

## Supplemental Material

### Section S1

Table S1. Relationship between momentary happiness and subsequent propensity to be alone as a function of different covariates ( $n=45,866$  observations from 5,422 individuals).

Covariate	OR <sup>†</sup>	95% CI
No daily mean covariate	0.995***	(0.994, 0.996)
Mean daily happiness (excluding $H_t$ )	1.002*	(1.000, 1.003)
Mean daily happiness (excluding $H_t$ & $H_{t+1}$ )	0.998*	(0.997, 0.9997)
Mean daily happiness (excluding $H_t$ & $H_{t-1}$ or $H_{t+2}$ )	1.002*	(1.000, 1.003)
$H_{t+1}$	1.003***	(1.001, 1.004)

\*  $p<.05$ ; \*\*  $p<.01$ ; \*\*\*  $p<.001$

† OR is of being alone at time  $t+1$  for a 1-point increase in happiness at time  $t$ , which was reported on a scale from 0-100.

For comparability with the commentary and the original paper, we also ran models using a sample of individuals with 3 or more complete observations for at least one day, the minimum number required to calculate our series of covariates with at least 1 observation ( $N = 115,817$  total observations from 15,851 participants). As shown in Table S2, results using this larger sample were essentially the same as results from the more conservative sample we report in the main manuscript (Table 1), with stronger statistical evidence for the observed effects. For completeness, we also report a completely unadjusted model for both datasets (relating  $H_t$  to  $A_{t+1}$  with individual-level random intercepts and slopes, with no adjustment for time of day or week).

Table S2. Relationship between momentary happiness and subsequent propensity to be alone as a function of different covariates and number of observations.

Covariate	3+ daily observations ( $n = 115,817^{\dagger}$ )		4+ daily observations ( $n = 45,866^{\dagger}$ )	
	OR $^{\ddagger}$	95% CI	OR $^{\ddagger}$	95% CI
Unadjusted	0.991***	(0.991, 0.992)	0.992***	(0.991, 0.993)
No daily mean covariate	0.994***	(0.994, 0.995)	0.995***	(0.994, 0.996)
Mean daily happiness (excluding $H_t$ )	1.002***	(1.001, 1.003)	1.002*	(1.000, 1.003)
Mean daily happiness (excluding $H_t$ & $H_{t+1}$ )	0.997***	(0.996, 0.997)	0.998*	(0.997, 0.999)
Mean daily happiness (excluding $H_t$ & $H_{t-1}$ or $H_{t+2}$ )	1.003***	(1.002, 1.004)	1.002*	(1.000, 1.003)
$H_{t+1}$	1.003***	(1.002, 1.004)	1.003***	(1.001, 1.004)

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

$^{\dagger}$  No. participants = 15,851 and 5,422 respectively.

$^{\ddagger}$  OR is of being alone at time  $t+1$  for a 1-point increase in happiness at time  $t$ , which was reported on a scale from 0-100.

Table S3. Complete results for Table S1 models (fixed effects given to 3 significant figures, except where more was required for clarity).

