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Authors

Lee, Ophelia
Shenthan, Vasheeigaran
Gan, Rachel
[et al.](#)

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Lingering Negative Affect with Future Physical Health: Replication

**Lingering Negative Affect in Response to Daily Stressors in relation with Physical Health
Years Later: A Longitudinal Replication**

Ashwini Murali, Kaleigh Lin, Rachel Gan, Vasheeigaran Shenthan, Ophelia Lee

Psychology and Cognitive Sciences, ULAB

University of California, Berkeley

Lingering Negative Affect with Future Physical Health: Replication

Abstract

Lingering negative affect (negative emotions related to stressors that had occurred the day before) has been introduced in recent years as a potential negative mediator to one's future physical health. The present study utilized longitudinal data from a community-based, nationwide study ($n = 2023$) to replicate a previous study on how negative affect that persists after a stressor has occurred is related to future health (Leger et al., *Psychological science*, 29(B), 1283-1290, 2018). Preliminary findings indicated that while certain values (e.g. means, standard deviation) were different from Leger's due to inconsistencies in the number of participants ($n = 1155$) included in the original paper, participants who graduated from high school and above experienced more stressors, and tended to be younger.

Keywords: daily stressors, health outcomes, lingering negative affect, replication, mean, standard deviations, participants

Lingering Negative Affect with Future Physical Health: Replication

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Everyone faces varying degrees of stress in our daily lives, such as school or work deadlines, interpersonal relationships, and other *stressors* (activities, events, and stimuli that cause stress), as a result of one's environment. While these stressors may seemingly be temporary and minor, in the long term, the accumulation of stress could potentially take a negative toll on one's mental health (Charles et al., 2013) as well as one's physical health (Piazza, 2013). A variety of researchers have looked into the long-term effects of daily stressors. While growing research has documented an association between same-day affective reactivity to daily stressor (Charles et al., 2006; Zohar, 1999), Leger et al. (2018) focused on the effect of lingering negative affect on long term physical health outcomes and found current lingering affect is correlated with future physical health outcomes. Our study attempts to replicate the core findings of this potential phenomenon and investigate whether affective recovery from daily stressors mediate later on physical health.

The study (Leger et al. 2018) that we are replicating investigates whether lingering negative affect is related to long-term stress over 10 years. *Lingering negative affect* (LNA) is the continued heightened negative affect that persists the day following a stressor. The authors hypothesize that the next day LNA would influence three independent physical health categories: chronic conditions, activities of daily living (ADLs), and instrumental activities of daily living (IADLs). The authors choose to study both the functional limitations and chronic conditions due to their overlapping nature, as they are good indicators of one's physical health. In addition, the changes in positive or negative affect in response to stressors, also known as *affective reactivity* (Piazza et al., 2013), is included in the investigation of LNA over the 10-year

Lingering Negative Affect with Future Physical Health: Replication

period. Using affective reactivity and the average number of stressors faced by each participant, a baseline assessment was created for each participant in order to produce conclusive results by isolating the negative affect on only physical health (Leger et al. 2018). The goal of this paper is to further verify and contribute to the validity of the previous study (Leger et al 2018). We expect to reach results consistent with the findings published by Leger et al., in which next-day LNA will independently predict three self-reports of physical health: chronic conditions, ADLs, and IADLs.

Materials and Methods

Participants

Participant data was taken from a national survey of people who completed the second wave of MIDUS II and NSDE II (n = 3294), and the MIDUS III survey taken approximately 10 years later. Additionally, participants that experienced at least one negative stressor during the diary portion of the study, completed MIDUS III, and all variables of interest were used to assess negative lingering affect (n = 2861).

Materials

National study of Daily Experiences

As in Leger et al. (2018), several measures were assessed using the *National Study of Daily Experiences (NSDE II)*, a daily diary study in which participants completed interviews about their daily experiences over the course of 8 days (Almeida et al., 2009). Firstly, *Daily*

Lingering Negative Affect with Future Physical Health: Replication

negative affect is one of the measures included in our current study in which participants were asked to reflect on their negative affect (e.g. nervousness, worthlessness, hopelessness, etc.) experienced on a 5-point scale from 0 (none of the time) to 4 (all of the time). *Daily stressors* were measured with 7 questions that asked whether certain stressors (e.g. having an argument with someone, forms of discrimination) had occurred via a binomial scale (1 = yes, 0 = no) in the past 24 hours. Last but not least, the *average number of stressors* was assessed.

Midlife in the United States Survey (MIDUS II; MIDUS III)

Data was collected and assessed from *Midlife in the United States Survey (MIDUS II; MIDUS III)*, a questionnaire that surveyed a national sample of participants and was conducted approximately 10 years prior to MIDUS III, another questionnaire conducted of the same sample. *Chronic illness* refers to whether the participants have had each of 26 chronic physical conditions in the last 12 months (Marmot et al., 1997). Chronic conditions were then subdivided into 16 categories including autoimmune disorders (HIV, autoimmune diseases), cancer, cardiovascular conditions (heart disease, high blood pressure, stroke, hypertension), diabetes, digestive conditions (stomach trouble, constipation, ulcer, swallowing problems), foot trouble, hay fever, gall bladder trouble, lung conditions (asthma, tuberculosis, other lung problems), neurological conditions, pain-related conditions (backache, joint diseases, migraines), skin trouble, thyroid disease, mouth/gum trouble, sleep problems, and urinary/bladder problems. Moreover, *functional limitations* were asked using the activities of daily living (ADL)/instrumental activities of daily living (IADL) scales. Items in both scales reflected one's ability to function at a basic level by themselves and their ability to engage in everyday activities (e.g.

