

Supplementary Materials

Changes in Sleep Regularity and Perceived Life Stress Across the COVID-19 Pandemic: A Longitudinal Analysis of a Predominately Female United States Convenience Sample

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Table S1. Participant Demographics.

N	181
Age	
Mean	42.29
Standard Deviation	18.51
Minimum	19
25%	27
50%	34
75%	61
Maximum	89
Ethnicity	
Hispanic	1.7%
Not Hispanic	97.2%
Prefer not to say	1.1%
Race	
African American	1.7%
Asian	6.6%
White	85.6%
Hispanic/Latinx	0.6%
Native Hawaiian or other Pacific Islander	0.0%
American Indian/Alaska Native	0.0%
More than one race/prefer to self-describe	5.0%
Unknown	0.0%
Prefer not to say	0.6%
Gender	
Female	84.0%
Male	12.7%
Non-binary/third gender	1.7%
Prefer to self-describe	0.0%
Prefer not to say	0.6%
Not reported	1.1%
Biological Sex	
Female	87.3%
Male	12.7%
Gender Identity	
Transgender	1.1%

Cisgender	97.8%
Prefer not to say	1.1%
Not reported	0.0%
Sexual Orientation	
Gay/lesbian	4.4%
Bisexual	11.0%
Straight/heterosexual	82.3%
Prefer to self-describe	1.7%
Prefer not to say	0.6%
Not reported	0.0%
Education	
Some high school	0.0%
High school diploma or GED	2.2%
Some college	7.7%
Bachelor's degree	22.7%
Some post-bachelor	11.0%
Graduate, medical, or professional degree	56.4%
Relationship Status	
Single	21.5%
In a relationship	24.3%
Married	45.3%
Separated/divorced	6.1%
Widowed	2.8%
Serious medical problems?	
No	90.1%
Yes	9.9%
Income	
\$0 - 25,000	6.1%
\$25,001 - 50,000	14.9%
\$50,001 - 75,000	18.8%
\$75,001 - 100,000	16.0%
\$100,001 - 150,000	19.3%
\$150,001 - 250,000	12.7%
\$250,000+	12.2%
not reported	0.0%
Are you a full time student?	
No	79.6%
Yes	20.4%
Are you currently employed?	
No	23.2%
Yes	56.4%

Not reported	20.4%
Political Ideology	
Very liberal	35.9%
Liberal	35.4%
Slightly liberal	11.6%
Moderate	11.0%
Slightly conservative	2.2%
Conservative	1.1%
Not reported	2.8%
Very conservative	0.0%
How many dependent children live with you?	
0	83.4%
1	8.8%
2	6.6%
3	1.1%
4	0.0%
5+	0.0%
How many people do you live with?	
0	16.0%
1	43.6%
2	17.7%
3	12.2%
4	6.1%
5+	4.4%
U.S. Region	
Northeast	48.1%
South	11.0%
West	15.5%
Midwest	17.7%
Not reported	7.7%

Table S2. Descriptive statistics.

