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Yi Jing CHUA

Singapore Management University, yijing.chua.2022@msps.smu.edu.sg

Nadyanna M. MAJEED

Verity Yu Qing LUA

Singapore Management University, verity.lua.2021@msps.smu.edu.sg

Chi-ying CHENG

Singapore Management University, cycheng@smu.edu.sg

Andree HARTANTO

Singapore Management University, andreeh@smu.edu.sg

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# **Subjective socioeconomic status moderates self-esteem reactivity to daily stressor exposure: Evidence from a daily diary approach**

CHUA, Yi Jing; Singapore Management University

MAJEED, Nadyanna M.; National University of Singapore

LUA, Verity Y. Q.; Stanford University

CHENG, Chi-Ying; HARTANTO, Andree; Singapore Management University

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**Abstract:** Research on self-esteem reactivity has demonstrated that self-esteem fluctuates in response to daily stressor exposure, and the strength of this relationship varies between individuals. Drawing upon the positive link between objective socioeconomic status (SES) and self-esteem, how subjective SES influences self-esteem reactivity to daily stressor exposure was explored. Using a 7-day daily diary study, the current study (N-participants = 243, N-days = 1651) adopted a multilevel analysis to demonstrate that subjective SES attenuated the within-person association between daily stressor exposure and daily self-esteem, even after controlling for demographics and objective indicators of SES. The interactions were also consistent across social stressors and non-social stressors. The findings provide evidence supporting the protective role of subjective SES in self-esteem reactivity to daily stressor exposure.

**Keywords:** Daily self-esteem, daily stressor exposure, subjective socioeconomic status, daily diary, multilevel modelling

## **Introduction**

Self-esteem is one of the most important psychological constructs in psychology research (Pyszczynski et al., 2004; Rosenberg, 1965). While high levels of self-esteem deem to predict positive personal outcomes including one's resilience, high functioning, and subjective well-being, counter-intuitive negative outcomes such as defensiveness and self-aggrandizement are also observed (e.g., Abdel-Khalek, 2016; Baumeister et al., 1996; Heppner & Kernis, 2011). To reconcile the contradictory findings surrounding high self-esteem, Kernis and colleagues (Kernis, 1993; Kernis & Waschull, 1995) introduced the dimension of self-esteem stability to add on to the mean level of self-esteem, a common measure of self-esteem. Self-esteem stability is defined as the degree of variation in an individual's affective evaluation of his own worth (i.e., self-esteem) over short time intervals (Greenier et al., 1999). In other words, in addition to high versus low mean levels of self-esteem, individuals can vary on the stability versus fluctuation of self-esteem on a daily basis. Self-esteem stability has been found to be related to important psychological outcomes such as better psychological well-being and a lower risk of developing depression (e.g., Butler et al., 1994; Franck et al., 2016; Kernis, 2005; Zeigler-Hill & Wallace, 2012). The utility of taking into account both self-esteem level and self-esteem stability is evident (e.g., Seery et al., 2004; Vaughan et al., 2014; Zeigler-Hill et al., 2014). For example, Seery et al.'s (2004) research showed that individuals with stable high self-esteem (i.e., high self-esteem level and high self-esteem stability) perceived failure as a challenge (i.e., a positive reaction), whereas those with unstable high self-esteem (i.e., high self-esteem level and low self-esteem stability) perceived failure as a threat (i.e., a negative reaction).

An important factor that may affect the stability of daily self-esteem is daily stressor exposure. Daily stressors are minor inconveniences in everyday life, such as disagreements with family members or deadlines at work (Almeida et al., 2002), and have been consistently linked to poor physical and affective well-being (Hill et al., 2018; Kiang & Buchanan, 2014; Ng et al., 2022; Surachman et al., 2019). Based on Lazarus and Folkman's (1984) theory of stress, self-esteem may be reactive to daily stressor exposure when the individual perceives these stressors as uncontrollable and is unable to effectively manage those stressors. Accordingly, research on daily self-esteem has demonstrated that daily self-esteem is negatively associated with daily stress levels (Montpetit & Tiberio, 2016), having more negative daily life events than positive daily life events

life events (Zuffianò et al., 2023) and having a higher number of daily stressors (Tolpin et al., 2004). While there is individual variability in self-esteem reactivity to daily stressor exposure (e.g., Dasch et al., 2008; Montpetit & Tiberio, 2016; Nezlek & Gable, 2001), little is known about what kind of people may be more receptive to self-esteem reactivity. Previous studies have shown that the self-esteem of depressed individuals and individuals who overvalue interpersonal relationships (i.e., high in sociotropy) are more vulnerable when confronted with daily stressors and interpersonal stressors respectively (Dasch et al., 2008; Nezlek & Gable, 2001), providing preliminary evidence for individual differences in self-esteem reactivity.

This study aims to investigate individuals' socioeconomic status (SES) as an individual difference and see how it influences self-esteem reactivity. SES is the position of an individual on the socioeconomic scale, which is determined by a combination of social and economic factors such as income, education, and occupation (Marmot et al., 1987). Given that SES usually serves as a social indicator of individuals and affords self-appraisals, it could have an impact on self-esteem (Rosenberg & Pearlin, 1978). This notion has been supported by a positive association between SES and self-esteem demonstrated in Twenge and Campbell's (2002) meta-analysis. While social economic status has historically been measured primarily by objective SES indicators such as occupation, education, and income, measures of objective SES are in fact used as proxies for individuals' social indicators, implying that how individuals perceive and make sense of their objective SES matters for their reactivity to self-esteem. Drawing upon the findings of Singh-Manoux et al. (2003) who demonstrated that subjective SES captures one's perception of own SES, this study aims to investigate whether subjective SES attenuates self-esteem reactivity to daily stressor exposure. Subjective SES will be introduced in the ensuing section.

