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Prosocial Behavior Mitigates the Negative Effects of Stress in Everyday Life

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Abstract

Recent theories of stress reactivity posit that, when stressed, individuals tend to seek out opportunities to affiliate with and nurture others to prevent or mitigate the negative effects of stress. However, few studies have tested empirically the role of prosocial behavior in reducing negative emotional responses to stress. The current analyses used daily diary data to investigate whether engaging in prosocial behavior buffered the negative effects of naturally occurring stressors on emotional well-being. Results showed that on a given day, prosocial behavior moderated the effects of stress on positive affect, negative affect, and overall mental health. Findings suggest that affiliative behavior may be an important component of coping with stress and indicate that engaging in prosocial behavior might be an effective strategy for reducing the impact of stress on emotional functioning.

Keywords

stress, prosocial behavior, mood, daily diary

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Experiences of stress can create vulnerability for a host of mental health problems, including depression (Hammen, 2005; Kessler & Magee, 1994), anxiety (Faravelli & Pallanti, 1989; Kendler, Hettema, Butera, Gardner, & Prescott, 2003), and substance use disorders (Jacobson, Southwick, & Kosten, 2001; Sinha, 2008). Increasingly, studies are showing that the pathogenic effects of life stress are evident not only over long intervals (e.g., months, years) but also on a day-to-day basis. That is, naturalistic stressors can regulate daily fluctuations in affect (Bolger, DeLongis, Kessler, & Schilling, 1989; Mroczek & Almeida, 2004). Nevertheless, it remains unclear what factors might buffer or mitigate the negative effects of stress on mental health.

A substantial body of research suggests that receiving social support alleviates the negative emotional impact of stressful experiences (e.g., Cohen & Wills, 1985; Lepore, Evans, & Schneider, 1991). However, *providing* support might also help individuals to better cope with stress. Providing instrumental and emotional support has been linked to positive emotional and physical health outcomes, including increased positive affect (Dulin & Hill, 2003; Midlarsky, 1991; Schwartz & Sendor, 1999) and decreased rates of mortality (Brown, Nesse, Vinokur, & Smith, 2003).

Prosocial behavior is hypothesized to serve as an effective coping strategy for individuals experiencing stress for a number of reasons. First, prosocial coping might buffer the negative mental health effects of stress through several psychological pathways. For example, helping others might distract an individual from stressors, as well as increase one's sense of meaning, purpose, and self-efficacy (Midlarsky, 1991). In addition, an affiliative and prosocial ("tend and befriend"; Taylor et al., 2000) pattern of responding to stress is hypothesized to influence biological systems that are involved in the regulation of the body's stress response. In particular, the hormone oxytocin is thought to encourage affiliative behavior, a key component of prosocial behavior, by reducing aversive feelings of fear and distress while down-regulating physiological and emotional reactions

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to stress (Heinrichs & Domes, 2008; Preston, 2013; Taylor et al., 2000). In addition, reward circuitry within the brain is hypothesized to motivate and reinforce caring behavior for others through the generation of positive feeling states in the helper (Goetz, Keltner, & Simon-Thomas, 2010; Preston, 2013).

In support of these hypotheses, recent findings suggest that exposure to stress is associated with an increased tendency to engage in affiliative and prosocial behavior (McGinley et al., 2009; von Dawans, Fischbacher, Kirschbaum, Fehr, & Heinrichs, 2012). For example, individuals exposed to an acute laboratory stressor exhibited higher levels of trust, trustworthiness, and sharing in social interaction tasks, compared with a control condition (von Dawans et al., 2012). There is also evidence suggesting that engaging in prosocial behavior mitigates the negative emotional and physical health effects of stress. In longitudinal studies, charitable behavior and providing emotional support buffered the negative effects of stress on rates of physical ailments and mortality (Krause, 2006; Poulin, Brown, Dillard, & Smith, 2013), and providing active help to a chronically ill love one was associated with elevated positive affect (Poulin et al., 2010).

