

A daily diary study on stressors, hurt feelings, aggression, and somatic symptoms: The role of rejection sensitivity and negative emotion differentiation

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Abstract

The current study adopted a daily diary design to examine associations of daily stressors and hurt feelings to three unfavorable daily outcomes, including verbal aggression, physical aggression, and somatic symptoms and the moderation of rejection sensitivity and negative emotion regulation on the relations between these daily variables. A total of 248 college students participated in the daily diary study in which they responded to the assessment on a daily basis for 7 consecutive days. The results indicated that daily stressors predicted daily verbal aggression; daily stressors, daily hurt feelings, and rejection sensitivity predicted somatic symptoms. Negative emotion regulation moderated the association between stressors and verbal aggression such that more stressors and high negative emotion regulation predicted more frequent daily verbal aggression. Rejection sensitivity moderated the association of hurt feelings to verbal and physical aggression. Perception of hurt feelings and high rejection sensitivity predicted more verbal aggression but less physical aggression. Rejection sensitivity also moderated the association of stressors to somatic symptoms such that more stressors and high rejection sensitivity predicted more somatic symptoms. The findings collectively highlight the importance of supporting individuals with high rejection sensitivity to encode social cues in a healthy way. It is imperative to provide emotion regulation skills to cope with negative emotions derived from social interactions.

KEYWORDS

aggression, daily diary study, emotion differentiation, hurt feelings, rejection sensitivity, somatic symptoms

1 | DAILY LIFE AND DAILY AGGRESSION

People may experience various unpleasant social events in daily life, such as social rejection, provocation, and conflict. These unpleasant social events (i.e., stressors) can trigger various internal (e.g., elevated levels of stress, anxiety, depression) and external (e.g., altercation) problems. The

current study focuses on three unfavorable outcomes that have been less studied in the literature: verbal (or psychological) and physical aggression and somatic symptoms (SOMA). Aggression is defined as any type of actions, in verbal or behavioral forms, with a goal of harming someone physically or psychologically (Baron & Richardson, 1994, p. 7). Aggression can be conceptualized as a mechanism to cope with stress resulted from

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unpleasant events (C. A. Anderson & Bushman, 2002; Shorey et al., 2012; Wyckoff, 2016). The literature revealed that stress hormones triggered by stressors can have a reciprocal relation with aggression (Kruk et al., 2004; Sprague et al., 2011). Stressors (and daily stressors) can trigger intense activity in the hypothalamic-pituitary-adrenocortical (HPA) axis (Veenema & Neumann, 2007). Enhanced intensity of HPA activity can be associated with a state of hyperarousal, which underlies outburst of aggression (Haller & Kruk, 2006). It is important to note that these studies operationalized aggression as physical aggression or explicit violent behavior (e.g., attacking). Limited research has focused on the verbal or psychological aggression which refers to intentional acts that threaten and humiliate others and impair the sense of self and emotional well-being (Follingstad et al., 2005; Yang, 2020a). In addition, these studies usually employed animal models or adopted cross-sectional data to assess the link between stressors and aggression, the findings of which tended to reflect patterns over a long period of time (Sprague et al., 2011). Research adopting methodologies that allow for collecting context-sensitive data is needed to capture the intricacy of dynamic relationships between daily variables. Such findings can help identify intervention markers for people who need support to address aggression and SOMA.

There is a small amount of research that has employed daily diary or ecological momentary designs to capture the influence of daily stressors on psychological functioning. This set of research typically falls in two primary areas. The first area is to investigate the association between stressors and proxies of aggression, such as anger and hostility (van Eck et al., 1998; Ménard et al., 2021; Pearson et al., 2017). A study using experience sampling methodology with a sample of 85 male white-collar workers found that more unpleasant events were associated with increases in negative affect and agitation as well as decreases in positive affect; perceived controllability on stress mitigated the effects of events on negative and positive affect (van Eck et al., 1998). Although a dearth of research has explicitly studied the predictors of verbal aggression, negative affects (such as verbal hostility) can easily lead to verbal aggression. In addition, this set of empirical findings is consistent with the associative network model of aggression (Berkowitz, 1990), which posits that the perceived stress and concomitant negative affects (such as hurt feelings) account for the link between exposure to stressors and subsequent aggressive behaviors. Hurt feelings are a type of the pronounced negative emotions often occur in the context of unpleasant events in interpersonal interactions and are referred to as social pain (Leary et al., 1998; Lemay et al., 2012). Hurt feelings are intertwined with cognitive functions, including perceptions, appraisals, expectations, and beliefs (Leary & Leder, 2009). Although limited, existing literature found that victims' hurt feelings were associated with negative emotions, such as anxiety and hostility, and victims perceived attribution of the hurt feelings plays a role in the association between hurt feelings and responses (Leary et al., 1998). Hurtful events were associated with feeling of rejection and powerlessness among a group of couples (Feeney, 2004). The second area focuses the relationship between stressors and ensuing internalizing symptoms (e.g., depression). For example, a study using a sample of emerging adults who were seeking treatment at a university counseling center found that perceived life stress was associated with anxiety and depression (Fassett-Carman et al., 2020). A study using a

community sample of adolescents showed that two types of stressful life events, comprised of family members being hospitalized and family discord, were associated with anxiety sensitivity which in turn predicted anxiety symptoms (McLaughlin & Hatzenbuehler, 2009). Despite the current research progress, more research is needed to expand to other internalizing symptoms (such as SOMA) in a daily context.

2 | DAILY LIFE AND SOMA

SOMA refer to medically unexplained symptoms including unpleasant bodily sensations (e.g., tiredness) or physical dysfunctions (e.g., pains in heart/chest) in certain body parts or organs (Garralda, 2010). SOMA can occur in the context of daily life and are deemed an important category of internalizing symptoms (Achenbach & Rescorla, 2001). Limited research has showed that stressors are positively associated with SOMA (Yang, 2020b). Stressors are associated with an increase in allostatic load and disturb allostasis (McEwen, 2007). The disturbance is furthermore associated with abnormal inflammatory activities (Luyten et al., 2013). Neuroimmunology research shows that dysregulated immune systems underly the association between social stress and aggression (Takahashi et al., 2018). Stressors are associated with inflammatory cytokines, which may lead to sickness behaviors (e.g., fever, anorexia, hyperalgesia, weakness) (Altamura et al., 2022; Irwin, 2011; Schwarz, 2003). Stressful events trigger the state of anger and increase the level of cytokines (Kiecolt-Glaser et al., 2005; Pesce et al., 2013). Couples who show higher hostile behaviors during their conflict interactions have a larger amount of increase in cytokines compared to other married couples (Kiecolt-Glaser et al., 2005). These lab-based cross-sectional or cohort findings collectively support the notion that both stressors and hurt feelings derived from stressors may predict SOMA in a daily context.