Lingering Negative Affect with Future Physical Health: Replication

walking one block, engaging in vigorous activity) on a 4-point scale ranging from 1 (not at all) to 4 (a lot).

Results

Results showed that at the MIDUS II baseline, 22.47% of participants reported having no chronic conditions, 19.62% of participants reported having one chronic condition, 19.03% of participants reported having two chronic conditions, 14.03% of participants reported having three chronic conditions, and 24% of participants reported having four or more chronic conditions.

Data from MIDUS III, which was taken 10 years after the MIDUS II, showed that 17.896% of participants reported no chronic conditions, 16.531% reported one chronic condition, 16.568% reported two chronic conditions, 12.723% reported three chronic conditions, and 51.312% reported four or more chronic conditions.

The MIDUS III baseline, which was taken 10 years after MIDUS II, reported that less participants had 3 or less chronic conditions, however, more participants had 4+ chronic conditions (Fig. 1). The MIDUS 2 ADL mean is 1.31 and the standard deviation is 0.62. For MIDUS II IADL, the mean is 1.77 and the standard deviation is 0.86. For MIDUS III, we calculated that the mean for ADL is 1.42 while the standard deviation is 0.71. For MIDUS III IADL, the mean is 1.97 and the standard deviation is 0.93 (Table 2).

Moreover, multilevel modeling of mean negative affect experienced by each participant in relation to previous-day stressor (Table 1) suggests the more stressors the subject experienced from the previous day, the more negative affect would they experience the following day; suggesting a possible lingering effect produced by prior stressors, such that it will prolong negative affect to the next day.

Discussion

The results of this replication study support some of the findings of Leger et al.'s (2018) study. Results of this study show that lingering negative affect as a response to stressors are correlated with increases in chronic conditions. The predictive multilevel modeling in Table 1 yielded similar findings with the paper, with some slight differences taking place in our replication. This is likely due to the discrepancy in the number of participants used in our data replication being higher than what was reported in Leger et. al (2018). The reason for this discrepancy is that the paper does not clearly reflect how they narrowed the participant numbers down to the final numbers. To avoid confusion and loss of data, we did not interfere with the number of participants since we could not accurately judge which participants' data were removed in the actual paper.

The means and standard deviations for daily negative affect and stressors were also extremely close to the numbers that were reported in the paper. The differences again most likely arise from a discrepancy in the number of participants. In addition, the means and standard deviations we calculated for ADLs and IADLs in MIDUS 2 and MIDUS 3 were the exact values found in the paper.

Despite all of these similar results, together with a found lingering negative affect relationship; our result is inefficient in explaining the proposed phenomena due to the inability to correlate LNA as a factor with other measurements such as chronic conditions. This is because a lack of clarity in terms of what constitute in reporting data analysis, leading to a very challenging replication process. Hence, while we were able to replicate a number of significant data points, we could not confidently report the hypothesized relationship between LNA and physical health condition.

Lingering Negative Affect with Future Physical Health: Replication

This study reveals many significant implications for the relationship between mental stress and physical health. Prior studies have shown that parts of the brain, such as the hippocampus, can physically alter their structure and function in response to long-term or chronic stress (McEwen, 1999). This can result in a decrease in mental capacity over time, and more specifically a decline in memory. In more extreme cases, severe mental stress has been linked to causing sudden death in individuals experiencing these stressors (Pignalberi et al., 2002). Therefore, it is important to keep in mind how stressors we may experience on a daily basis can still impact us after the stressful event has occurred in the form of lingering negative affect.

Some future directions of this study can be to potentially track mortality rates in another longitudinal study, which would have many implications for quality and length of life as a function of previous-day stressors and daily negative affect. In addition, though this study emphasizes the negative interactions between the mind and body, it is also relevant to understand how positive emotions may contribute to increased quality of life. A more comprehensive study may therefore also take into account the mediating effects of nutritional choices, exercise, and participants' optimism levels to help determine how these lifestyle choices can interact with daily stressors and physical health (i.e., number of chronic illnesses).

Conclusion

The purpose of this replication was to replicate the details of Leger et. al. (2018) on lingering negative affect and future physical health condition, which our study failed to validate through our data analysis. This study sought to highlight the close connection between the mind and the body, as it relates to lingering negative affect caused by stressors, and in turn its correlation to physical health. However, we cautioned future research on reporting their data

Lingering Negative Affect with Future Physical Health: Replication

analysis process in clear and digestible ways, in order to avoid potential frustration that may impeded scientific progression.