In studies of the physiological mechanisms of these stress-buffering effects, feelings of compassion (Goetz et al., 2010; Stellar, Cohen, Oveis, & Keltner, 2015), as well as prosocial behavior (Diamond, Fagundes, & Butterworth, 2012), have been linked to changes in the autonomic nervous system that are quite different from the body's stress response. Individuals who are experiencing compassion tend to show increased vagal activity, reduced heart rate, and reduced skin conductance, indicating up-regulation of the parasympathetic nervous system, in contrast to the activation of the sympathetic nervous system typically seen in distressed individuals (Floyd et al., 2007b; Goetz et al., 2010; Stellar et al., 2015). Recent reviews of helping behavior also show that prosocial behavior is associated with activation of dopaminergic pathways in the ventral striatum, a key area of reward circuitry in the brain (Goetz et al., 2010; Preston, 2013). Consistent with these findings, expressing affection to a loved one after a laboratory stress task predicted less increase in cortisol, a neuroendocrine marker associated with stress reactivity, during an acute stressor (Floyd et al., 2007b), as well as facilitated return to baseline in cortisol levels following the stressor (Floyd et al., 2007a).

Building on these findings, the current project was designed to test whether engaging in prosocial behavior toward strangers or acquaintances buffers the negative impact of stress on daily emotional functioning within a more naturalistic setting, using a daily diary methodology. Daily diaries are uniquely suited to capturing naturally occurring stressors and prosocial behavior, in contrast to questionnaire or interview methods, which require participants to recall and make generalizations about their typical behavior. Based on previous findings, we hypothesized that engaging in prosocial behavior would buffer the negative effects of daily stress on reports of same-day negative and positive affect, as well as ratings of overall mental health.

Method

Participants

Participants were 77 adults (53.2% female) who were recruited for a study on social and hazardous drinking. Study participants were recruited using a variety of methods, including flyers distributed at high traffic locations in the community and community events, word of mouth, and Craigslist advertisements. Participants ranged in age from 18 to 44 years old (M = 24.52, SD = 5.68), and on average participants had received 15 years of education (SD = 2.21). The majority of participants were Caucasian (71.4%; African American, 9.1%; Hispanic, 7.8%; Asian, 7.8%; Other, 3.9%).

Procedure

Participants participated in an initial phone screening to determine eligibility for the study. Participants needed to report drinking alcohol at least once per week over the past month to be selected for the study. Individuals with substance dependence (for any substance other than nicotine), serious mental illness (diagnosis of schizophrenia, bipolar disorder, or other psychotic disorder, or active suicidality), or cognitive impairment were excluded from the study. Individuals who met criteria for the study then completed an intake interview that verified eligibility using the Structured Clinical Interview for *DSM-IV* Axis I Disorders–I (First, Spitzer, Gibbon, & Williams, 1995) and gathered demographic and substance use history. Following this intake session, participants returned for a training session during which they were instructed in the use of smartphone assessments, which participants completed over the next 14 days.

Daily assessments used in the current analyses were completed once per day in the evening prior to bedtime. Participants were prompted with automated reminders on smartphones each night at 9:30 p.m. but were asked to complete the survey any time after activities were done for the day before going to bed. To encourage compliance, survey completion was monitored daily by research assistants, and participants were contacted if surveys were missed or contained data irregularities. Participants were paid for their participation, and received a bonus payment if they completed 95% of all survey responses.

Measures

Stress. Using an established list of stressors (Almeida, Wethington, & Kessler, 2002), each evening participants were asked whether they had experienced any stressful life events over the course of the day and, if so, were prompted to record the number of events experienced. Stressful events represented a number of stress domains including interpersonal, work/education, home, finance, health/accident, event happened to someone I know well, and other. A total count of the number of stressors endorsed across these domains was used as a measure of daily stress.

Prosocial behavior. Participants were presented with an established list of prosocial behaviors and asked to endorse any helpful behaviors they engaged in when interacting with strangers or acquaintances that day (Morelli, Rameson, & Lieberman, 2014). Prosocial behaviors included items such as "held open a door," "helped with schoolwork," and "asked someone if they need help." A measure of prosocial behavior was created by summing the number of helping behaviors engaged in each day.