### *Subjective Socioeconomic Status and Self-Esteem*

Subjective SES is a measure of one's perception of one's socioeconomic position in society (Singh-Manoux et al., 2003). Intuitively, individuals' subjective SES should be closely aligned with their objective SES, such that the effects of the two should be redundant when dealing with daily stressors. However, subjective SES is actually a more comprehensive and nuanced indicator of SES than objective SES because individuals consider their past socioeconomic status and future opportunities in addition to current objective indicators of SES when determining their subjective SES (Singh-Manoux et al., 2003). Indeed, empirical evidence shows that subjective SES predicts physical and psychological outcomes (e.g., Cundiff & Matthews, 2017; Zell et al., 2018) such as subjective reports of health status (Operario et al., 2004; Präg, 2020) and chronic negative affect (Kraus & Park, 2014). Thus, subjective SES is likely to attenuate the relationship between self-esteem reactivity and daily exposure to stressors over and above objective SES.

One possible mechanism by which subjective SES is related to the reactivity of self-esteem to daily stressors is the sense of control. First, self-esteem is positively related to internal locus of control (e.g., Kurtović et al., 2018; Pu et al., 2017; Yang et al., 2014), which is the belief that one has control over the outcome of events in his/her lives

(Rotter, 1966). Specifically, individuals who believe they have more control over their outcomes exhibit higher self-esteem. Furthermore, research has shown that these control beliefs are in fact malleable and can vary in daily life (Koffer et al., 2019; Ong et al., 2005). This is because different situations place different demands on individuals, hence causing individuals' control beliefs to fluctuate depending on how well they think they can handle a particular situation. To the extent that control beliefs fluctuate in the face of adverse situations such as daily stressors, this would also lead to fluctuations in self-esteem. As a result, it is likely that self-esteem is reactive due to changes in control beliefs in the face of daily stressors.

Furthermore, when confronted with similar stressors, it is found that individuals with lower subjective SES are more vulnerable and exhibit higher levels of psychological reactivity including both physical and affective reactivity (Derry et al., 2013; Rahal et al., 2020; Yong et al., 2021). Research has also demonstrated that individuals with low subjective SES are more likely to perceive stressors as threatening (Derry et al., 2013), possibly due to their lower perceived environmental mastery and control compared to those with high subjective SES (Chen & Paterson, 2006; Kraus et al., 2009; Navarro-Carrillo et al., 2020). Indeed, individuals with low subjective SES tend to believe that exerting control over their lives is futile because they face greater constraints and have limited access to resources (Kraus et al., 2012). As a result, those with low subjective SES may be more likely to experience lower perceived control when faced with stressors compared to individuals with high subjective SES. However, to date, how subjective SES is related to self-esteem reactivity in daily life has not been examined, which begs empirical investigation. Given that both subjective SES and self-esteem are related to similar constructs assessing sense of control, it is predicted that levels of subjective SES may influence self-esteem reactivity in response to daily stressor exposure. This is because perceived control may swing more among individuals with low SES when they feel threatened by daily stressors.

### *Type of Daily Stressor Exposure and Self-Esteem*

The attenuating role of high subjective SES on self-esteem reactivity to daily stressor exposure could potentially be specific to life domains. Research has shown that individuals with lower subjective SES are more motivated to behave in ways that allow them to build social ties with others compared to individuals with higher subjective SES (e.g., Kraus & Keltner, 2009; Piff et al., 2010), possibly because individuals with lower social status need more help from others in their external environment to achieve their goals. To the extent that behaving in a socially engaging manner is important to individuals with lower subjective socioeconomic status, they would also be more likely to exhibit increased reactivity to stressors that could potentially compromise their ability to connect with others (i.e., social stressors) compared to other type of stressors (i.e., non-social stressors). This reasoning is partially supported by Hooker et al.'s (2017) study, which found that participants with lower subjective SES did not show higher emotional reactivity to stressors when they had high levels of perceived support

compared to participants with higher subjective SES. However, there has yet to be a study examining whether the moderating role of subjective SES on self-esteem reactivity differs between social stressors and non-social stressors.

## The Current Study

Drawing upon the proposed rationales, the present study examined whether subjective SES moderates the relationship between daily stressor exposure on self-esteem reactivity and whether the moderating role of subjective SES in the relationship between daily stressor exposure and self-esteem reactivity is affected by stressor type (i.e., social vs. non-social stressors). It was hypothesized that participants with higher levels of subjective SES would demonstrate lower levels of self-esteem reactivity when exposed to daily stressors in comparison to participants with lower levels of subjective SES (H1). Furthermore, we hypothesized that the moderating role of subjective SES on the relationship between daily stressor exposure and self-esteem reactivity would apply to exposure to social stressors but not to exposure to non-social stressors (H2). A multilevel approach by utilizing a diary study design was employed to test both hypotheses. This study design allowed us to examine day-to-day fluctuations in daily stressor exposure and reactivity of self-esteem while controlling for demographic variables such as age, sex, and objective SES.

## Method

### *Participants and Design*

253 participants were recruited from a local university's subject pool system in Singapore as part of a larger project investigating daily experiences and well-being (see [Goh et al., 2023](#); [Majeed, Kasturiratna, et al., 2023](#); [Ng et al., 2022](#)). Participants provided informed consent to participate in the study, which the Institutional Review Board at the authors' university had approved. We excluded 10 participants because they had missing data on the "Parents' education level" variable. As a result, the current analysis comprised data from 243 individuals.

Participants completed a baseline questionnaire across two sessions and performed a 7-day daily diary survey which started within 2 days from the second baseline session. The link to the daily diary survey was emailed to participants at 8 p.m. every night, and the survey could be completed between 8 p.m. that day till 3 a.m. the day after. On average, each participant completed 6.80 days of daily diary surveys (97% completion rate). Participants' descriptive statistics has been summarized in [Table 1](#).