3 | ROLES OF REJECTION SENSITIVITY (RS) AND NEGATIVE EMOTION DIFFERENTIATION

An important stream of research that can illustrate the association of daily events to aggression and SOMA is pertinent to high-order psychological functions that regulate affective and behavioral responses in the context of daily stressors (Sprague et al., 2011). This is relevant because stressors and hurt feelings are concomitant with intense emotional reactions and activation of emotional response systems (both cognitive and physical). Thus, emotion response systems may attenuate or exacerbate the association between stressors, hurt feelings, and possible ensuing symptoms. According to the unified protocol model of emotional disorders (Kennedy et al., 2022), certain personality traits (e.g., sensitivity to certain social cues), and emotion regulation strategies, such as frequent use of avoidance or suppression or inflexible use of regulation strategies, play a role in internalizing symptoms and

externalizing behaviors. The current study focuses on two cognitive constructs: RS and negative emotion differentiation. RS is conceptualized as a cognitive-affective processing disposition. High RS is characterized by a chronic tendency to expect, perceive, and overreact to rejection (Downey & Feldman, 1996). The disposition can be accompanied with emotions of anxiety (i.e., anxious RS) or anger (i.e., angry RS) (Downey et al., 1997). The current study focused on anxious RS. According to social information processing theories (e.g., S. M. Andersen & Chen, 2002), RS guides attention allocation, perception of social cues, and overall interpretation of information. Thus, individuals with high RS may experience a greater impact of rejection cues in social interactions, which increase the probability and intensity of behavioral responses (Downey & Feldman, 1996; Downey et al., 1998). In this sense, RS can be perceived as a defensive motivation system which protects themselves from exposure to further rejection (Downey et al., 2004). The activation of defensive expectations motivates people to act defensively in the form of either aggression or social anxiety and withdrawal (Downey et al., 1998; London et al., 2007; Marston et al., 2010).

Empirical research corroborates the notion that individuals with high RS are more vulnerable to the deleterious impact of stressors and feeling of hurt. Individuals with high RS tend to respond to rejection with aggression, whereas those with low RS did not (Romero-Canyas et al., 2010). On the contrary, low RS individuals downplay rejection cues during brief interactions with potential dating partners compared to high RS individuals (Romero-Canyas & Downey, 2013). Research with both male college students and patients diagnosed with borderline personality disorder revealed similar findings, in which individuals with high RS tended to respond aggressively to their partners' negative or ambiguous behaviors (Downey et al., 2000; Sommerfeld & Shechory Bitton, 2020). A study using experimental paradigms to manipulate rejection and assess physical aggression found that RS moderated the link between rejection and aggression; individuals with high RS showed more aggressive behaviors toward the rejector than those with low RS (Ayduk et al., 2008).

Compared to the literature on RS and aggression, less research has been conducted to examine the relation between RS and SOMA. Because individuals with high RS are prone to perceived rejection and more vulnerable to biological reactions resulted from stress exposure, these individuals are more susceptible to experiencing SOMA. To the author's knowledge, there is only one study examining such a relation, which revealed that patients with somatoform pain disorder reported higher levels of RS than healthy individuals (Nacak et al., 2021).

Negative emotion differentiation refers to the ability to differentiate negative emotional experiences and identify and label discrete negative emotional states (Barrett et al., 2001). People with high emotion differentiation are able to make fine-grained distinctions between emotional states and adaptive judgment, and less prone to misattribution errors (Barrett et al., 2001; Gohm & Clore, 2000). Empirical research shows that greater emotion differentiation is associated with improved ability to regulate

negative emotions and mental health benefits (Ottenstein, 2020). Greater negative emotion differentiation is associated with fewer depression symptoms, less likely to use substance to cope with stressors, and more daily optimism (Brown et al., 2021; Kennedy et al., 2022; Starr et al., 2017; Yang, 2022). More frequent use of disengagement or avoidance strategies may lead to a rapid reduction in distress, which in turn negatively reinforces the use of avoidant strategies in regulating emotions and hinders the development or expansion of more adaptive repertoire of emotion regulation strategies. In this sense, people with high negative emotion differentiation have a larger repertoire of emotion regulation strategies. Empirical studies also corroborate the moderation role of negative emotion differentiation between negative emotionality and mental health outcomes. For example, one study showed that negative emotion differentiation moderated the association between daily negative events and depressive symptoms (Kashdan et al., 2010). The strength of association between daily negative emotional experiences and depressive symptoms was stronger in individuals with low negative emotion differentiation than that in those with high negative emotion differentiation (Starr et al., 2017). Negative emotion differentiation also buffered the association between provocation and aggressive responses among a sample of angry people. High negative emotion differentiation predicted a weaker association between feeling of angry and being provoked and daily aggressive responses (Pond et al., 2012). Based on these findings, it is possible that negative emotion differentiation serves as a protective factor that buffers the influence of stressors and hurt feelings on unfavorable outcomes.

4 | CURRENT STUDY

The current research was intended to address several research gaps in both research methodology and theoretical relationships. First, most of the existing studies present findings based on methods with less ecological validity, such as cross-sectional or cohort (i.e., nonintensive longitudinal) studies or research adopting lab paradigms to assess aggression (e.g., hot sauce task; Ayduk et al., 2008). While these previous studies may present findings that reflect general patterns, it is important to adopt a nuanced research lens and contextualize the study of aforementioned variables in an ecologically valid setting for several reasons: (1) the perception of life events being stressful and hurtful is context-dependent; (2) the activation of the motivational defensive mechanism of RS depends on the evaluation of situational factors (e.g., who was involved in the situation); and (3) whether the function of emotion regulation is healthy or unhealthy varies across situations (Gross, 2015). The current study adopted a daily diary design allowing for real-time assessment on dynamic daily processes and examined the association between daily predictors and daily aggression. Second, despite high relevance, a dearth of research has examined the impact of social pain or hurt feelings on aggression and SOMA in the context of daily stressors. Such relationships were the topic of the current study.