Affect and mental health. Positive and negative affect were measured using the 10-item short-form of the Positive and Negative Affect Scale (Thompson, 2007), a scale developed by drawing items from the original Positive and Negative Affect Scale (Watson & Clark, 1994), a well-validated measure of positive and negative affect. Participants rated the extent to which they were experiencing different positive and negative emotional states, and positive and negative affect subscales were calculated. Daily mental health was measured using a single item that asked participants to rate their mental health for that day using a visual analog scale with a slider interface that was quantified along a 0 to 100 scale ranging from poor to excellent.

Data analysis

Data analyses were conducted using a hierarchical linear modeling (HLM) framework to account for the nesting of days within individuals across the course of the study (Raudenbush & Bryk, 2002; Raudenbush, Bryk, & Congdon, 2004), and robust standard errors were used. The main effects of stress and prosocial behavior on the three mental health outcomes were examined using the following HLM functions:

$$\begin{aligned}\text{POSAFFECT}_t = {} & \pi_0 + \pi_1(\text{DAY}_t) + \pi_2(\text{WKND}_t) + \\ & \pi_3(\text{POSAFFECT}_{t-1}) + \pi_4(\text{STRESSWI}_t) + \\ & \pi_5(\text{PROSOCIALWI}_t) + e_t\end{aligned}$$

$$\begin{aligned}\pi_{0j} = {} & \beta_{00} + \beta_{01}(\text{STRESSBW}_j) + \beta_{02}(\text{PROSOCIALBW}_j) + \\ & \beta_{03}(\text{GENDER}_j) + \beta_{04}(\text{RACE}_j) + \beta_{05}(\text{AGE}_j) + u_{0j}\end{aligned}$$

$$\pi_{1j} = \beta_{10} + u_{1j}$$

$$\pi_{2j} = \beta_{20} + u_{2j}$$

$$\pi_{3j} = \beta_{30} + u_{3j}$$

$$\pi_{4j} = \beta_{40} + u_{4j}$$

$$\pi_{5j} = \beta_{50} + u_{5j}$$

where POSAFFECT_t represents levels of positive affect on Day_t. Level 1 variables of interest were person-centered, such that STRESSWI_t represents within-person fluctuations in stressors around participants' average number of daily stressors across all 14 days. Similarly, PROSOCIALWI_t represents within-person fluctuations in prosocial behaviors around each person's average prosocial behaviors (Mroczek & Almeida, 2004; Scholz, Kliegel, Luszczynska, & Knoll, 2012). Random effects were added to both the within-person prosocial behavior and stress slopes to allow for within-person processes to differ across individuals. Between-person effects of stress (STRESSBW_j) and prosocial behavior (PROSOCIALBW_j) were accounted for by entering these variables as predictors of the intercept on Level 2. The inclusion of person-centered predictors at Level 1 and mean predictors at Level 2 allows for the disaggregation of the within-person and between-person effects of each predictor on mental health outcomes (Raudenbush & Bryk, 2002).

The confounding effects of the prior day's mental health on prosocial behavior, stress, and mental health were controlled for by including the lagged outcome as a covariate (grand-centered) on Level 1 in all analyses (e.g., POSAFFECT_{t-1} in this set of example equations). Time effects across the course of the study (Day_t) and weekend versus weekday effects (WKND_t; 1 = *weekend*, 0 = *weekday*) were accounted for by entering these variables as Level 1 covariates. The effects of participant gender (–1 = *female*, 1 = *male*), race (–1 = *Caucasian*, 1 = *non-Caucasian*), and age (grand centered) were controlled for by including these variables as between-subjects predictors of the intercept on Level 2.