Fixed effects	No daily mean covariate		Mean daily happiness (excl. $H_t$ ) [1]		Mean daily happiness (excl. $H_t$ & $H_{t+1}$ ) [2]		Mean daily happiness (excl. $H_t$ & $H_{t-1}$ or $H_{t+2}$ ) [3]		$H_{t+1}$ [4]	
	OR†	95% CI	OR†	95% CI	OR†	95% CI	OR†	95% CI	OR†	95% CI
<i>Intercept</i>	0.368	(0.097, 1.40)	0.512	(0.136, 1.92)	0.449	(0.119, 1.69)	0.511	(0.136, 1.92)	0.454	(0.120, 1.72)
Happiness ( $H_t$ )	0.995***	(0.994, 0.996)	1.002*	(1.000, 1.003)	0.998*	(0.997, 0.9997)	1.002*	(1.000, 1.003)	1.003***	(1.001, 1.004)
Alone ( $A_t$ )	3.85***	(3.68, 4.02)	3.85***	(3.69, 4.03)	3.85***	(3.69, 4.02)	3.86***	(3.70, 4.04)	3.87***	(3.70, 4.04)
Weekday	1.34***	(1.26, 1.43)	1.33***	(1.25, 1.42)	1.34***	(1.25, 1.43)	1.33***	(1.25, 1.42)	1.34***	(1.25, 1.43)
Sunday	1.18***	(1.09, 1.28)	1.17***	(1.08, 1.27)	1.17***	(1.08, 1.28)	1.16***	(1.07, 1.26)	1.17***	(1.08, 1.27)
[1]	-	-	0.989***	(0.987, 0.990)	-	-	-	-	-	-
[2]	-	-	-	-	0.994***	(0.992, 0.996)	-	-	-	-
[3]	-	-	-	-	-	-	0.988***	(0.986, 0.990)	-	-
[4]	-	-	-	-	-	-	-	-	0.988***	(0.986, 0.989)
00:00-01:59	1.63	(0.363, 7.33)	1.62	(0.364, 7.23)	1.59	(0.357, 7.12)	1.67	(0.375, 7.40)	1.81	(0.402, 8.12)
02:00-03:59	1.12	(0.239, 5.30)	1.09	(0.233, 5.13)	1.08	(0.231, 5.09)	1.10	(0.234, 5.13)	1.22	(0.258, 5.80)
04:00-05:59	1.34	(0.351, 5.15)	1.34	(0.352, 5.07)	1.32	(0.346, 5.01)	1.36	(0.360, 5.16)	1.47	(0.383, 5.63)
06:00-07:59	1.17	(0.308, 4.43)	1.16	(0.308, 4.34)	1.14	(0.303, 4.31)	1.18	(0.314, 4.41)	1.26	(0.332, 4.78)
08:00-09:59	1.05	(0.278, 3.99)	1.04	(0.277, 3.89)	1.03	(0.273, 3.87)	1.06	(0.283, 3.97)	1.14	(0.302, 4.33)
10:00-11:59	1.23	(0.324, 4.65)	1.20	(0.321, 4.51)	1.19	(0.317, 4.48)	1.23	(0.328, 4.59)	1.33	(0.350, 5.02)
12:00-13:59	1.19	(0.314, 4.50)	1.16	(0.310, 4.36)	1.15	(0.307, 4.34)	1.19	(0.317, 4.44)	1.28	(0.337, 4.84)
14:00-15:59	1.14	(0.301, 4.31)	1.11	(0.297, 4.18)	1.11	(0.294, 4.16)	1.14	(0.304, 4.25)	1.23	(0.325, 4.66)
16:00-17:59	1.01	(0.266, 3.81)	0.980	(0.262, 3.68)	0.974	(0.259, 3.66)	1.00	(0.267, 3.74)	1.09	(0.287, 4.12)
18:00-19:59	1.21	(0.320, 4.59)	1.18	(0.315, 4.43)	1.17	(0.311, 4.41)	1.20	(0.322, 4.50)	1.32	(0.348, 5.00)
20:00-21:59	1.56	(0.411, 5.95)	1.52	(0.403, 5.72)	1.51	(0.399, 5.70)	1.54	(0.410, 5.79)	1.70	(0.447, 6.48)
<b>Random effects (2 significant figures)</b>										
	SD	Correlation	SD	Correlation	SD	Correlation	SD	Correlation	SD	Correlation
ID (intercept)	0.77		0.87		0.83		0.83		0.78	
ID (slope $H_t$ )	0.0074	-0.57	0.0097	-0.70	0.0088	-0.65	0.0091	-0.65	0.0080	-0.58

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .† OR is of being alone at time  $t+1$  for a 1-point increase in happiness at time  $t$ , which was reported on a scale from 0 to 100.

**Section S2**

Table S4. Akaike and Bayesian Information Criteria as a function of different covariates ( $n=64,644$  observations from 10,204 individuals).