### *Measures*

**Daily Stressor Exposure.** The Daily Inventory of Stressful Events (DISE) was used to measure daily stressor exposure ([Almeida et al., 2002](#)). There are seven categories of stressors in DISE, namely discrimination, work/education stressors, network stressors,

**Table I.** Summary of Descriptive Statistics.

Variable	N	M	SD	Observed Range	Theoretical Range	ICC
<b>Person level</b>						
Sex (% female)	243	76%				
Race (% Chinese)	243	75%				
Age (in years)	243	22.10	1.65	19–29		
Monthly household income	243	3.02	1.43	1–6	1–6	
Parents' education level	243	6.20	2.66	0–10	0–10	
Mother's education level	243	5.31	2.79	0–10	0–10	
Father's education level	243	5.47	2.99	0–10	0–10	
Subjective SES	243	6.11	1.26	2–10	1–10	
<b>Day level</b>						
Daily stressor exposure	1651	38%				.63
Daily social stressor exposure	1651	29%				.59
Daily non-social stressor exposure	1651	24%				.67
Daily self-esteem	1651	3.84	0.81	1–5	1–5	.51

Note. For person-level variables, *N* refers to the number of participants. For day-level variables, *N* refers to the number of observations.

arguments, avoided arguments, stressors at home, and “other stressors” (Almeida et al., 2002). During the daily diary survey, participants were asked if they had experienced any of the seven types of stressors. In line with previous research on daily stressor exposure (e.g., Almeida et al., 2002; Majeed et al., 2021; Ng et al., 2022), the day was considered a *stressor day* if the participant reported experiencing at least one of the seven stressors and otherwise was considered a *non-stressor day* if the participant reported experiencing none of the seven stressors. A stressor day was coded as 1 and a non-stressor day was coded as 0 in our analyses.

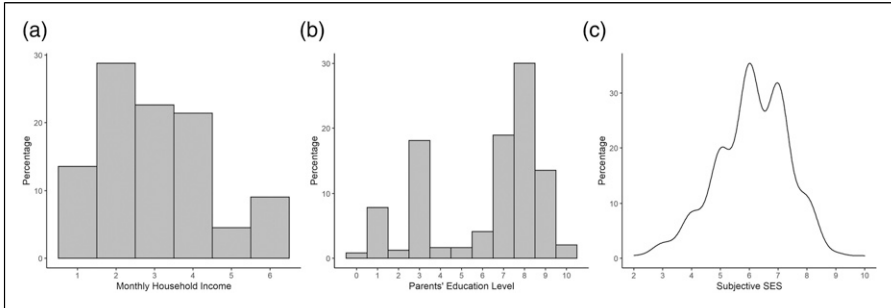
In addition, daily stressor exposure was further specified in the current work in terms of whether any *social* and/or *non-social* stressors were experienced that day by classifying the seven categories of stressors in the original DISE into social and non-social types of stressors. Specifically, four types of stressors—arguments, avoided arguments, discrimination, and network stressors—were considered social stressors. The remaining three categories of stressors—work/education stressors, stressors at home, and “other stressors”—were considered non-social stressors. Similar to daily stressor exposure, days were considered *social stressor days* and/or *non-social stressor days* (coded as 1) if at least one of the respective type of stressor occurred, and *social non-stressor day* and/or *non-social non-stressor day* (coded as 0) otherwise.

**Daily Self-Esteem.** Daily self-esteem was measured using both state self-esteem items from the Momentary Self-Views scale (Majeed, Chua, et al., 2023). The two items were

taken verbatim from Rosenberg's Self-Esteem Scale (Rosenberg, 1979). The two items were only modified in terms of timeframe, with participants rating their agreement to the two items "in the present moment." Specifically, participants rated their agreement with two statements ("I am inclined to feel I am a failure", reverse-scored; "I take a positive attitude towards myself") on a 5-point Likert scale (1 = *Strongly disagree*, 5 = *Strongly agree*) after reading a preamble ("Think about how you feel in the present moment and rate your agreement with each statement. In the present moment..."). Daily self-esteem was computed by averaging the two items on each day for each participant ( $\alpha_{\text{within}} = .11$ ,  $\alpha_{\text{between}} = .87$ ).

**Subjective SES.** Subjective SES was measured at baseline using a 10-point ladder scale adapted from Adler et al. (2000). Participants were shown a picture of a ladder and were informed that the ladder represented every individual in their society. The ladder had 10 rungs, with the top rung representing individuals with the best financial situation, education and jobs, and the bottom rung representing individuals with the worst financial situation, the worst jobs, or no jobs. Then participants had to choose the most appropriate rung of the ladder that represented their perceived social standing in the community (1 = *lowest standing*, 10 = *highest standing*). The density plot for subjective SES is shown in Figure 1.

**Demographics.** Participants provided demographic information regarding their sex, race, age and objective SES during the baseline survey. Participants provided information about their race by selecting one of the four options, "Chinese," "Malay," "Indian," or "Others", which corresponded to the primary system for race classification in Singapore (Choong, 2021). Monthly household income and parents' education level were used as indicators of participants' objective SES. Participants' monthly household income was measured using their family income on a 6-point scale (1 = Less than \$2,000, 2 = \$2000–\$5,999, 3 = \$6000–\$9,999, 4 = \$10,000–\$14,999, 5 = \$15,000–\$19,999, 6 = More than \$20,000). Participants' father's education level and mother's education level were each measured using a single item on an 11-point scale (0 = *No formal schooling*, 1 = *Primary School (PSLE)*, 2 = *N-Level*, 3 = *O-Level*, 4 = *Nitec*, 5 = *Higher Nitec*, 6 = *A-Level and International Baccalaureate (IB)*, 7 = *Polytechnic Diploma or Other Diploma*, 8 = *Bachelor's Degree*, 9 = *Master's Degree*, 10 = *PhD, EdD, JD, or other professional degree*). Due to a strong correlation between mother's education level and father's education level ( $r = .62$ , 95% CI = [.54, .69],  $t(241) = 12.37$ ,  $p < .001$ ), we created a new variable (i.e., parents' education level) by coding for the parent with the higher education level. For example, if a participant's father's education level was greater than their mother's education level, the value indicating father's education level was employed as the value for parents' education level. The histogram plots for monthly household income and parents' education level are shown in Figure 1.