Third, existing literature on RS and aggression primarily focuses on behaviors in close relationships (e.g., partners in dating) or extreme situations (e.g., homicide) (Leary et al., 2006). It is less known what such a relation entails when people experience unpleasant social events in a daily context. Relatedly, it would be important to understand the role of negative emotion differentiation in the association between daily predictors and unfavorable outcomes. Fourth, most the literature focuses on proxies of aggression or physical aggression. However, the psychological abuse derived from verbal aggression can have deleterious effect on people's well-beings as well (Yang, 2020a). The current study addressed two different forms of aggression: verbal and physical aggression.

The current study had several hypotheses. (Hypothesis 1) Daily stressors (a predictor), daily hurt feelings (a predictor), RS (a moderator), and negative emotion differentiation (a moderator) would predict verbal aggression. (Hypothesis 2) RS and negative emotion differentiation, respectively, were expected to moderate the association between each predictor and verbal aggression such that high RS and low emotion differentiation would predict an association between each predictor and verbal aggression. (Hypothesis 3) Daily stressors, daily hurt feelings, RS, and negative emotion differentiation would predict physical aggression. (Hypothesis 4) RS and negative emotion differentiation, respectively, were expected to moderate the association between each predictor and verbal aggression such that high RS and low emotion differentiation would predict an association between each predictor and physical aggression. (Hypothesis 5) Daily stressors, daily hurt feelings, RS, and negative emotion differentiation would predict SOMA. (Hypothesis 6) Negative emotion differentiation was expected to moderate the association between each predictor and SOMA such that RS and negative emotion differentiation would predict an association of each predictor to SOMA.

5 | METHODS

5.1 | Participants

Participants were 248 ($M_{age} = 19.65$, standard deviation [SD] = 3.53) college students (4% self-identified Hispanic) recruited from intro-level psychology classes in a public university at a southern state. Seventy-two percent of the participants were female. Sixty-seven percent of the sample were Caucasian, 24% African American, 9% others. The majority of the participants were freshmen (56%) or sophomore (21%), followed by 12% junior students, 10% senior students, and 1% other. The data were collected between January and December 2019. As for family socioeconomic status, 26% of the participants reported an annual family income of <30,000, 15% between 30,000 and 49,999, 22% between 50,000 and 74,999, and 37% >75,000. All participants provided informed consent and were granted course credits for participation. The study was approved by the university institutional review board.

5.2 | Procedure

Participants were recruited from intro-level psychology classes in a public university at a Southern state, through class and email announcements. The assessment included an initial baseline assessment and daily diaries for 7 consecutive days. Participants first completed an initial baseline assessment in a study laboratory, followed by a short training on how to complete daily diary surveys. Then, participants completed the first daily diary onsite. The following daily diaries were completed online via a Qualtrics link sent at 6 p.m. every day. Participants were instructed to complete the daily diary by midnight of each day. Participants completed 1355 assessments over the course of the 7-day period. The average compliance rate for daily diaries (excluding the first day) was 75.4%, ranging between 68.3% and 79.9%, which is comparable to those reported in studies adopting a daily diary design (e.g., Starr et al., 2017). The missingness of daily diaries was not significant related to gender ($p > 0.29$), RS ($p > 0.07$), or negative emotion differentiation ($p > 0.26$).

5.3 | Within-subject measures (daily measures)

Within-subject measures include variables of daily stressor, daily hurt feelings, daily verbal aggression, daily physical aggression, and daily SOMA. Daily stressors were assessed through a semi-structured Daily Inventory of Stressful Events (DISE) (Almeida et al., 2002). The DISE assess the occurrence of daily stressors in various life domains (arguments or disagreements, avoided arguments and tensions, home events, work events, events occurring to the respondent's close other, and discrimination). Each day, participants indicated whether they experienced each of these stressor types by answering yes (1) or no (0) to a series of forced-choice questions (e.g., Did you have an argument or disagreement with anyone today?) in the past 24 h for the first daily assessment and since the previous assessment for the rest of daily assessments. The total number of stressors was computed and used in data analysis. After responding to the daily stressors questions, participants were asked to respond to the item "Since the time yesterday, has anyone provoked you and hurt your feelings" by answering yes (1) and no (0). The adoption of a single item for assessing hurt feelings was consistent with the literature (Lemay et al., 2012). The percentages of people who reported hurt feelings on each of the 7 days were 20.6% ($n = 51$), 19.4% ($n = 33$), 17.1% ($n = 30$), 12.2% ($n = 23$), 9.9% ($n = 19$), 11.6% ($n = 23$), and 12.5% ($n = 23$), respectively.

Each day, participants were asked to report how many times they had engaged in verbal and physical aggression (see Table 1) on a scale of 0 (*Never*), 1 (*Once or twice*), 2 (*3–5 times*), 3 (*6–10 times*), 4 (*More than 10 times*). Verbal aggression includes calling names, verbal insults, put-downs, ridicule, character attacks, racial epithets, threats, ultimatums, and other types of verbal aggression. Physical aggression includes kicking, slapping, choking, biting, attacking others, and other types of physical aggression. Because a small percent of individuals

TABLE 1 Descriptive statistics of daily variables.

| | Verbal aggression (n/%) | | | | | Physical aggression (n/%) | | Stressors | | General health | | | | | | |
|-------|-------------------------|---------------|---------------------|------------|--------------------|---------------------------|-----|------------|------------------|----------------|------|----|-----|-------------|-------------|-------------|
| | Never | Once or twice | Three to five times | 6–10 times | More than 10 times | No | Yes | Means (SD) | Somatic symptoms | | | | | | | |
| Day 1 | 174 | 70.2 | 47 | 19 | 17 | 6.9 | 5 | 2 | 2 | 235 | 94.8 | 13 | 5.2 | 1.46 (1.04) | 1.28 (0.45) | 6.54 (1.84) |
| Day 2 | 131 | 77.5 | 26 | 15.4 | 7 | 4.1 | 3 | 1.8 | 2 | 161 | 94.7 | 9 | 5.3 | 0.92 (0.93) | 1.27 (0.48) | 6.81 (1.81) |
| Day 3 | 146 | 83.4 | 23 | 13.1 | 4 | 2.3 | 1 | 0.6 | 1 | 170 | 97.1 | 5 | 2.9 | 0.60 (0.81) | 1.23 (0.47) | 6.70 (2.04) |
| Day 4 | 158 | 84 | 20 | 10.6 | 5 | 2.7 | 4 | 2.1 | 1 | 182 | 96.8 | 6 | 3.2 | 0.54 (0.85) | 1.22 (0.46) | 6.68 (2.02) |
| Day 5 | 168 | 87.5 | 18 | 9.4 | 4 | 2.1 | 2 | 1 | 0 | 190 | 99 | 2 | 1 | 0.47 (0.79) | 1.20 (0.47) | 6.86 (1.94) |
| Day 6 | 177 | 90.3 | 14 | 7.1 | 2 | 1 | 3 | 1.5 | 0 | 197 | 99.5 | 1 | 0.5 | 0.40 (0.76) | 1.20 (0.45) | 6.77 (2.01) |
| Day 7 | 165 | 90.7 | 14 | 7.7 | 2 | 1.1 | 1 | 0.5 | 0 | 183 | 99.5 | 1 | 0.5 | 0.42 (0.76) | 1.20 (0.48) | 6.91 (1.94) |