Hypotheses regarding the interaction between daily stress and daily prosocial behavior in predicting mental health were examined using the same functions, except that the interaction between the two Level 1 predictors was added:

$$\text{POSAFFECT}_t = \pi_0 + \pi_1(\text{DAY}_t) + \pi_2(\text{WKND}_t) + \pi_3(\text{POSAFFECT}_{t-1}) + \pi_4(\text{STRESSWI}_t) + \pi_5(\text{PROSOCIALWI}_t) + \pi_6(\text{STRESSxPROSOC}_t) + e_t$$

$$\pi_{0j} = \beta_{00} + \beta_{01}(\text{STRESSBW}_j) + \beta_{02}(\text{PROSOCIALBW}_j) + \beta_{03}(\text{GENDER}_j) + \beta_{04}(\text{RACE}_j) + \beta_{05}(\text{AGE}_j) + u_{0j}$$

$$\pi_{1j} = \beta_{10} + u_{1j}$$

$$\pi_{2j} = \beta_{20} + u_{2j}$$

$$\pi_{3j} = \beta_{30} + u_{3j}$$

$$\pi_{4j} = \beta_{40} + u_{4j}$$

$$\pi_{5j} = \beta_{50} + u_{5j}$$

$$\pi_{6j} = \beta_{60} + u_{6j}$$

Results

Participants showed a very high rate of daily diary compliance, with only 4.6% missing data for the three outcome variables, 5.1% missing data for reports of prosocial behavior, and 5.8% missing data for reports of daily stress. On average, participants reported experiencing 0.59 (*SD* = 1.46) stressors per day and engaging in 1.65 (*SD* = 1.64) prosocial behaviors per day.

Main effects of stress and prosocial behavior on outcomes

Analyses first examined the main effects of daily stress and prosocial behavior on the three mental health outcomes (see Table S1 in the Supplemental Material available online for full results from the main effects models). Between-person findings for average prosocial behavior showed that individuals with higher average prosocial behavior had higher positive affect (b = 0.47, SE = 0.16, p < .01) but there were no significant associations between average prosocial behavior and either negative affect (b = 0.03, SE = 0.14, p = .81) or mental health (b = –1.15, SE = 1.14, p = .32). Between person findings of average stress across the study period revealed that individuals who experienced more stress reported higher average negative affect (b = 0.44, SE = 0.21, p < .05) and worse average mental health (b = –5.01, SE = 1.46, p < .001) over the course of the study. There was no significant association between average stress and positive affect (b = –0.34, SE = 0.27, p = .21).

Daily within-person fluctuations in prosocial behaviors and stress also had significant associations with the outcomes. Higher than average daily prosocial behavior was associated with higher levels of daily positive affect (b = 0.20, SE = 0.06, p < .01) and better overall mental health (b = 1.06, SE = 0.46, p < .05), but prosocial behavior was not associated with negative affect on the within-person level (b = 0.03, SE = 0.04, p = .50). Higher than usual daily stress was associated with higher negative affect (b = 0.74, SE = 0.12, p < .001) and worse overall mental health (b = –2.12, SE = 0.45, p < .05) that day, but daily stress was not associated with changes in positive affect that day (b = –0.09, SE = 0.06, p = .15).

Interaction effects: Prosocial behavior moderates the impact of stress on outcomes

Next, analyses examined whether prosocial behavior moderated the effects of stress on mental health outcomes (see Table 1 for full results). Results showed that on a given day, within-person variations in prosocial behavior moderated the relationship between within-person variations in stress and positive affect (see Fig. 1a). The online calculator designed by Preacher, Curran, and Bauer (2003) to calculate simple slopes was used to probe the nature of this interaction. Results revealed that, as expected, individuals who reported lower than usual levels of prosocial behavior (i.e., 1.5 *SD*s below the person-centered mean) showed significantly lower positive affect in response to higher than average daily stress (b = –0.30, SE = 0.10, p < .01). In contrast, individuals who reported higher levels of prosocial behavior than usual (i.e., 1.5 *SD*s above the person-centered mean) did not show a negative relationship between stress and positive affect (b = 0.05, SE = 0.07, p = .49).