**Figure 1.** Histogram plot for monthly household income (panel A) and parents' education level (panel B) and density plot for subjective SES (panel C).

### Analytic Plan

We used multilevel modeling to evaluate (1) the influence of subjective SES on the association between daily stressor exposure and daily self-esteem and (2) the influence of subjective SES on the association between daily exposure to social and non-social stressors and daily self-esteem. Multilevel analysis was used to accommodate the two-level data structure, where repeated measures over 7 days (Level 1) were nested within participants (Level 2).

**Direct Relationship Between Daily Stressor Exposure and Daily Self-Esteem.** To investigate the direct relationship between daily stressor exposure (for each type) and daily self-esteem, daily stressor exposure (for each type) was included at Level 1 (Enders & Tofghi, 2007) while its person-level mean was included at Level 2. The equation for the Direct Model is shown below. The parameter of interest is  $\gamma_{10}$  which denotes the within-person change in daily self-esteem in relation to daily stressor exposure.

Direct Model:

$$\text{Level 1: } (\text{Daily self-esteem})_{di} = B_{0i} + B_{1i}(\text{daily stressor exposure})_{di} + \varepsilon_{di}$$

$$\text{Level 2: } B_{0i} = \gamma_{00} + \gamma_{01}(\text{average stressor exposure})_i + \mu_{0i}$$

$$B_{1i} = \gamma_{10} + \mu_{1i}$$

In the level 1 equation, participant  $i$ 's mean level of self-esteem on non-stressor days is represented by  $B_{0i}$  and the influence of variation in daily stressor exposure on daily self-esteem is represented by  $B_{1i}$ . In the level 2 equation,  $B_{0i}$  is modeled as a function of participant  $i$ 's average stressor exposure over the week. The amount of deviation from the model-implied values for intercept and slope for daily stressor exposure for each participant are represented by  $\mu_{0i}$  and  $\mu_{1i}$  respectively.

**Moderating Role of Subjective SES.** A cross-level interaction between daily stressor exposure (Level 1) and subjective SES (Level 2) was incorporated in an Unadjusted Moderation Model to investigate the moderating role of subjective SES on the relationship between daily stressor exposure (for each type) and daily self-esteem. Level



2 covariates were added in an additional Adjusted Moderation Model. These covariates were age, race, sex, and measures of objective socioeconomic status (household income and parents' education level). Sex and race were dummy-coded using the reference category of female and majority race (i.e., Chinese) respectively. The cross-level interaction between daily stressor exposure and each covariate was also included in the Adjusted Moderation Model to accurately estimate the moderating role of subjective SES after accounting for the stated covariates (Yzerbyt et al., 2004). In the equations of the Adjusted Moderation Model shown below, the parameter of interest is  $\gamma_{11}$  which denotes the between-person differences in self-esteem reactivity due to subjective SES.

Adjusted Moderation Model:

Level 1: (Daily self-esteem) $_{di} = B_{0i} + B_{1i}(\text{daily stressor exposure})_{di} + \varepsilon_{di}$

Level 2:  $B_{0i} = \gamma_{00} + \gamma_{01}(\text{average stressor exposure})_i + \gamma_{02}(\text{subjective SES})_i + \gamma_{03-07}(\text{covariates})_i + \mu_{0i}$

$B_{1i} = \gamma_{10} + \gamma_{11}(\text{subjective SES})_i + \gamma_{12-16}(\text{covariates})_i + \mu_{1i}$

At Level 1, participant  $i$ 's mean level of self-esteem on non-stressor days is represented by  $B_{0i}$ , while the change in daily self-esteem from a non-stressor day to a stressor day is represented by  $B_{1i}$ . In the Level 2 equations,  $B_{0i}$  is modeled as a function of participant  $i$ 's average stressor exposure, subjective SES and other covariates to account for between-person variations.  $B_{1i}$  is modeled as a function of subjective SES and other covariates as a test of how participants' daily self-esteem reactivity differs by their level of subjective SES and covariates. For each participant,  $\mu_{0i}$  and  $\mu_{1i}$  reflect the amount of deviation from the model-implied values for intercept and slope of daily stressor exposure respectively.

To further understand the cross-level interaction, we conducted two follow-up analyses. Simple slopes were first computed to examine the association between daily stressor exposure and daily self-esteem at contrasting levels of subjective SES. Then, we used the Johnson-Neyman technique (Johnson & Fay, 1950) to identify the estimated value of subjective SES at which daily self-esteem was no longer significantly predicted by daily stressor exposure.

### Transparency and Openness

The design and analysis plan of the current study were not pre-registered. Data, relevant materials, and analytic code of the study have been made publicly available on Researchbox (#682; <https://researchbox.org/682>).

Data analyses were carried out in *R* version 3.6.3 (R Core Team, 2021) with *psych* version 2.1.9 (Revelle, 2022) used to generate descriptive statistics. ICCs were calculated based on null models (i.e., models with random intercept only) in line with merTools version 0.5.2 (Knowles et al., 2020), modified to use Bound Optimization BY Quadratic Approximation (BOBYQA) and 200,000 maximum iterations in order to prevent convergence failures. Following Majeed, Kasturiratna, et al. (2023), reliability for day-level measures were calculated using the procedure outlined by Bonito et al. (2012) and Nezlek (2017). *lme4* version 1.1–28 (Bates et al., 2015) and *lmerTest* version 3.1–3

(Kuznetsova et al., 2017) were used to carry out multilevel modeling. The full dataset was standardized (including dummy-coded variables of race and gender and person-centered daily stressor exposure) and multilevel analysis was rerun using *effects* version 0.4.5 (Ben-Shachar et al., 2020) on the standardized dataset to yield effect sizes represented by standardized coefficients. The dummy-coded variables of race and gender were also standardized so that the effect sizes from rerunning the analysis for those variables will reflect the effect of those variables (i.e., sex, ethnicity) on daily self-esteem, instead of reflecting the effect of reference category of those variables (i.e., male, Chinese) on daily self-esteem. The online calculator <https://www.danielsoper.com/statcalc/calculator.aspx?id=103> was used to test whether there was a significant difference in slope estimates (Soper, 2023). An additional online calculator <http://www.quantpsy.org/interact/hlm2.htm> was used to generate the R code required for computing simple slopes, Johnson-Neyman analyses and the corresponding plots (Preacher et al., 2023).