Note: The number of participants completed assessment at each day is Day 1: N = 248; Day 2: N = 170; Day 3: N = 175; Day 4: N = 188; Day 5: N = 192; Day 6: N = 198; Day 7: N = 184. For between-subject variables: Rejection sensitivity mean = 8.33, SD = 3.06. Negative emotion differentiation: Mean = 0.78, SD = 0.52.

Abbreviation: SD, standard deviation.

engaged in daily physical aggression, the variable of physical aggression was recoded into a dichotomous variable (1 = yes, 0 = no).

Daily SOMA were assessed by the 7-item Somatization subscale of the Brief Symptom Checklist (Derogatis, 1993), supplemented by a single-item scale assessing general health. In Somatization, each day, participants were asked to report how often symptoms (i.e., “faintness,” “pains in heart/chest,” “nausea,” “trouble getting breath,” “hot/cold spells,” “numbness,” “weakness of body”) have been experienced since the previous day on a five-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). The scale has good reliability (α ranging from 0.79 to 0.87 for seven daily assessments in the current study). The mean score was used in data analysis. Participants were also asked to self-report general health with a single item: “Since the time yesterday, rate your general health a 9-point scale from worse to best,” which is scored on a scale from 1 (*worse*) to 9 (*best*).

5.4 | Between-subject measures

RS was assessed using the Rejection Sensitivity–Adult Questionnaire (RSA; Berenson et al., 2009; Downey & Feldman, 1996). The RSA assesses anxious expectations for rejection by people in close relationships (e.g., parents, friends, significant others) via the presentation of nine hypothetical interpersonal situations in which rejection by the other person is possible (e.g., “You ask your parents or another family member for a loan to help you through a difficult financial time.”). Participants rated to which degree they felt anxious about each situation (*Concern*) ranging from 1 (*very unconcerned*) to 6 (*very concerned*) and to which degree they expected the likelihood of rejection (*Expected Rejection*) ranging from 1 (*very unlikely*) to 6 (*very likely*). In the current sample, the scale demonstrated good reliability ($\alpha = .70$). The scores were calculated by first multiplying the degree of anxiety and the expected likelihood of rejection for each situation, and then averaging these multiplication scores across the nine situations.

Negative emotion differentiation was operationalized as to which degree participants were able to identify and label different emotions of the same valence (e.g., differentiate between sadness and angry). It was calculated based on the 7-day daily responses on negative emotion states. Each day, participants were asked to rate their current affect using the five negative adjectives (distressed, sad, irritated, angry, and anxious) from the Positive and Negative Affect Schedule scale (Mackinnon et al., 1999) on a scale ranging from 1 (*not at all*) to 5 (*extremely*). Following pre-established procedures (Barrett et al., 2001; Pond et al., 2012), negative emotion differentiation was calculated by taking the average intraclass correlation coefficients (ICC) for all items across all assessment points. Negative emotion differentiation reflects how much someone differentiates between negative emotions that belong to different emotion categories. The average ICC level was 0.41 and comparable to the literature (e.g., Starr et al., 2017). All ICCs were Fisher z-transformed before further analyses were performed (Barrett et al., 2001). The indices were

multiplied by -1 , so that a higher value indicates a higher level of emotion differentiation. Because daily emotion items are nested in person, multilevel modeling was used to estimate reliability of items (Level 1) nested within days (Level 2; within persons), which are nested in individuals (Level 3; between persons; Nezlek, 2017). The analyses found items of negative emotion (item-level reliability = 0.73) measures formed reliable scales. A time-varying covariate—Days which was defined as which day during the 7-day period (Day 1 = 0) was included in the model (Miranda et al., 2019). Gender (men = -1 , women = 1) was also included in the data analysis as a covariate.

5.5 | Analytic plan

Multilevel modeling (Raudenbush & Bryk, 2002) was used to test the relations of daily predictors to daily verbal and physical aggression and daily SOMA (and supplementary variable of general health) and the moderation of between-subject variables of and negative emotion differentiation on the relations between daily variables. Within-person variables were centered on group mean, and between-person variables were centered on the grand mean. Three different sets of analytical models and equations were used to examine the hypothesized relations because the three sets of outcome data follow different distributions. As presented in Table 1, the majority of the participants reported no verbal aggression and distributions of daily responses were extremely positive skewed (see Table 1 for frequencies) Thus, multilevel Poisson analysis was used to examine the association between variables and verbal aggression (see Supporting Information for equations). Because daily responses on physical aggression were dichotomous (see Table 1), multilevel logistic regression was used to assess the relation between predictors and physical aggression. Multilevel modeling with continuous outcomes was used to assess the associations of predictors to SOMA and general health. The missing data were addressed with restricted maximum likelihood in data analyses with the package of HLM 8.0 (Raudenbush & Congdon, 2021).

Unconditional models were run to examine the within- and between-person variability in each of the outcome variables. Then, the data analyses were performed in two steps. First, multilevel modeling was used to test the associations of daily variables and between-subject variables with each of the daily outcome variables. Second, an additional set of multilevel models was performed to test the associations of daily variables, between-subject variables, and cross-level two-way interactions with each of the daily outcome variables. Preliminary analyses revealed that the multilevel models with random slopes for verbal and physical aggression could not converge; thus, the slopes for these two sets of models were fixed. However, the slopes in the models predicting daily SOMA and general health were random. In addition, sensitivity analyses were performed to test the hypothesized models with random slopes to predict verbal and physical aggression with a normal distribution (see equations in the Supporting Information).