Covariate	OR <sup>†</sup>	95% CI	AIC	BIC
No daily mean covariate	0.995***	(0.994, 0.996)	76918	77091
$H_{t+1}$	1.003***	(1.002, 1.004)	76318	76500
$H_{Day}$	1.002**	(1.001, 1.003)	76591	76773
$H_{PastDay}$	0.997***	(0.995, 0.998)	76887	77069
$H_{PastWeek}$	0.997***	(0.995, 0.998)	76888	77070

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

† OR of being alone at time  $t+1$  for a 1-point increase in happiness at time  $t$ , which was reported on a scale from 0-100.

For comparability with the commentary and the original paper, we also fit models on all complete pairs of observations, as long as these pairs were within 12h of each other, with at least one measure in the previous 24 hours ( $N = 154,520$ ). Note we were able to include all observations in the calculation of these covariates (not those just within 12h). As shown in Table S5, results using this larger sample were essentially the same as results from the more conservative sample we discuss in the main manuscript (Table S4).

Table S5. Akaike and Bayesian Information Criteria as a function of different covariates and number of observations.

Covariate	2+ daily observations plus 1+ in prev. 24h ( $n = 154,520^{\dagger}$ )				3+ daily observations plus 2+ in prev. 24h ( $n = 64,644^{\dagger}$ )			
	OR $^{\ddagger}$	95% CI	AIC	BIC	OR $^{\ddagger}$	95% CI	AIC	BIC
No daily mean	0.995***	(0.994, 0.995)	186251	186440	0.995***	(0.994, 0.996)	76918	77091
$H_{t+1}$	1.003***	(1.002, 1.004)	184484	184683	1.003***	(1.002, 1.004)	76318	76500
$H_{Day}$	1.003***	(1.002, 1.003)	185005	185204	1.002**	(1.001, 1.003)	76591	76773
$H_{PastDay}$	0.996***	(0.996, 0.997)	186182	186381	0.997***	(0.995, 0.998)	76887	77069
$H_{PastWeek}$	0.996***	(0.996, 0.997)	186187	186386	0.997***	(0.995, 0.998)	76888	77070

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

$^{\dagger}$  No. individuals = 22,505 and 10,204 respectively.

$^{\ddagger}$  OR is of being alone at time  $t+1$  for a 1-point increase in happiness at time  $t$ , which was reported on a scale from 0-100.

### Section S3

The time lag between measures in the WHO SAGE dataset is not consistent across individuals (as reported activities are of varying length). Therefore, we checked whether this affected results of the “temporal proximity” analyses by adding the time elapsed during the interim activity as a control variable in the models we reported in Table 1 (column 1). While such a control is not possible or relevant in the model relating  $H_t$  to  $A_{t+1}$  (as activities were reported back-to-back), we included the duration of the interim activity as a covariate in the model relating  $H_t$  to  $A_{t+2}$ , and the sum of the interim two activities (e.g., summed duration of activity 2 and 3 when relating happiness at activity 1 to being alone at activity 4) in the model relating  $H_t$  to  $A_{t+3}$ . As shown in Table S6, results for the latter two models are very similar to those reported in Table 1.

Table S6. Relationship between current happiness and subsequent propensity to be alone at time  $t+1$ ,  $t+2$ , and  $t+3$  in the WHO SAGE dataset in models controlling for the time elapsed during the interim activity (or activities).

	Original model		Controlling for time elapsed	
	OR <sup>†</sup>	95% CI	OR <sup>†</sup>	95% CI
$H_t \rightarrow A_{t+1}$	1.036*	(1.008, 1.064)	-	-
$H_t \rightarrow A_{t+2}$	1.028*	(1.000, 1.057)	1.026	(0.998, 1.055)
$H_t \rightarrow A_{t+3}$	1.026	(0.998, 1.055)	1.026	(0.998, 1.055)

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

<sup>†</sup> OR is for a 1-point increase in happiness at time  $t$ , which was reported on a scale from -2 to 2.