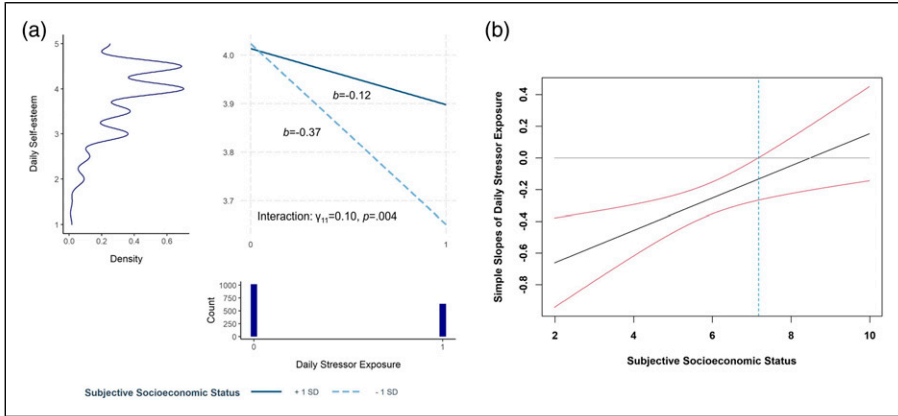
## Results

### *Daily stressor exposure and daily self-esteem*

Daily stressor exposure and average stressor exposure were significantly and negatively related to daily self-esteem in the Direct Model. In particular, participants experienced lower levels of self-esteem on stressor days compared to non-stressor days (i.e., within-person;  $\gamma_{10} = -0.22$ ,  $SE = 0.04$ ,  $\beta = -.13$ , 95% CI =  $[-.18, -.08]$ ,  $p < .001$ ). Furthermore, participants who were exposed to stressors across the 7 days generally experienced lower levels of daily self-esteem compared to participants who were not exposed to stressors, to a small extent (i.e., between-person;  $\gamma_{01} = -0.43$ ,  $SE = 0.13$ ,  $\beta = -.15$ , 95% CI =  $[-.25, -.06]$ ,  $p = .002$ ).

### *Subjective SES and Self-Esteem Reactivity*

In support of our hypothesis, we found a significant cross-level interaction between daily stressor exposure and subjective SES on same-day self-esteem (Unadjusted Moderation Model:  $\gamma_{11} = 0.07$ ,  $SE = 0.03$ ,  $\beta = .05$ , 95% CI =  $[.01, .10]$ ,  $p = .021$ ; Adjusted Moderation Model:  $\gamma_{11} = 0.10$ ,  $SE = 0.03$ ,  $\beta = .08$ , 95% CI =  $[.02, .13]$ ,  $p = .004$ ). Simple slopes analysis (Figure 2 Panel A) revealed that participants lower in subjective SES (1 *SD* below the mean) reported significant decreases in self-esteem on stressor days compared to non-stressor days ( $b = -0.37$ ,  $SE = 0.06$ , 95% CI =  $[-0.49, -0.25]$ ,  $p < .001$ ). However, the decrease in self-esteem on stressor days compared to non-stressor days did not reach statistical significance for participants higher in subjective SES (1 *SD* above the mean;  $b = -0.12$ ,  $SE = 0.07$ , 95% CI =  $[-0.26, 0.03]$ ,  $p = .113$ ). Johnson-Neyman analysis (Figure 2 Panel B) revealed that daily stressor exposure predicted lower levels of daily self-esteem at values of subjective SES below 7.18 (i.e., 1.07 above the sample mean). A summary of our results is available in Table 2.



**Figure 2.** Simple Slopes Depicting Cross-Level Interaction of Daily Stressor Exposure and Subjective SES on Daily Self-Esteem with Marginal Histogram and Density Plot Indicating Distribution of Daily Stressor Exposure and Self-esteem respectively (Panel A) and Johnson-Neyman Plot Identifying Region of Significance (Panel B). Note. In Panel A and Panel B, slopes depict the patterns after controlling for demographics and objective SES in the Adjusted Moderation Model.

### *Stressor Exposure Type and Self-Esteem Reactivity.*

When daily social stressor exposure was specified as the predictor, daily social stressor exposure ( $\gamma_{10} = -0.23$ ,  $SE = 0.04$ ,  $\beta = -.13$ , 95% CI =  $[-.17, -.08]$ ,  $p < .001$ ) and average social stressor exposure ( $\gamma_{01} = -0.49$ ,  $SE = 0.15$ ,  $\beta = -.16$ , 95% CI =  $[-.25, -.06]$ ,  $p = .002$ ) demonstrated significant associations with daily self-esteem in the Direct Model. Similarly, when daily non-social stressor exposure was specified as the predictor in the Direct Model, we found significant associations between daily non-social stressor exposure and daily self-esteem ( $\gamma_{10} = -0.23$ ,  $SE = 0.04$ ,  $\beta = -.12$ , 95% CI =  $[-.17, -.07]$ ,  $p < .001$ ) and between average non-social stressor exposure and daily self-esteem ( $\gamma_{01} = -0.33$ ,  $SE = 0.16$ ,  $\beta = -.10$ , 95% CI =  $[-.20, -.005]$ ,  $p = .039$ ). Our results indicated that participants experienced lower levels of self-esteem on days when they were exposed to social stressors or non-social stressors, compared to days when they were not exposed to social stressors and non-social stressors respectively. In addition, participants who were exposed to social stressors or non-social stressors across the 7 days generally experienced lower levels of daily self-esteem, compared to individuals who were not exposed to social stressors or non-social stressors respectively.