6 | RESULTS

The descriptive statistics of key variables are presented in Table 1. The correlations involving within-person variables were calculated with multilevel modeling, whereas, the between-person variables were calculated with bivariate correlations (see Table 2). As for the correlations between predictors and each of the dependent variables, the number of stressors ($p < .001$) and hurt feelings ($p = .006$) were correlated with verbal aggression. The number of stressors was correlated with physical aggression ($p = .05$). Stressors ($p < .001$) and hurt feelings ($p < .001$) were correlated with SOMA. Stressors ($p < .001$), hurt feelings ($p = .002$), and RS ($p < .001$) were associated with general health. There were sex/gender differences in general health ($p = .003$) and hurt feelings ($p = .04$), in which male participants reported better general health and less likelihood of hurt feelings than did female participants. Unconditional models revealed that 28% and 35% of the variances in daily verbal and physical aggression, respectively, were attributed to between-person variability and 72% and 65% of variances were attributed to within-person variability. Likewise, 57% and 63% of the variance in daily somatization and general health, respectively, were between-person variability; 43% and 37% of the variances were attributed to within-person variability. For each outcome variable, the results were reported in two separate steps (see Tables 3 and 4). The first step included the main effects on each of the outcome variables. The second step included the main effects and two-way interactions.

Regarding Hypotheses 1 and 2, the multilevel Poisson models were used to analyze the impact of predictors on daily verbal aggression. The findings revealed that the number of stressors (incident risk rate [IRR] = 1.31, confidence interval [CI]: [1.123, 1.527]) and days (IRR = 0.82, CI: [0.752, 0.889]) predicted verbal aggression. For the model with two-way interactions, the results indicated that the number of stressors (IRR = 1.40, CI: [1.180, 1.653]) and days (IRR = 0.82, CI: [0.752, 0.887]) were significantly associated with the expected frequency (in the format of count) of daily verbal aggression; the two-way interaction between stressors and RS (IRR = 1.26, CI: [1.014, 1.554]) and that between hurt feelings and RS (IRR = 0.87, CI: [0.802, 0.953]) were significant (see Table 3).

Simple slope tests were performed to unpack the significant interaction. The results (see Figure 1) showed that a higher number of stressors was associated with a greater frequency (in the format of counts) of daily verbal aggression for both low and high NED, but the strength was stronger among those with high negative emotion differentiation (IRR = 1.58, CI: [1.222, 1.599]) than those with low negative emotion differentiation (IRR = 1.25, CI: [1.107, 1.446]). That is, for those with high NED, each one-unit increase in daily stressors (one more stressor) was associated with a 58% increase in the rate of daily verbal aggression, whereas such a rate increased by 25% among those with low NED. Therefore, negative emotion differentiation intensified the association between stressors and verbal aggression. The results of simple slope tests for the interaction between hurt feelings and RS in predicting verbal aggression showed that, for those with low levels of RS, individuals who reported hurt feelings had a

TABLE 2 Correlation coefficients between key variables and sex/gender differences in key variables.

| | Verbal aggression | Physical aggression | Somatic symptoms | General health | Stressors | Hurt | Negative ED | RS |
|---|-------------------|---------------------|------------------|---------------------|------------------|---------------------|-----------------|------------------|
| Physical aggression | 0.07**** | | | | | | | |
| Somatic symptoms | 0.23**** | 0.03 | | | | | | |
| General health | -0.02 | 0.004 | -0.06**** | | | | | |
| Stressors | 0.16**** | 0.02** | 0.06**** | -0.20**** | | | | |
| Hurt | 0.13**** | 0.02 | 0.11**** | -0.38**** | 0.61**** | | | |
| Negative ED | -0.10* | -0.04* | -0.05 | 0.33 | -0.12 | -0.06** | | |
| RS | 0.004 | -0.001 | -0.05 | -0.13**** | 0.03**** | 0.009** | -0.09 | |
| Days | -0.07**** | -0.01**** | -0.01**** | 0.04** | -0.17**** | -0.01 | | |
| Sex/gender (male = 1; t test) (HR or Cohen's d) | 1.20 (HR = 1.20) | 0.89 (HR = 1.28) | 0.45 (d = 0.49) | 2.97**** (d = 4.21) | -1.41 (d = 1.91) | -2.08** (HR = 0.62) | 1.42 (d = 0.22) | -1.17 (d = 0.17) |

Note: Correlations involving within-person variables were estimated with multilevel modeling. Correlations between days and negative ED and RS were not computed. Sex/gender variable was dummy coded: male = 1, female = 0. HR is calculated by the ratio of males' odds of the event to females' odds of the event in each respective variable. Abbreviations: HR, hazard ratio; Hurt, hurt feelings; Negative ED, negative emotion differentiation; RS, rejection sensitivity. **p* < .1; ***p* < .05; ****p* < .01; *****p* < .001.

higher rate (by 16%) of reporting verbal aggression than those who did not report hurt feelings on that day, IRR = 1.16, CI: [1.000, 1.325]. For individuals with high levels of RS, whether or not they experienced hurt feelings was not associated with the rate of verbal aggression, IRR = 1.01, CI: [0.810, 1.204].

Regarding Hypotheses 3 and 4, the multilevel logistic models were used to analyze the main effects and two-way interactions of predictors on daily physical aggression. The results revealed that the main effect of days was significant (odds ratio [OR] = 0.61, CI: [0.494, 0.756]) while none of the other main effects were significant. The analyses involving main effects and two-way interactions indicated that the main effect of days (OR = 0.61, CI: [0.494, 0.751]) and two-way interaction between hurt feelings and RS (OR = 1.28, CI: [1.021, 1.608]) were significant.

The simple slope tests for the significant interaction between hurt feelings and RS showed that for those with low RS whether or not they felt hurt did not predict daily physical aggression, (OR = 0.68, CI: [0.22, 2.10]). However, high RS individuals were more likely to report physical aggression in days when their feelings got hurt (OR = 1.23, CI: [1.01, 1.50]) than in days when they did not experience hurt feelings. Therefore, RS exacerbated the relation between hurt feelings and physical aggression among those with high RS but not among those with low RS.

Regarding Hypotheses 5 and 6, multilevel models with normal distributions were used to analyze the main effects and two-way interactions of predictors on daily SOMA and general health, respectively (See Table 4). The results of the model involving the main effects indicated that stressors (*b* = 0.06, *p* < .001) and hurt feelings (*b* = 0.07, *p* = .01) were significantly associated with SOMA. The analyses of main effects and two-way interactions showed that the main effects of stressors (*b* = 0.05, *p* < .001) and RS (*b* = 0.02, *p* = .03), the interaction between stressors and RS (*b* = 0.01, *p* = .05) were significant. In addition, fewer stressors (*b* = -0.15, *p* = .01), not reporting hurt feelings (*b* = -0.26, *p* = .03), low RS (*b* = -0.14, *p* < .001), and being male (*b* = 0.94, *p* < .001) predicted better general health. After adding the interactions, the results showed that the number of stressors (*b* = -0.14, *p* = .002), RS (*b* = -0.13, *p* < .001) and being male (*b* = 0.94, *p* < .001) predicted better general health. None of the interactions were significant.