	N	M (s)	Mt (sw*)	Md (MADN)	Min	25th percentile	75th percentile	Max	skew	kurtosis
Age	181	42.29 (18.51)	38.59 (24.12)	34.00 (13.34)	19.00	27.00	61.00	89.00	0.72	-0.94
rMEQ	166	15.09 (4.54)	15.13 (4.26)	15.00 (4.45)	4.00	12.00	18.00	25.00	-0.07	-0.42
Sleep Midpoint (Hours Past Midnight)										
Pre-Pandemic Workday	176	2.96 (1.18)	2.85 (.96)	2.75 (.93)	-0.50	2.25	3.50	8.00	0.74	2.16
Pre-Pandemic Free-day	176	3.86 (1.41)	3.73 (1.33)	3.75 (1.24)	-0.50	2.88	4.50	8.00	0.31	0.68
Pandemic-1 Workday	176	3.44 (1.53)	3.30 (1.36)	3.25 (1.33)	-0.50	2.38	4.25	8.63	0.66	1.13
Pandemic-1 Free-day	176	4.05 (1.60)	3.89 (1.48)	3.75 (1.48)	-0.50	3.00	5.00	8.75	0.46	0.50
Pandemic-2 Workday	176	3.09 (1.24)	3.01 (1.07)	3.00 (1.11)	-0.50	2.38	3.75	8.01	0.71	1.82
Pandemic-2 Free-day	176	3.78 (1.43)	3.71 (1.27)	3.75 (1.27)	-0.50	2.86	4.50	8.00	0.33	0.53
Pandemic-3 Workday	176	3.06 (1.31)	2.98 (.98)	3.00 (.99)	-1.00	2.33	3.63	7.50	0.41	0.89
Pandemic-3 Free-day	176	3.77 (1.48)	3.67 (1.21)	3.62 (1.29)	-1.00	2.98	4.50	7.51	0.21	0.59
Pandemic-4 Workday	176	3.02 (1.30)	2.96 (1.06)	3.00 (1.11)	-1.25	2.25	3.63	8.01	0.53	1.88
Pandemic-4 Free-day	176	3.80 (1.49)	3.71 (1.27)	3.75 (1.30)	-1.25	2.75	4.50	8.00	0.15	0.61
Sleep Duration (Hours)										
Pre-Pandemic Workday	181	7.95 (.95)	7.95 (.91)	8.00 (.74)	5.00	7.50	8.50	12.00	0.14	1.65
Pre-Pandemic Free-day	181	8.55 (1.15)	8.59 (1.04)	8.50 (.74)	4.00	8.00	9.25	12.00	-0.61	2.27
Pandemic-1 Workday	181	8.00 (1.25)	8.09 (1.10)	8.00 (1.11)	.00	7.50	9.00	11.75	-1.52	8.57
Pandemic-1 Free-day	181	8.38 (1.37)	8.40 (1.03)	8.25 (1.11)	.00	7.83	9.00	15.00	-0.75	9.94
Pandemic-2 Workday	181	7.91 (1.08)	7.90 (.94)	8.00 (.99)	3.00	7.25	8.50	12.50	-0.06	3.41
Pandemic-2 Free-day	181	8.33 (1.17)	8.34 (0.91)	8.25 (1.11)	3.00	7.83	9.00	12.50	-0.33	2.82
Pandemic-3 Workday	181	7.94 (0.98)	7.97 (1.12)	8.00 (1.11)	5.00	7.33	8.75	10.47	-0.34	0.16
Pandemic-3 Free-day	181	8.36 (1.20)	8.43 (.92)	8.50 (.74)	.00	7.92	9.00	11.00	-2.03	12.43
Pandemic-4 Workday	181	7.97 (.98)	7.97 (1.00)	8.00 (.74)	5.00	7.25	8.50	11.00	-0.10	0.63
Pandemic-4 Free-day	181	8.47 (1.14)	8.44 (1.01)	8.50 (.74)	5.00	8.00	9.00	12.75	0.08	1.36
Perceived Stress Scale										
Pandemic-1	166	19.04 (7.64)	18.77 (7.71)	20.00 (7.41)	0.00	13.00	23.75	37.00	0.10	-0.29
Pandemic-2	180	14.91 (7.57)	14.80 (8.34)	15.00 (8.90)	0.00	9.00	21.00	35.00	0.16	-0.61
Pandemic-4	180	15.31 (7.57)	15.02 (8.32)	15.00 (8.90)	0.00	10.00	21.00	34.00	0.23	-0.58

Note. rMEQ, Reduced Morningness-Eveningness Questionnaire; M = mean; s = standard deviation; Mt = 20% trimmed mean; sw* = 20% winsorized standard deviation (scaled to estimate the standard deviation under normality); Md = median; MADN = median absolute deviation (scaled to estimate the standard deviation under normality).

Table S3. Analysis of sleep midpoint and sleep duration. Bracketed values give 95% confidence intervals. Effect sizes and confidence intervals are in minutes and reflect differences in the trimmed means of the conditions being compared. See text for details of trimmed mean ANOVA and t-test analyses. Significant results bolded for emphasis.