The cross-level interaction between daily exposure to social stressors and subjective SES on daily self-esteem was significant in the Adjusted Moderation Model ( $\gamma_{11} = 0.08$ ,  $SE = 0.03$ ,  $\beta = .06$ , 95% CI =  $[.01, .10]$ ,  $p = .024$ ) but not in the Unadjusted Moderation Model ( $\gamma_{11} = 0.05$ ,  $SE = 0.03$ ,  $\beta = .04$ , 95% CI =  $[-.01, .08]$ ,  $p = .090$ ). However, there

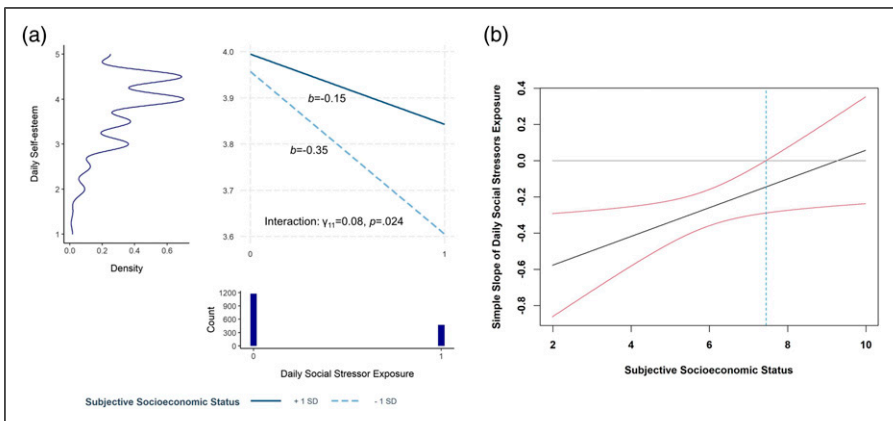
**Table 2.** Summary of Results.

	Unadjusted Moderation Model		Adjusted Moderation Model	
	Std. Coeff	Coeff. (SE)	Std. Coeff	Coeff. (SE)
<b>Fixed effects</b>				
Intercept, $\gamma_{00}$	-.001	4.08 (0.06)***	.002	4.02 (0.07)***
Daily stressor exposure, $\gamma_{10}$	-.13	-0.22 (0.04)***	-.13	-0.24 (0.05)***
Average stressor exposure, $\gamma_{01}$	-.15	-0.42 (0.13)**	-.13	-0.36 (0.13)**
Subjective SES, $\gamma_{02}$	.08	0.03 (0.03)	.05	-0.004 (0.03)
Daily stressor exposure $\times$ Subjective SES, $\gamma_{11}$	.05	0.07 (0.03)*	.08	0.10 (0.03)**
<b>Covariates</b>				
Age, $\gamma_{03}$			-.02	-0.002 (0.03)
Race, $\gamma_{04}$			-.04	-0.08 (0.09)
Sex, $\gamma_{05}$			.16	0.26 (0.10)**
Monthly household income, $\gamma_{06}$			-.005	0.02 (0.03)
Parents' education level, $\gamma_{07}$			.10	0.03 (0.02)*
Daily stressor exposure $\times$ Age, $\gamma_{12}$			-.02	-0.02 (0.03)
Daily stressor exposure $\times$ Race, $\gamma_{13}$			.005	0.02 (0.09)
Daily stressor exposure $\times$ Sex, $\gamma_{14}$			.02	0.09 (0.11)
Daily stressor exposure $\times$ Monthly household income, $\gamma_{15}$			-.05	-0.06 (0.03)
Daily stressor exposure $\times$ Parents' education level, $\gamma_{16}$			-.02	-0.01 (0.02)
<b>Random effects</b>				
Intercept, $\mu_{0i}$	.45	0.26 (0.51)	.42	0.25 (0.50)
Daily stressor exposure, $\mu_{1i}$	.03	0.08 (0.28)	.02	0.07 (0.26)
Residual, $\varepsilon_{di}$	.46	0.30 (0.55)	.46	0.30 (0.55)

Note.  $N_{\text{participants}} = 243$ ,  $N_{\text{days}} = 1651$ . Sex was dummy-coded with female as reference category and race was dummy-coded with Chinese (majority race) as reference category. \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

was no significant cross-level interaction between daily exposure to non-social stressors and subjective SES on same-day self-esteem in both the Unadjusted Moderation Model ( $\gamma_{11} = 0.04$ ,  $SE = 0.04$ ,  $\beta = .03$ , 95% CI =  $[-.02, .08]$ ,  $p = .280$ ) and the Adjusted Moderation Model ( $\gamma_{11} = 0.08$ ,  $SE = 0.04$ ,  $\beta = .05$ , 95% CI =  $[-.003, .11]$ ,  $p = .066$ ). We further investigated whether there was a significant difference between the interaction slope estimates in the Adjusted Moderation Model for non-social stressors and social stressors since interaction estimates were similar in both models, but the significance of interaction estimates differed. We found no significant difference between the interaction slopes in the Adjusted Moderation Model for non-social stressors

and social stressors and ( $t(3298) = 0.009, p = .993$ ). The lack of a significant difference in interaction slope estimates implied that the different significant interaction results for social and non-social stressors could be attributed to noise and that subjective SES attenuates self-esteem reactivity to both daily social stressor exposure and daily non-social stressor exposure. For the interaction between daily exposure to social stressors and subjective SES on daily self-esteem, we similarly examined whether there was a significant difference in interaction slope estimates in the Unadjusted Moderation Model and the Adjusted Moderation Model because the significance of interaction estimates differed even though interaction estimates were similar. We again found no significant difference between the interaction slopes in the Unadjusted Moderation Model and the Adjusted Moderation Model ( $t(3,298) = 0.57, p = .568$ ) and hence, simple slope and Johnson-Neyman analyses were conducted based on the Adjusted Moderation Model. Simple slopes analysis (Figure 3 Panel A) revealed that the decrease in self-esteem on stressor days compared to non-stressor days reached statistical significance for participants higher in subjective SES (1 *SD* above the mean;  $b = -0.15, SE = 0.07, 95\% CI = [-0.29, -0.01], p = .035$ ) and participants lower in subjective SES (1 *SD* below the mean;  $b = -0.35, SE = 0.06, 95\% CI = [-0.47, -0.23], p < .001$ ), thus suggesting that participants high and low in subjective SES reported significant decreases in self-esteem on stressor days compared to non-stressor. Johnson-Neyman analysis (Figure 3 Panel B) revealed that daily stressor exposure predicted lower levels of daily self-esteem at values of subjective SES below 7.46 (i.e., 1.35 above the sample mean).