Regarding the significant two-way interaction between stressors and RS, the simple slope tests showed that the number of stressors was significantly associated with SOMA for those with high levels of RS, *b* = 0.07, *p* < .001, whereas such a relation was not significant among those with low levels of RS, *b* = 0.034, *p* = .056. Hence, RS intensified the strength of the association between the number of stressors and SOMA.

6.1 | Sensitivity analysis

The sensitivity analyses were performed to examine the associations between predictors and each of the two aggression variables with a normal distribution (see Supporting Information: Table 2). The

TABLE 3 Multilevel analysis results on verbal and physical aggression.

| Variables | Verbal aggression using multilevel analysis with Poisson distribution ^a | | | | Physical aggression using multilevel analysis with logistic distribution ^b | | | | |
|-------------------------------|--|---------------------|-------------|---------------------|---|---------------------|-------------|---------------------|--|
| | Step 1 | | Step 2 | | Step 1 | | Step 2 | | |
| | IRR | CI | IRR | CI | OR | CI | OR | CI | |
| Intercept | 0.11 | 0.081, 0.153 | 0.11 | 0.079, 0.151 | 0.01 | 0.005, 0.020 | 0.01 | 0.005, 0.018 | |
| Time-varying within-person | | | | | | | | | |
| STR | 1.31 | 1.123, 1.527 | 1.40 | 1.181, 1.653 | 0.93 | 0.548, 1.583 | 1.02 | 0.567, 1.843 | |
| Hurt | 1.22 | 0.897, 1.658 | 1.03 | 0.704, 1.506 | 0.85 | 0.290, 2.473 | 0.91 | 0.303, 2.761 | |
| Days | 0.82 | 0.752, 0.889 | 0.82 | 0.752, 0.887 | 0.61 | 0.493, 0.756 | 0.61 | 0.494, 0.751 | |
| Time-invariant between-person | | | | | | | | | |
| NED | 0.69 | 0.445, 1.059 | 0.70 | 0.421, 1.161 | 0.74 | 0.207, 2.641 | 0.63 | 0.162, 2.480 | |
| RS | 0.98 | 0.914, 1.056 | 1.00 | 0.920, 1.089 | 0.90 | 0.788, 1.025 | 0.86 | 0.732, 1.010 | |
| Male | 1.38 | 0.851, 2.240 | 1.38 | 0.844, 2.241 | 1.90 | 0.663, 5.462 | 1.91 | 0.643, 5.646 | |
| Cross-level within × between | | | | | | | | | |
| STR × NED | | | 1.26 | 1.014, 1.554 | | | 1.41 | 0.811, 2.437 | |
| STR × RS | | | 1.04 | 0.992, 1.100 | | | 0.95 | 0.843, 1.075 | |
| Hurt × NED | | | 0.62 | 0.371, 1.049 | | | 1.39 | 0.203, 9.512 | |
| Hurt × RS | | | 0.87 | 0.802, 0.953 | | | 1.28 | 1.021, 1.608 | |

Note: Bold fonts: key significant results.

Abbreviations: CI, confidence interval; Hurt, hurt feelings; IRR, incident risk ratio; NED, negative emotion differentiation; OR, odds ratio; RS, rejection sensitivity; STR, stressors.

^aStep 1: Intercept Variance = 1.13, $p < .001$. Step 2: Variance = 1.14, $p < .001$.

^bStep 1: Intercept Variance = 1.88, $p > .50$. Step 2: Variance = 1.93, $p > .50$.

sensitivity analyses also modeled the random slopes of within-subjects variables. The results of sensitivity analyses were comparable to the multilevel analyses with Poisson and dichotomous distributions, respectively, with the exception for the interaction between stressors and negative emotion differentiation in predicting verbal aggression. Specifically, the results of sensitivity analysis indicated that daily stressors ($b = 0.09$, $p < .001$), days ($b = -0.04$, $p < .001$), and the interaction between hurt feelings and RS ($b = -0.04$, $p = .002$) were significantly predicting verbal aggression. However, the sensitivity analyses with random slopes did not find a significant interaction between stressors and negative emotion differentiation, whereas the multilevel modeling with fixed effects showed that the moderation of negative emotion differentiation on the association between stressors and verbal aggression was significant in the multilevel modeling with Poisson distribution. None of the slopes of the within-subjects variables in either set of sensitivity analyses were significant.

7 | DISCUSSION

Using a daily diary design, the current study focused on less researched domains of externalizing and internalizing problems—verbal and physical aggression and SOMA. The current study also

included a variable of general health to supplement the assessment of SOMA. The study investigated the association of stressors and hurt feelings to each of the outcome variables and also examined the role of RS and negative emotion differentiation on the associations between these daily variables. Regarding Hypotheses 1 and 2, the finding indicated that daily stressors predicted daily verbal aggression. Moderation analyses revealed that negative emotion differentiation moderated the association between daily stressors and verbal aggression such that negative emotion differentiation increased the association of daily stressors to verbal aggression. RS moderated the association between hurt feelings and verbal aggression, in which RS intensified the association between hurt feelings and verbal aggression. Regarding Hypotheses 3 and 4, the only significant predictors of physical aggression were the variable days and the interaction between hurt feelings and RS. Follow-up analyses on the moderation of RS on the relation between hurt feelings and physical aggression indicated that RS exacerbated the relation between hurt feelings and physical aggression. Regarding Hypotheses 5 and 6, the findings showed that daily stressors, hurt feelings, and high RS predicted daily SOMA and general health, respectively. RS moderated the association between stressors and SOMA such that more stressors and high RS predicted more SOMA. When comparing the different influences of stressors and hurt feelings on outcome variables, the findings demonstrated stressors predicted both externalizing and internalizing

TABLE 4 Multilevel analysis results on daily somatic symptoms and general health.