Sleep Midpoint			
	<i>Test Statistic</i>	<i>p</i> -value	Difference (mins)
<i>Trimmed ANOVA</i>			
Main effect of Time Point	Q = 9.01	<0.001	
Main effect of Day	Q = 189.60	<0.001	
Interaction	Q = 6.67	<0.001	
<i>Follow-up trimmed t-tests</i>			
Pre-Pandemic Free-day - Workday	t(105.0) = 12.59	<0.001	53.03 [44.68, 61.38]
Pandemic-1 Free-day - Workday	t(105.0) = 10.47	<0.001	35.03 [28.40, 41.67]
Pandemic-2 Free-day - Workday	t(105.0) = 11.19	<0.001	42.23 [34.75, 49.71]
Pandemic-3 Free-day - Workday	t(105.0) = 11.26	<0.001	41.53 [34.22, 48.84]
Pandemic-4 Free-day - Workday	t(105.0) = 10.92	<0.001	44.75 [36.62, 52.87]
<i>Interaction follow-ups</i>			
SJL Pandemic-1 - Pre-Pandemic	Q = 26.82	<0.001	
SJL Pandemic-2 - Pre-Pandemic	Q = 9.23	0.002	
SJL Pandemic-3 - Pre-Pandemic	Q = 10.18	0.001	
SJL Pandemic-4 - Pre-Pandemic	Q = 5.22	0.022	
SJL Pandemic-2 - Pandemic-1	Q = 4.28	0.039	
SJL Pandemic-3 - Pandemic-1	Q = 4.22	0.040	
SJL Pandemic-4 - Pandemic-1	Q = 6.65	0.010	
Sleep Duration			
	<i>Test Statistic</i>	<i>p</i> -value	Difference (mins)
<i>Trimmed ANOVA</i>			
Main effect of Time	Q = 1.69	0.150	
Main effect of Day	Q = 70.93	<.0001	
Interaction	Q = 4.54	0.001	
<i>Follow-up trimmed t-tests</i>			
Pre-Pandemic Free-day - Workday	t(108.0) = 8.14	<0.001	38.77 [29.33, 48.21]
Pandemic-1 Free-day - Workday	t(108.0) = 3.99	<0.001	18.68 [9.40, 27.96]
Pandemic-2 Free-day - Workday	t(108.0) = 6.33	<0.001	26.22 [18.00, 34.44]
Pandemic-3 Free-day - Workday	t(108.0) = 6.15	<0.001	27.60 [18.70, 36.50]
Pandemic-4 Free-day - Workday	t(108.0) = 6.10	<0.001	28.41 [19.18, 37.64]
<i>Interaction follow-ups</i>			
SSR Pandemic-1 - Pre-Pandemic	Q = 17.47	<0.001	
SSR Pandemic-2 - Pre-Pandemic	Q = 6.72	0.010	
SSR Pandemic-3 - Pre-Pandemic	Q = 5.23	0.022	
SSR Pandemic-4 - Pre-Pandemic	Q = 4.54	0.033	
SSR Pandemic-2 - Pandemic-1	Q = 2.17	0.141	
SSR Pandemic-3 - Pandemic-1	Q = 2.83	0.093	
SSR Pandemic-4 - Pandemic-1	Q = 3.03	0.082	

Note. SJL, social jetlag; SSR, social sleep restriction.

Table S4. Age and chronotype regression models. Results show Theil-Sen regression with the Harrell-Davis estimate of the population median in place of the sample median in the Theil-Sen algorithm and the Gauss-Seidel method for extending Theil-Sen to multiple predictors. Confidence intervals and p-values were calculated via a percentile bootstrap method.

Social Jet Lag (Pandemic-2 - Pandemic-1)				
Predictor	Coefficient (b)	SE	CI	<i>p</i> -value
intercept	26.59	15.16	[2.88, 62.29]	0.020
Age	-0.47	0.19	[-0.92, -0.16]	<0.001
rMEQ	-0.09	0.63	[-1.40, 1.04]	0.851
Social Sleep Restriction (Pandemic-2 - Pandemic-1)				
Predictor	Coefficient (b)	SE	CI	<i>p</i> -value
intercept	51.17	17.07	[13.49, 85.57]	0.010
Age	-0.59	0.21	[-.98, -0.14]	<0.001
rMEQ	-1.11	0.90	[-2.92, 0.55]	0.134