**Figure 3.** Simple Slopes Depicting Cross-Level Interaction of Daily Social Stressor Exposure and Subjective SES on Daily Self-Esteem with Marginal Histogram and Density Plot Indicating Distribution of Daily Social Stressor Exposure and Self-esteem respectively (Panel A) and Johnson-Neyman Plot Identifying Region of Significance (Panel B). Note. In Panel A and Panel B, slopes depict the patterns after controlling for demographics and objective SES in the Adjusted Moderation Model.

## Discussion

Research has demonstrated that individual characteristics moderate the relationship between self-esteem reactivity and daily stressor exposure. Still, the specific individual differences contributing to the discrepancy in self-esteem reactivity remain unclear. The current study sought to investigate the moderating effects of subjective SES on the relationship between daily stressor exposure and daily self-esteem reactivity and whether the moderating role of subjective SES would differ between stressor types via a 7-day daily diary survey. We found that exposure to daily stressors was associated with lower self-esteem levels at the within-person level, suggesting that individuals experienced lower levels of self-esteem on stressor days compared to non-stressor days. In addition, average stressor exposure was associated with lower levels of self-esteem, suggesting that individuals who were exposed to daily stressors experienced lower levels of daily self-esteem than individuals who were not exposed to daily stressors. Consistent with our hypothesis, there was a significant cross-level interaction between subjective SES and daily stressor exposure. On stressor days compared to non-stressor days, participants with lower subjective SES reported a significant reduction in self-esteem, whereas participants with higher subjective SES experienced a limited decline in self-esteem. More importantly, it was found that participants with high and low subjective SES demonstrated similar levels of self-esteem on non-stressor days. This pattern of results remained consistent after including demographic variables and measures of objective SES as covariates. Lastly, our results demonstrate that both non-social and social stressors influence self-esteem reactivity at the within- and between-person levels. Specifically, individuals who were exposed to stressors generally experienced lower levels of daily self-esteem than those who were not exposed to stressors, regardless of stressor type. Subjective SES also moderated the relationship between self-esteem reactivity and daily stressor exposure, regardless of stressor type.

The negative association between daily stressor exposure and daily self-esteem is in line with previous studies that examined daily stressors and daily self-esteem (e.g., [Alessandri et al., 2016](#); [Dehart & Pelham, 2007](#); [Montpetit & Tiberio, 2016](#); [Zuffianò et al., 2023](#)). The current study extends previous findings by examining the moderating role of subjective SES in the relationship between daily stressor exposure and daily self-esteem. Higher levels of subjective SES were found to buffer self-esteem reactivity to daily stressor exposure even after controlling for indicators of objective SES, including monthly household income and parents' education level. This suggests that the protective role of subjective SES in attenuating self-esteem reactivity to daily stressor exposure is independent of objective SES and less likely due to the tangible resources and opportunities associated with individuals with high objective SES. Another important factor that might drive the increased self-esteem reactivity to daily stressor exposure amongst individuals with low subjective SES is the cognitive appraisal of stressors and stressful events. Individuals with lower subjective SES are more inclined to perceive stressors as threatening ([Derry et al., 2013](#)), possibly because they have a lower sense of perceived control and environmental mastery compared to individuals

with high subjective SES (Kraus et al., 2009; Navarro-Carrillo et al., 2020). Consequently, individuals with lower subjective SES may be more likely to perceive a lack of ability to effectively cope with stressors and therefore experience greater self-esteem reactivity to daily stressor exposure. Future research should measure participants' perceived threat and perceived control to investigate the potential mechanisms underlying the effect of low subjective SES on self-esteem reactivity to daily stressor exposure.

The moderating effect of subjective SES on the relationship between daily stressor exposure and self-esteem is also consistent with previous work where individuals with lower perceived social status demonstrate higher reactivity to stressors (e.g., Kraus & Park, 2014; Operario et al., 2004). The results of this study appear to contradict findings in the study conducted by Gruenewald et al. (2006), in which individuals with perceived social status did not show significantly higher levels of stress reactivity when confronted with a social task. However, the difference in results could be attributed to various factors, including the referent group used to assess participants' subjective SES, the type of stressors assessed, and the type of reactivity measured. In particular, the study by Gruenewald et al. (2006) measured subjective SES with reference to participant's peer groups and investigated the influence of acute stressors on cortisol reactivity, whereas the current study measured subjective SES with reference to society and investigated self-esteem reactivity to daily stressors. Overall, the results from the present study contribute to the extant literature by demonstrating that individuals with low subjective SES report higher self-esteem reactivity to daily stressors when subjective SES is measured with reference to society.