Prosocial behavior also moderated the relationship between daily stress and negative affect (see Fig. 1b). Simple slopes analyses revealed that, as expected, individuals who reported lower than usual levels of prosocial behavior had significantly higher negative affect in response to higher than average daily stress (b = 0.91, SE = 0.20, p < .001). Individuals who reported higher than average prosocial behavior showed a less strong, but still statistically significant, relationship between higher than average daily stress and negative affect (b = 0.47, SE = 0.07, p < .001).

Finally, prosocial behavior moderated the relationship between daily stress and overall mental health (see Fig. 1c). Simple slopes analyses revealed that individuals who reported lower levels of prosocial behavior than usual reported lower levels of mental health with increasing levels of stress (b = –4.83, SE = 1.71, p < .01), whereas individuals who reported higher levels of prosocial behavior did not show a relationship between higher

Table 1. Moderating Effects of Daily Prosocial Behavior on the Relationship Between Daily Stress and Mental Health Outcomes

	Positive Affect			Negative Affect			Mental Health		
Predictors	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
For overall intercept, π_0									
Intercept, β_{00}	13.86	0.25	< .001	6.29	0.18	< .001	68.67	1.30	< .001
Stress person mean, β_{01}	–0.37	0.26	.16	0.39	0.20	.06	–4.94	1.37	< .001
Prosocial person mean, β_{02}	0.45	0.17	< .01	0.05	0.13	.71	–0.94	0.99	.35
Gender, β_{03}	0.27	0.21	.20	0.11	0.13	.40	–0.48	1.07	.66
Race, β_{04}	0.26	0.23	.26	–0.16	0.15	.29	1.81	1.22	.14
Age, β_{05}	0.09	0.05	.08	–0.002	0.03	.95	0.43	0.21	< .05
For Day_t slope, π_1									
Intercept, β_{10}	–0.03	0.02	.26	0.007	0.01	.59	0.05	0.11	.67
For Wknd_t slope, π_2									
Intercept, β_{20}	–0.70	0.18	< .001	–0.17	0.10	.09	1.01	1.09	.36
For Outcome_{t-1} slope, π_3									
Intercept, β_{30}[a]	0.19	0.04	< .001	0.15	0.03	< .001	0.18	0.04	< .001
For Stress_t slope, π_4									
Intercept, β_{40}	–0.12	0.06	.34	0.69	0.11	< .001	–2.54	0.84	< .01
For Prosocial_t slope, π_5									
Intercept, β_{50}	0.20	0.06	< .01	0.03	0.04	.43	1.08	0.39	< .01
For $\text{Stress}_x\text{Prosocial slope}_t$, π_6									
Intercept, β_{60}	0.10	0.04	< .01	–0.12	0.06	< .05	1.27	0.54	< .05

[a]This variable represents the prior day's (day_{t-1}) level of each outcome. For example, when predicting positive affect, this variable represented the level of positive affect on the previous day.

than average daily stress and mental health (b = –0.25, SE = 0.63, p = .69).

Discussion

The current study examined whether prosocial behavior mitigated the negative impact of stress on mental health and mood on a day-to-day basis. Results suggested that engaging in higher than usual rates of prosocial behavior on a given day might buffer the negative impact of stress on positive affect and ratings of overall mental health on that day. In addition, engaging in prosocial behavior appeared to reduce, but not fully eliminate, the detrimental effects of stress on negative affect.

Recent theories of stress reactivity posit that traditional models of fight-or-flight responses to stress might ignore affiliative behavior as an important component of coping with stress (Taylor et al., 2000). In addition, there is increasing interest in determining whether the beneficial aspects of affiliating with others during or after a stressor are due to providing versus receiving support. Consistent with previous findings (Floyd et al., 2007a, 2007b; Krause, 2006; Poulin et al., 2013), the current results suggest that engaging in prosocial behavior might be an effective strategy for reducing the negative impact of stress on emotional functioning. Previous studies have largely examined this question in laboratory studies or with retrospective, observational measures (but see Poulin et al., 2010, for an ecological momentary assessment study of active helping and affect in a sample of spouse caregivers). In contrast, the current project shows that prosocial behavior might serve as a helpful strategy for coping with stress on a daily basis, across a number of naturalistic contexts. Furthermore, the use of within-subjects analyses allowed us to determine that regardless of whether an individual typically engages in few or many prosocial behaviors, an increase in helping behavior relative to one's average might buffer the harmful effects of stress.

