friendships, such as the elderly. The employment of mild acute shared stressful situations could provide opportunities for creating affiliative bonds in these populations.

In conclusion, the present study found that shared stressful situations can promote affiliative behavior in a setting that university students may experience in daily life. Specifically, immediate affiliative desire prompted by shared stressful exposure to a difficult test mediated long-term affiliative responses, such as liking and future intentions to affiliate with the partner. Although this is not the only important factor in forming new friendships and the negative consequences of chronic stress should not be overlooked, mild experiences of shared stressful situations can act as a potential avenue for friendship formation experiences.

### References

- Altman, I., & Taylor, D. (1973). *Social penetration: The development of interpersonal relationships*. Holt, Rinehart, & Winston.
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the self-scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63(4), 596-612. <https://doi.org/10.1037/0022-3514.63.4.596>
- Aron, A., Melinat, E., Aron, E. N., Vallone, R. D., & Bator, R. J. (1997). The experimental generation of interpersonal closeness: A procedure and some preliminary findings. *Personality and Social Psychology Bulletin*, 23(4), 363-377. <https://doi.org/10.1177/0146167297234003>
- Bastian, B., Jetten, J., & Ferris, L. J. (2014). Pain as social glue: Shared pain increases cooperation. *Psychological Science*, 25(11), 2079-2085. <https://doi.org/10.1177/0956797614545886>
- Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods*, 11(2), 142-163. <https://doi.org/10.1037/1082-989X.11.2.142>
- Beauchaine, T. P., Neuhaus, E., Zalewski, M., Crowell, S. E., & Potapova, N. (2011). The effects of allostatic load on neural systems subserving motivation, mood regulation, and social affiliation. *Development and Psychopathology*, 23(4), 975-999. <https://doi.org/10.1017/S0954579411000459>
- Chaikin, A. L., & Derlega, V. J. (1974). Variables affecting the appropriateness of self-disclosure. *Journal of Consulting and Clinical Psychology*, 42(4), 588-593. <https://doi.org/10.1037/h0036614>
- Cohen, S. (2004). Social relationships and health. *American Psychologist*, 59(8), 676-684. <https://doi.org/10.1037/0003-066x.59.8.676>
- Dindia, K., & Allen, M. (1992). Sex differences in self-disclosure: A meta-analysis. *Psychological Bulletin*, 112(1), 106-124. <https://doi.org/10.1037/0033-2909.112.1.106>
- Fink, G. (Ed.). (2016). *Stress: Concepts, cognition, emotion, and behavior: Handbook of stress series (vol. 1)*. Academic press.
- Foster, C. A., Witcher, B. S., Campbell, W. K., & Green, J. D. (1998). Arousal and attraction: Evidence for automatic and controlled processes. *Journal of Personality and Social Psychology*, 74(1), 86-101. <https://doi.org/10.1037/0022-3514.74.1.86>
- Gouin, J. P. (2011). Chronic stress, immune dysregulation, and health. *American Journal of Lifestyle Medicine*, 5(6), 476-485. <https://doi.org/10.1177/1559827610395467>
- Greene, K., Derlega, V. J., & Mathews, A. (2006). Self-disclosure in personal relationships. In A. L. Vangelisti & D. Perlman (Eds.), *The Cambridge Handbook of Personal Relationships*, (p. 409-427). Cambridge university press.
- Gump, B. B., & Kulik, J. A. (1997). Stress, affiliation, and emotional contagion. *Journal of Personality and Social Psychology*, 72(2), 452-468. <https://doi.org/10.1037/0022-3514.72.2.305>
- Kashy, D. A., & Kenny, D. A. (1999). The analysis of data from dyads and groups. In H. T. Reis & C. M. Judd (Eds.), *Handbook of Research Methods in Social Psychology*.
- Kenny, D. A. (1996). Models of nonindependence in dyadic research. *Journal of Social and Personal Relationships*, 13(2), 279-294. <https://doi.org/10.1177/0265407596132007>
- Kudielka, B. M., Hellhammer, D. H., & Kirschbaum, C. (2007). Ten years of research with the trier social stress test-revisited. In E. Harmon-Jones & P. Winkielman (Eds.), *Social neuroscience: Integrating biological and psychological explanations of social behavior* (p. 56-83). The Guilford Press
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.