In contrast, our finding that individuals showed higher self-esteem reactivity to both daily social stressor and non-social stressor exposure contradicts the sociometer hypothesis, which suggests that individuals would show higher self-esteem reactivity to social stressors compared to non-social stressors (Leary et al., 1995). Furthermore, the literature suggests that individuals with lower subjective SES may show higher levels of self-esteem reactivity since establishing social relationships with others is more important for them than for individuals with high subjective SES (e.g., Kraus & Keltner, 2009; Piff et al., 2010). However, we found that subjective SES moderated the relationship between self-esteem reactivity and daily stressor exposure, regardless of stressor type. It is plausible that the moderating role of subjective SES is not context-specific and that self-esteem fluctuations are equally sensitive to social and non-social stressors. However, it is also highly plausible that the current pattern of result is due to the manner in which social and non-social stressors were measured in the study. In particular, since social stress has been broadly defined as stress caused by circumstances that can potentially affect relationships or membership in a social group (Juth & Dickerson, 2013), the categories of arguments, avoided arguments, network stressors, and discrimination were grouped as an index of social stressors and the remaining categories were used as an index of non-social stressors in the present study. Previous research has combined the categories of arguments and avoided arguments or categories of arguments, avoided arguments, and network stressors as an index of

interpersonal/social stressors (e.g., Almeida, 2005; Birditt, 2014; Stawski et al., 2013; Witzel, 2019; Witzel et al., 2023), although this specific categorization of social and non-social stressors has not been used before. In retrospect, however, the items in DISE were fairly broad and could include social and non-social categories. For example, “being taken advantage of at work” might be categorized as either an avoided argument stressor (e.g., an individual knows he/she is being taken advantage of but decides to let it go) or a work stressor, depending on the individual. Overall, the lack of empirical evidence for the categorization of social and non-social stressors in the current study, combined with the overly broad categorization of DISE items, may have resulted in the failure to detect a significant difference between self-esteem reactivity to social and non-social stressors. Future research should therefore use other well-established measures of social and non-social stressors to determine whether self-esteem reactivity differs by stressor type.

### *Limitations*

The generalizability of the current finding may be limited, given that most of the participants in the present study are female and Chinese. Research has consistently demonstrated that women are exposed to more daily stressors (Vermeersch et al., 2010; Witzel, 2019) and are more likely to report higher stress levels (Almeida & Kessler, 1998; Witzel, 2019) compared to men. In addition, research has shown that individuals with interdependent self-construal (e.g., Asians) evaluate themselves via the quality of their social relationships. Hence, individuals with interdependent self-construal would be more sensitive to social evaluative threats (Markus & Kitayama, 1994). Therefore, individuals with interdependent self-construal are more likely to demonstrate higher reactivity to socio-evaluative stressors that could threaten their ability to form social relationships than individuals with independent self-construal (Hu et al., 2018, 2019). Given that stressor exposure was measured using DISE, where a majority of the stressor categories can be considered social in nature, it is possible that the current pattern of findings was due to Chinese participants demonstrating stronger reactivity to daily social stressors than Western participants and that results might not be as significant or might not replicate in a sample of Western participants with independent self-construal.

Secondly, the MacArthur scale used to measure subjective SES in the current study assessed the cognitive evaluation but not the affective evaluation of one’s perceived standing in society (Callan et al., 2015). However, individuals with the same level of subjective SES can have different affective appraisals of their subjective SES, and one’s affective assessment of their perceived social status predicts psychological states, mental health, and behavior more strongly than one’s cognitive appraisal of their perceived status (Callan et al., 2015; Smith et al., 2012). Therefore, future studies should examine how individuals’ affective appraisal of their social status moderates the relationship between daily stressor exposure and daily self-esteem and compare whether the results would differ from the findings in the current study. Thirdly, the study’s cross-sectional design restricts causal inferences regarding self-esteem



reactivity and daily stressor exposure. It is possible that lower levels of self-esteem reactivity to daily stressor exposure contribute to higher levels of subjective SES, although this is theoretically unlikely. Lastly, we measured self-esteem using two items from Rosenberg's self-esteem scale to alleviate the strain of filling up lengthy surveys daily on participants. While the shortened measure of self-esteem could potentially affect the reliability of the results for this study, this is unlikely given that the two items extracted from the full-length scale had high pseudo external item quality and internal item quality (Majeed, Chua, et al., 2023).

## Conclusion

Despite these limitations, the study presents preliminary evidence for the role of subjective SES in individual self-esteem reactivity to everyday stressors at the within- and between-person levels using a daily diary design. Previous research has shown that individuals with low subjective SES may be more vulnerable to stressors due to their lower perceived control over life outcomes (e.g., Navarro-Carrillo et al., 2020). However, few studies have examined the effects of stressors on self-esteem in everyday life since past studies have relied primarily on experimental studies to document the acute impact of subjective SES on reactivity to laboratory stressors (Hooker et al., 2017; Rahal et al., 2020).

The current study provides preliminary evidence for the moderating role of subjective SES on the association between daily stressor exposure and self-esteem reactivity. Specifically, individuals with low subjective SES are at higher risk of experiencing lower state self-esteem when confronted with stressors than those with high subjective SES. Results remained consistent after controlling for demographics and objective indicators of SES. Interestingly, although previous research has shown that a brief experimental manipulation can change the way individuals perceive their subjective SES (Kraus et al., 2010), the cognitive averaging hypothesis suggests that subjective SES is a genuine reflection of numerous status-related indicators that individuals experience in their daily lives (Euteneuer, 2014; Singh-Manoux et al., 2003). Consequently, interventions that alter perceptions of subjective SES may only have a temporary effect on increasing individuals' resilience to everyday stressors.

## Declaration of Conflicting Interests

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## ORCID iDs

- Yi Jing Chua  <https://orcid.org/0000-0002-5198-544X>  
Nadyanna M. Majeed  <https://orcid.org/0000-0003-0148-0846>  
Verity Y. Q. Lua  <https://orcid.org/0000-0002-1000-3438>  
Chi-Ying Cheng  <https://orcid.org/0000-0002-4985-7860>  
Andree Hartanto  <https://orcid.org/0000-0001-8758-6400>

## Data Availability Statement

Data, relevant materials, and analytic code of the study have been made publicly available on Researchbox (#682; <https://researchbox.org/682>).

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## Author Biographies

**Yi Jing Chua** is a masters student at Singapore Management University.

**Nadyanna M. Majeed** is a PhD student at National University of Singapore.

**Verity Y. Q. Lua** is a PhD student at Stanford University.

**Chi-Ying Cheng** is an associate professor of Psychology at Singapore Management University. Her research focuses on culture and identity, multiculturalism and creativity.

**Andree Hartanto** is an assistant professor in the School of Social Sciences at Singapore Management University. His research focuses on the cognitive effects of bilingualism, technology and social media use.