| Variables | Somatization ^a | | | | | | General health ^b | | | | | |
|---------------------------------|---------------------------|------|----------|-------------|-------------|------------|-----------------------------|-------------|----------|-------------|-------------|----------|
| | Step 1 | | | Step 2 | | | Step 1 | | | Step 2 | | |
| | <i>b</i> | SE | <i>p</i> | <i>b</i> | SE | <i>p</i> | <i>b</i> | SE | <i>p</i> | <i>b</i> | SE | <i>p</i> |
| Intercept | 1.24 | 0.03 | <.001 | 1.24 | 0.03 | <.001 | 6.49 | 0.14 | <.001 | 6.48 | 0.15 | <.001 |
| Time varying (within person) | | | | | | | | | | | | |
| Stressors | 0.06 | 0.01 | <.001 | 0.05 | 0.01 | <.001 | -0.15 | 0.06 | .01 | -0.14 | 0.06 | .02 |
| Hurt feelings | 0.07 | 0.03 | .01 | 0.07 | 0.04 | .11 | -0.26 | 0.12 | .03 | -0.10 | 0.13 | .45 |
| Days | 0.00 | 0.01 | .85 | 0.00 | 0.01 | .84 | 0.002 | 0.03 | .95 | 0.002 | 0.03 | .94 |
| Time invariant (between person) | | | | | | | | | | | | |
| NED | -0.02 | 0.04 | .65 | -0.03 | 0.04 | .46 | 0.30 | 0.22 | .19 | 0.26 | 0.24 | .29 |
| RS | 0.02 | 0.01 | .11 | 0.02 | 0.01 | .03 | -0.14 | 0.03 | <.001 | -0.13 | 0.03 | <.001 |
| Male | -0.04 | 0.06 | .51 | -0.04 | 0.06 | .48 | 0.94 | 0.25 | <.001 | 0.94 | 0.25 | <.001 |
| Cross-level (within × between) | | | | | | | | | | | | |
| Stressors × NED | | | | -0.02 | 0.02 | .32 | | | | -0.04 | 0.11 | .74 |
| Stressors × RS | | | | 0.01 | 0.00 | .05 | | | | -0.02 | 0.01 | .19 |
| Hurt feelings × NED | | | | -0.03 | 0.07 | .70 | | | | 0.41 | 0.28 | .15 |
| Hurt feelings × RS | | | | -0.01 | 0.01 | .49 | | | | -0.04 | 0.04 | .33 |

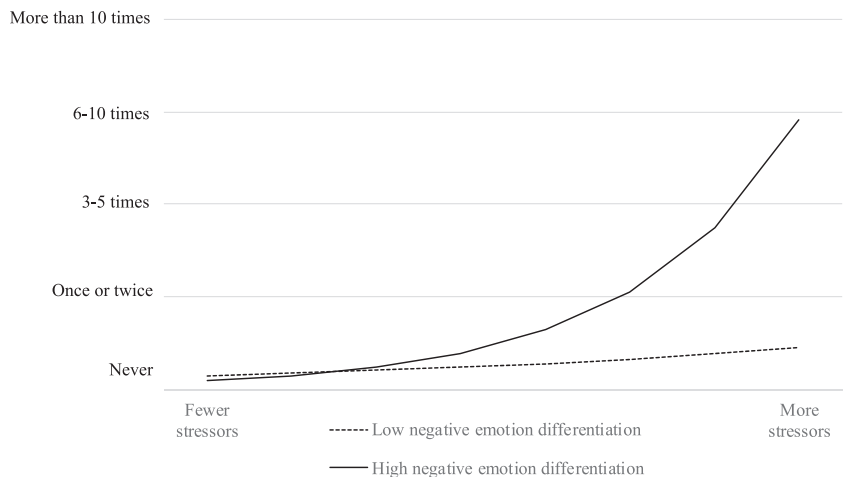
Note: Bold fonts: key significant results.

Abbreviations: *b*, unstandardized coefficients; Hurt, hurt feelings; NED, negative emotion differentiation; RS, rejection sensitivity; SD, standard deviation; SE, maximum likelihood estimation with standard error; STR, stressors.

^aStep 1: Intercept VAR = 0.12, *p* < .001; days VAR = 0.005, *p* < .001; stressors VAR = 0.01, *p* > .50; hurt feelings VAR = 0.01, *p* > .50. Residual *r* = .08, SD = 0.28. Step 2: Intercept VAR = 0.12, *p* < .001; days VAR = 0.005, *p* < .001; stressors VAR = 0.009, *p* > .50; hurt feelings VAR = 0.007, *p* > .50. Residual *r* = .08, SD = 0.28.

^bStep 1: Intercept VAR = 2.06, *p* < .001; days VAR = 0.03, *p* = .19; stressors VAR = 0.05, *p* = .36; hurt feelings VAR = 0.11, *p* = .16. Residual *r* = 1.23, SD = 1.11. Step 2: Intercept VAR = 2.06, *p* < .001; days VAR = 0.03, *p* = .18; stressors VAR = 0.04, *p* = .29; hurt feelings VAR = 0.11, *p* = .12. Residual *r* = 1.23, SD = 1.11.

FIGURE 1 Expected frequencies of verbal aggression with Poisson distribution.



symptoms (i.e., verbal aggression, SOMA, and general health), whereas hurt feelings only predicted internalizing symptoms. Hurt feelings are intertwined with cognitive processing of concomitant negative emotions (Leary & Leder, 2009), the process of which involves internal psychological processes. Therefore, hurt feelings precipitate the development of SOMA and inflict general health.

7.1 | Predictors of verbal and physical aggression (Hypotheses 1–4)

The current findings revealed the link between stressors and verbal aggression in a daily setting, which adds to the literature that aggression could be a coping mechanism for daily stressors

(Wyckoff, 2016). It is also important to note that such a relation was not significant in physical aggression, which might be attributed to a low occurrence rate of physical aggression (e.g., percentage <1% in Day 6 or Day 7). Negative emotion differentiation moderated the association between stressors and verbal aggression such that more stressors and higher negative emotion differentiation predicted a higher rate of daily verbal aggression. This finding was contradictory to the hypothesized relation and the literature (Pond et al., 2012; Starr et al., 2017). Verbal aggression is not a socially desirable action, but some individuals may use verbal aggression to vent negative emotions derived from stress. Therefore, it was possible that people with high negative emotion differentiation were able to process and differentiate negative emotions and thus obtained sustained exposure to negative emotions derived from stressors. As such, they were more likely to use venting to cope with stressors, which was embodied as verbal aggression. On the contrary, those with low negative emotion differentiation may only process and differentiate negative emotions to a limited degree, which in turn less likely to trigger verbal aggression. RS moderated the association between hurt feelings and verbal aggression such that hurt feelings and low RS predicted verbal aggression. The unexpected findings could be attributed to people with low RS being less sensitive to social cues and less motivated to comply with social desirability. As a result, they may choose to regulate negative emotions with verbal aggression. On the contrary, because people with high RS were sensitive to ambivalent or negative social cues, they may choose to withdraw from the unpleasant social encounters (Downey et al., 1998; London et al., 2007; Marston et al., 2010), which predicted less verbal aggression.