## Section S4

In a similar vein to the “past 24h” model included in Elmer’s commentary, we additionally computed models relating current happiness and subsequent propensity to be alone at time  $t+1$ ,  $t+2$ , and  $t+3$  in the WHO SAGE dataset, controlling for a mean daily happiness covariate computed *only* using measures that had occurred earlier in the day (in addition to time of day and whether or not the participant was alone at the time of the current happiness record). These results provide further statistical evidence for the “*temporal proximity*” account. In fact, we observe a clearer weakening of the positive relationship between momentary happiness and subsequent propensity to be alone as the temporal gap between the two measures increases (see Table S7).

Note that while the models relating current happiness to being alone at  $t+1$  and  $t+2$  are identical to those in Table 1 and computed on the same 43,059 observations from 19,384 individuals, the model relating current happiness to being alone at  $t+3$  is computed on a smaller subset of observations ( $n = 23,678$ ) from 13,606 individuals. This is because the covariate is computed only using previous happiness records, and so the first current happiness measure that can be used is the 2<sup>nd</sup> of the day (related to social interactions during the 5<sup>th</sup> activity of the day, with the 1<sup>st</sup> measure being used to compute the “previous daily mean happiness” covariate). In addition, this model includes only random intercepts, as including random slopes would have resulted in more random effects than observations. As such, this result is presented here only for completeness.

Table S7. Relationship between momentary happiness and subsequent propensity to be alone at time  $t+1$ ,  $t+2$ , and  $t+3$  in the WHO SAGE dataset in models controlling for mean daily happiness including only previous moods.

	OR§	95% CI
$H_t \rightarrow A_{t+1}^\dagger$	1.051**	(1.013, 1.092)
$H_t \rightarrow A_{t+2}^\dagger$	1.035	(0.997, 1.074)
$H_t \rightarrow A_{t+3}^\ddagger$	0.997	(0.947, 1.048)

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .       $^\dagger n=43,059$  observations       $^\ddagger n=23,678$  observations  
 § OR is of being alone for a 1-point increase in happiness at time  $t$ , which was reported on a scale from -2 to 2.



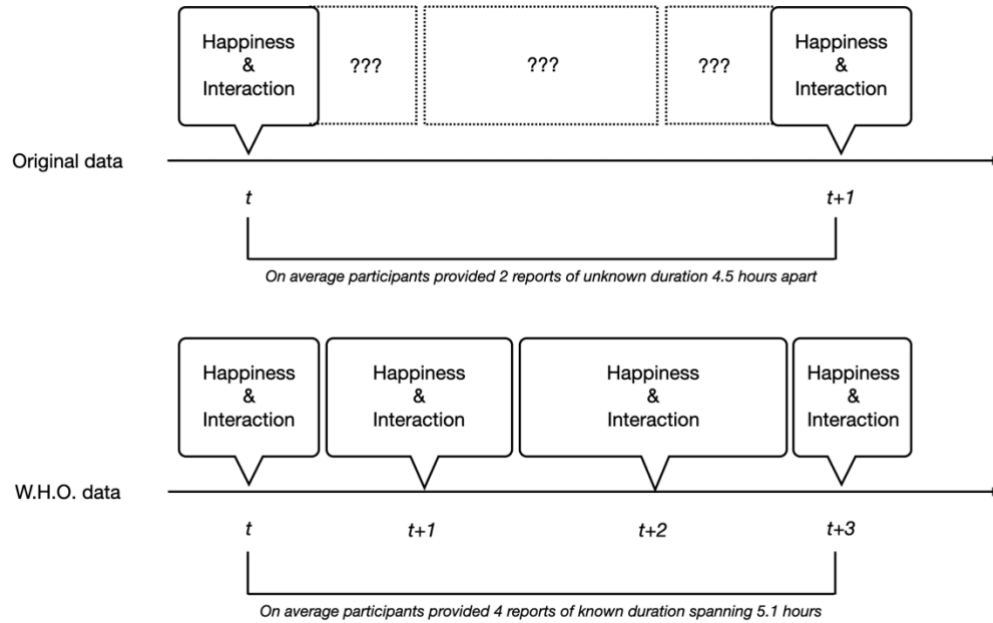


Figure S1. Average temporal resolution of our original and WHO SAGE data.