- Mackinnon, A., Jorm, A. F., Christensen, H., Korten, A. E., Jacomb, P. A., & Rodgers, B. (1999). A short form of the positive and negative affect schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. *Personality and Individual Differences, 27*(3), 405-416. [https://doi.org/10.1016/S0191-8869\(98\)00251-7](https://doi.org/10.1016/S0191-8869(98)00251-7)
- Margittai, Z., Van Wingerden, M., Schnitzler, A., Joëls, M., & Kalenscher, T. (2018). Dissociable roles of glucocorticoid and noradrenergic activation on social discounting. *Psychoneuroendocrinology, 90*, 22-28. <https://doi.org/10.1016/j.psyneuen.2018.01.015>
- McEwen, B. S. (2000). Allostasis and allostatic load: Implications for neuropsychopharmacology. *Neuropsychopharmacology, 22*(2), 108-124. [https://doi.org/10.1016/S0893-133X\(99\)00129-3](https://doi.org/10.1016/S0893-133X(99)00129-3)
- Montoya, R. M., & Insko, C. A. (2008). Toward a more complete understanding of the reciprocity of liking effect. *European Journal of Social Psychology, 38*(3), 477-498. <https://doi.org/10.1002/ejsp.431>
- Montoya, R. M., Horton, R. S., & Kirchner, J. (2008). Is actual similarity necessary for attraction? A meta-analysis of actual and perceived similarity. *Journal of Social and Personal Relationships, 25*(6), 889-922. <https://doi.org/10.1177/0265407508096700>
- Muthén, L.K., & Muthén, B.O. (2017, april). *Mplus User's Guide*. (8th ed.) [https://www.statmodel.com/download/usersguide/MplusUserGuideVer\\_8.pdf](https://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf)
- Okken, V., Van Rompay, T., & Pruyn, A. (2013). Room to move: On spatial constraints and self-disclosure during intimate conversations. *Environment and Behavior, 45*(6), 737-760. <https://doi.org/10.1177/0013916512444780>
- Pinheiro, J., Bates, D., DebRoy, S., Sarkar, D., & R Core team (2021). nlme: Linear and nonlinear mixed effects models. R package version 3.1-152. <https://CRAN.R-project.org/package=nlme>.
- Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2011). Alternative methods for assessing mediation in multilevel data: The advantages of multilevel SEM. *Structural Equation Modeling, 18*(2), 161-182. <https://doi.org/10.1080/10705511.2011.557329>
- Rao, L. L., Han, R., Ren, X. P., Bai, X. W., Zheng, R., Liu, H., Wang, Z. J., Li, J. Z., Zhang, K., & Li, S. (2011). Disadvantage and prosocial behavior: The effects of the Wenchuan earthquake. *Evolution and Human Behavior, 32*(1), 63-69. <https://doi.org/10.1016/j.evolhumbehav.2010.07.002>
- Repetti, R., & Wang, S. W. (2017). Effects of Job stress on family relationships. *Current Opinion in Psychology, 13*, 15-18. <https://doi.org/10.1016/j.copsyc.2016.03.010>
- Rodriguez, H., Trainor, J., & Quarantelli, E. L. (2006). Rising to the challenges of a catastrophe: The emergent and prosocial behavior following hurricane Katrina. *The Annals of the American Academy of Political and Social Science, 604*(1), 82-101. <https://doi.org/10.1177/0002716205284677>
- Sias, P. M., & Bartoo, H. (2007). Friendship, social support, and health. In L'Abate L. (Ed.) *low-cost approaches to promote physical and mental health*, 455-472.
- Sprecher, S. (1998). Insiders' perspectives on reasons for attraction to a close other. *Social Psychology Quarterly, 61*(4), 287-300. <https://doi.org/10.2307/2787031>
- Takahashi, T., Ikeda, K., & Hasegawa, T. (2007). Social evaluation-induced amylase elevation and economic decision-making in the dictator game in humans. *Neuroendocrinology Letters, 28*(5), 662-665.
- Taylor, S. E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychological Review, 107*(3), 411-429. <https://doi.org/10.1037/0033-295X.107.3.411>
- Vinkers, C. H., Zorn, J. V., Cornelisse, S., Koot, S., Houtepen, L. C., Olivier, B., Verster, J. C., Kahn, R. S., Boks, M. P. M., Kalenscher, T., & Joëls, M. (2013). Time-dependent changes in altruistic punishment following stress. *Psychoneuroendocrinology, 38*(9), 1467-1475. <https://doi.org/10.1016/j.psyneuen.2012.12.012>
- Vitaliano, P. P., Scanlan, J. M., Zhang, J., Savage, M. V., Hirsch, I. B., & Siegler, I. C. (2002). A path model of chronic stress, the metabolic syndrome, and coronary heart disease. *Psychosomatic Medicine, 64*(3), 418-435. <https://doi.org/10.1097/00006842-200205000-00006>
- von Dawans, B., Fischbacher, U., Kirschbaum, C., Fehr, E., & Heinrichs, M. (2012). The social dimension of stress reactivity: Acute stress increases prosocial behavior in humans. *Psychological Science, 23*(6), 651-660. <https://doi.org/10.1177/0956797611431576>
- von Dawans, B., Ditzen, B., Trueg, A., Fischbacher, U., & Heinrichs, M. (2019). Effects of acute stress on social behavior in women. *Psychoneuroendocrinology, 99*, 137-144. <https://doi.org/10.1016/j.psyneuen.2018.08.031>
- von Dawans, B., Strojny, J., & Domes, G. (2021). The effects of acute stress and stress hormones on social cognition and behavior: Current state of research and future directions. *Neuroscience & Biobehavioral Reviews, 121*, 75-88. <https://doi.org/10.1016/j.neubiorev.2020.11.026>

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