The current study revealed that RS weakened the association between hurt feelings and verbal aggression, but intensified the relation between hurt feelings and physical aggression. The differential moderation effects of RS on the associations of hurt feelings to verbal and physical aggression may be attributed to the different occurrence rates and different functions of these two forms of aggression. Verbal aggression often occurs in the absence of physical aggression and there can be a natural progression from verbal aggression to physical aggression (Stets, 1990). The current study found that participants reported higher daily occurrence of verbal aggression than physical aggression. Physical aggression serves as a strategy of exerting power which involves using behavioral attacks and punishments to gain compliance. It is possible that when high RS individuals experienced hurt feelings, they withdrew from unpleasant social events to prevent further social rejections, which was embodied as less verbal aggression. That said, high RS may also adopt physical aggression, albeit less frequent, to cope with hurt feelings and restore positive self-perception.

7.2 | Predictors of SOMA (Hypotheses 5 and 6)

Consistent with the literature (Irwin, 2011; Kiecolt-Glaser et al., 2005; Takahashi et al., 2018), the current study revealed that more

stressors and hurt feelings predicted more SOMA and worse general health. Neuroimmunological studies reveal that stressors increase the level of proinflammatory cytokines, which are associated with nonspecific sickness symptoms (Altamura et al., 2022; Schwarz, 2003). As a result, these detrimental effects may embody more SOMA and worse physical health. The association between RS and SOMA and general health can be explained by the fact that RS predicts a greater tendency to perceive or overreact to rejection (Downey & Feldman, 1996). As a result, high RS individuals experience chronic stress, which in turn predicts negative health-related outcomes, such as SOMA or physical health. The negative association of RS to general health adds to the limited literature that points to the detrimental effect of RS on health. As for the moderation, RS increased the relation between hurt feelings and SOMA. High RS individuals may experience greater degrees of anxiety or anger in negative social encounters and be motivated to use either social withdrawal or retribution strategies to relieve the negative emotions. As such, they experienced more internalizing conflicts and had more opportunities in international conflicts, in turn, contribute to physical aggression and SOMA. In addition, the activation of the defensive mechanism of RS often co-occurs with situations that trigger hurt feelings. This is consistent with the moderation role of RS in the association between hurt feelings and each of the outcome variables and corroborates the importance of RS in understanding externalizing and internalizing symptoms experienced in daily life. In addition, most of the literature on RS and aggression focuses on close relationships or extreme situations, The current findings add to the literature by showing the negative influences of RS in daily life.

7.3 | Limitations and future directions

The current study has several limitations. First, the study recruited a sample of college students in a Southern state. The number and type of stressors and social pains that these college students experienced on a daily basis might not be applicable for other populations. Thus, the generalization of the findings is limited. Second, because of concurrent same-day assessment, the associations of stressors and hurt feelings to each of the dependent variables were bidirectional. Thus, no causality could be inferred from the findings. It was possible that people who reported more aggression or had more somatic complaints tended to experience more daily stressors and hurt feelings. Future research with data allowing for testing lagged effects may consider examining temporal relations between these daily variables. Third, due to model nonconvergence on random effects, the slopes were fixed, which may lead to biased interpretations on the findings. Relatedly, although the majority of the results of sensitivity analyses were comparable to the main analyses, there was one exception pertaining to one of the key hypotheses. That is, the interaction between stressors and negative emotion regulation was not significant when the effects were modeled with random slopes and verbal aggression followed a normal distribution. On the

contrary, such an interaction was significant when the multilevel modeling with Poisson distribution included fixed slopes. Future research may need to replicate the moderation of emotion differentiation on the association between stressors and verbal aggression. Fourth, it is possible that people with high RS and low negative emotion differentiation tend to develop a negative perception of neutral or ambiguous social cues, which lead to more stressors or hurt feelings. In this sense, daily stressors and hurt feelings serve as mediators between the trait of RS and negative emotion differentiations and the dependent variables. Fifth, the current study examined the association of predictors to each dependent variable, separately, without accounting for the possible associations between dependent variables (e.g., aggression predicts SOMA, Yang, 2020a). Future research with data allowing for more intricate analytic models may consider testing if aggression or SOMA may serve as a “proxy” mediator between a predictor and an outcome. Sixth, the study used a single-item tool to assess hurt feelings and general health. Although it is acceptable to adopt a single item to assess less complex concepts in a daily setting (e.g., Groen et al., 2022; Wiley et al., 2022), future research may benefit from innovative assessment methods to capture daily functioning while not adding too much response burden to participants. Seventh, the current study did not differentiate between anxious and angry RS (McDonald et al., 2010). The unexpected role of RS on the association between hurt feelings and verbal aggression implies that anxious RS may play a role underlying the association between hurt feelings and verbal aggression in certain types of daily stressors. Future research is needed to clarify the distinctive role of anxious and angry RS in social withdrawal versus seeking retribution. Relatedly, people with high negative emotion differentiation and low RS reported more verbal aggression when they reported more stressors and social pains. In this sense, verbal aggression is perceived as a functional, adaptive strategy in a stressful daily setting among people who are deemed to have better psychological functioning to cope with stressors and related emotions. Therefore, future research may benefit from exploring the role of verbal aggression in regulating emotions arisen from negative social interactions. It is also important to note that the unexpected findings also speak to the importance of context in understanding relations of daily predictors to aggression and SOMA (Park et al., 2018).

7.4 | Implication

The current study has several implications for practitioners. First, the current findings demonstrate that aggressive behavior could arise out of negative emotions in unpleasant social interactions. The relations also depend on individual traits, such as RS and negative emotion differentiation. Interventions target aggression need to include coping skills for how to deescalate the impact of negative social events in a dynamic daily setting. Second, social pains associated with stressors are important intervention markers for SOMA and general health. Third, although emotion differentiation is a precursor to

adaptive emotion processing, additional regulatory strategies, such as emotion appraisal, are also important in helping people inflicted with daily stressors. Fourth, given individuals with high RS are more susceptible to physical aggression and SOMA, self-affirmation practices and interventions addressing high-valence negative emotions such as mindfulness interventions would help alleviate the negative influence of RS when exposed to stressors and hurt feelings.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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