Further research is needed to determine the exact mechanisms by which prosocial behavior mitigates the negative mental health effects of daily stressors. It is possible that supporting others has psychological benefits such as distracting an individual from his or her own experiences of daily stress or increasing an individual's sense of meaning and self-efficacy (Midlarsky, 1991). Engagement in prosocial behavior might also influence physiological systems implicated in affiliative behavior, such as the oxytocin system (Taylor et al., 2000), reward circuitry within the brain (Preston, 2013), and the parasympathetic nervous system (Diamond et al., 2012; Goetz et al., 2010). Both psychological and biological pathways

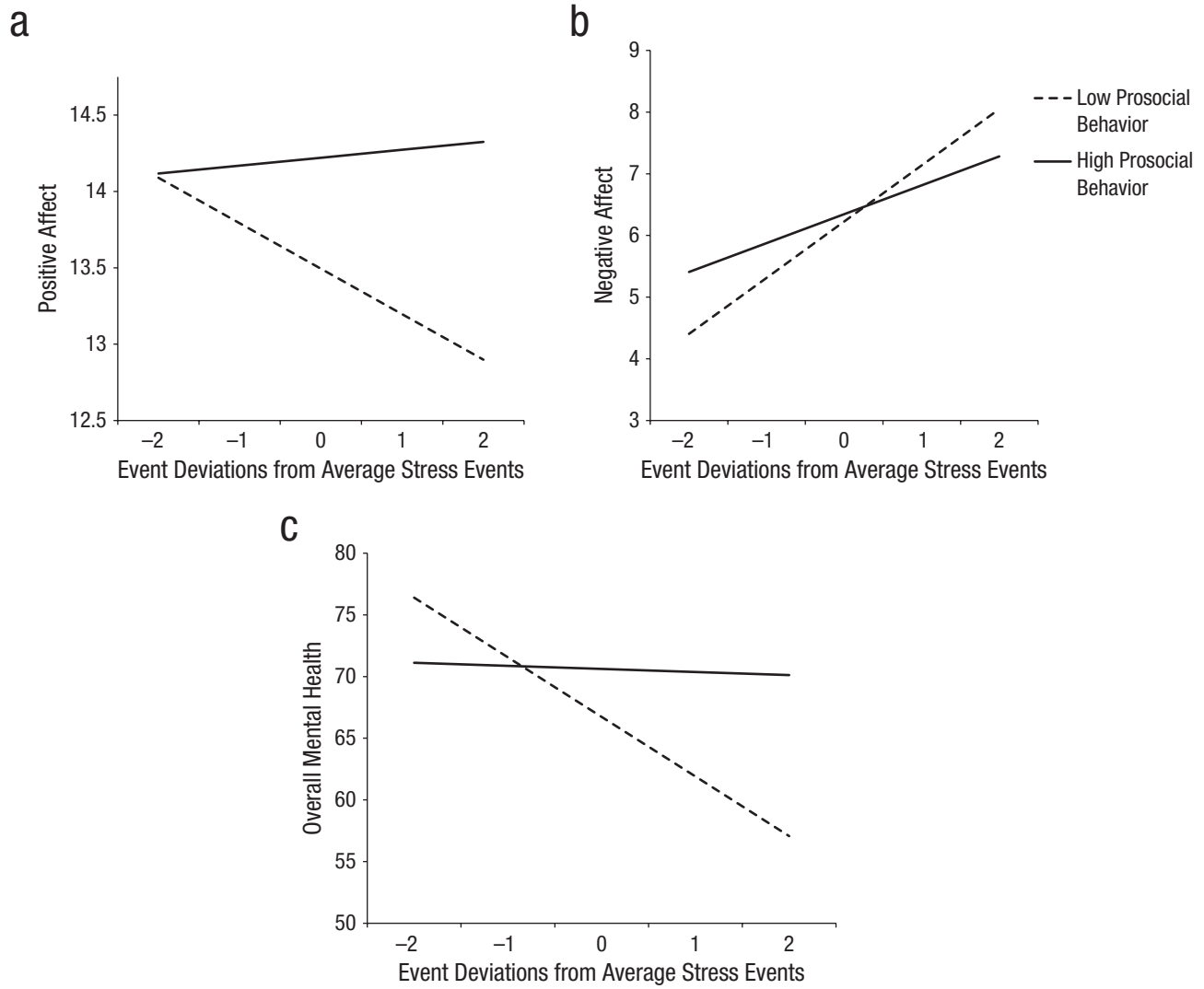

Fig. 1. Higher than usual levels of prosocial behavior on a given day buffer the negative effects of daily stress on positive affect, negative affect, and overall ratings of mental health.

might then in turn lead to a down-regulation of one's emotional stress response. Measures of stress and prosocial behavior in the current study were based on brief, subjective self-report ratings. More objective measurements of biological markers may clarify the exact nature of these psychological or biological mechanisms. It is also possible that engaging in helping behavior elicits communal responses from others and that this social process plays an important role in the beneficial effects of prosocial behavior.

Several limitations of the current study should be acknowledged. First, the sample was composed largely of Caucasian participants, and findings therefore need to be replicated in more ethnically and culturally diverse samples. This is a particularly important area for future research given observable differences in the emphasis on cooperative social behavior across cultures (Carlo, Fabes, Laible, & Kupanoff, 1999). Second, given that only one assessment each of stress, prosocial behavior, and negative affect was made per day, it was not possible for current analyses to ascertain whether stressors always preceded prosocial behavior and affect. To attempt to address this issue, analyses included information about the previous day's mental health to try to control for the influences of the prior day's emotional well-being on future reports of prosocial behavior, stress, and mental health. In addition, prosocial and stress reporting at the end of the day were event based measures. Thus, although retrospective, they were less subject to bias than more subjective state measures (e.g., perceived stress). Finally, even if significant moderation findings result from an alternative sequence of events, such as