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Lingering Negative Affect with Future Physical Health: Replication

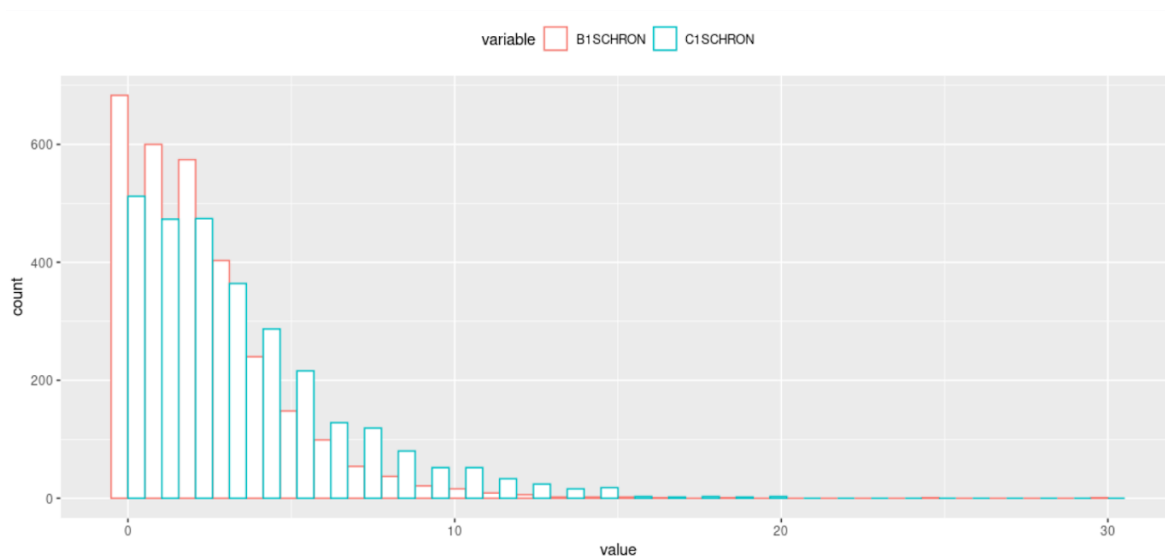


Fig. 1. Combined histogram comparing chronic conditions in MIDUS 3 to MIDUS

Data from NSDE II shows that nearly half of the participants (44.41%) reported no daily negative affect, while 29.85% of participants reported a daily negative affect between 1 and 3. The remaining 25.74% of participants reported much greater levels of negative affect beyond 3.

Using multilevel modeling to model negative affect, we obtained an estimate of 0.009572 for Previous-Day Stressors with a standard error of 0.002968 in terms of fixed effects (Table 1).

Lingering Negative Affect with Future Physical Health: Replication

Table 1.*Multilevel modeling of negative affect based on previous-day stressor.*

Fixed effects:

	Estimate	Std. Error	T value
(Intercept)	0.198654	0.006039	32.897
MLM\$`Previous-day Stressor`	0.009572	0.002968	3.226

Random effects:

Groups	Name	Variance	Std. Dev.
M2ID	(Intercept)	0.06102	0.2470
Residual		0.04975	0.2231
Number of obs.	14061	Groups	M2ID, 2021

Lingering Negative Affect with Future Physical Health: Replication

Table 2. Descriptive Statistics and Correlations for Study Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
MIDUS II									
1. Age (years)	54.54	11.35	—						
2. Education ^a	7.48	2.49	-.12**	—					
3. Chronic conditions ^b	2.28	2.36	.18**	-.14**	—				
4. ADLs	1.31	.62	.16**	-.20**	.40**	—			
5. IADLs	1.77	.86	.27**	-.22**	.49**	.81**	—		
MIDUS III									
6. Chronic conditions ^c	3.26	3.15	.16**	-.16**	.58**	.37**	.44**	—	
7. ADLs	1.42	.71	.27**	-.24**	.36**	.55**	.58**	.44**	—
8. IADLs	1.97	.93	.36**	-.25**	.39**	.51**	.66**	.48**	.84**

Note: MIDUS = Midlife in the United States Survey; ADLs = activities of daily living; IADLs = instrumental activities of daily living. ^aSeventy-four percent of the MIDUS II sample reported having at least some college education. ^bTwenty-one percent of the MIDUS II sample reported having no chronic conditions. ^cSeventeen percent of the MIDUS III sample reported having no chronic conditions. ** indicates $p < .01$.

Table 3: Results of Negative Binomial and Ordinary Least 10 Years Later: Squares Regression Models Predicting Physical Health Outcomes

Variable	ADLs		IADLs	
	<i>b</i>	95% CI	<i>b</i>	95% CI
	$(R^2 = .218^{**})$		$(R^2 = .218^{**})$	

Lingering Negative Affect with Future Physical Health: Replication

Time 1 health indicator	.10**	[.10	.11]	.14**	[.13	.14]
Gender (reference = female)	.10**	[.08	.12]	.17**	[.14	.20]
Age	.01**	[.01	.01]	.02**	[.02	.03]
Education	-.05**	[-.06	-.05]	-.06**	[-.07	-.06]

Note: Ordinary least squares regressions were run for activities of daily living (ADLs) and instrumental activities of daily living (IADLs). ** $p < .01$.