prior prosocial behavior interacting with later stressful events to benefit mental health outcomes within a given day, the clinical implications would be similar. Such findings would still suggest that increasing prosocial behavior might lessen negative effects of stress on mental health. Nevertheless, studies that assess these constructs multiple times per day, as well as integrate naturalistic with more experimental, laboratory-based designs, are needed to more precisely examine the timing and sequence of stress and prosocial behavior in predicting emotional well-being.

Despite these limitations, current findings highlight engaging in prosocial behavior as a previously understudied protective factor for individuals experiencing stress. Results suggest that even brief periods of supporting or helping others might help to mitigate the negative emotional effects of daily stress. Future studies should examine whether certain types of prosocial behavior (e.g., providing emotional versus instrumental support) have more potent buffering effects on the stress-affect relationship. In addition, research should examine whether these patterns are also observed in clinical samples suffering from reduced positive affect and elevated negative affect, such as individuals with depression. Finally, the incorporation of more objective measurements of stress-related physiological processes (e.g., blood pressure, heart rate) into naturalistic studies of daily stress processes could help to determine the exact mechanisms by which prosocial behaviors influence the body's stress response. This line of investigation could help to inform prevention and intervention efforts for individuals at-risk due to elevated exposure to stress.

Author Contributions

E. B. Raposa and E. B. Ansell developed the study concept. All authors contributed to the study design. Data collection was supervised by E. B. Ansell. E. B. Raposa and H. B. Laws performed the data analysis and interpretation under the supervision of E. B. Ansell. E. B. Raposa drafted the manuscript, and H. B. Laws and E. B. Ansell provided critical revisions. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Supplemental Material

Additional supporting information may be found at http://cpx.sagepub.com/content/by/supplemental-data.

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