| **Table 4** *Within-Person Descriptive Statistics, Correlations, and Reliability for all EMA variables* | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Descriptives** | | |  | **Within-Person Correlations [M (SD)]** | | | | | | | |
| **EMA Variable** | **M (SD)** | **[CI]** | **[CI]** |  | **1.** | **2.** | **3.** | **4.** | **5.** | **6.** | **7.** | **8.** |
| 1. Momentary Loneliness | 2.51 (2.50) | 0.86 [0.86, 0.87] | 0.99 [0.99, 0.99] |  | -- |  |  |  |  |  |  |  |
| 2. Cognitive Composite Score | 68.95 (15.69) | 0.29 [0.27, 0.32] | 0.81 [0.76, 0.87] |  | 0.005 (0.15) | -- |  |  |  |  |  |  |
| 3. Cognitive Composite Median RT | 30.12 (5.95) | 0.26 [0.24, 0.29] | 0.59 [0.50, 0.69] |  | 0.007 (0.19) | -0.15 (0.29) | -- |  |  |  |  |  |
| 4. Social Interaction Recency | 1.31 (1.31) | – | – |  | 0.12 (0.23) | 0.02 (0.14) | 0.05 (0.17) | -- |  |  |  |  |
| 5. Social Interaction Quality | 6.14 (1.34) | 0.58 [0.57, 0.60] | 0.63 [0.55, 0.72] |  | -0.24 (0.27) | 0.01 (0.16) | -0.003 (0.17) | -0.03 (0.15) | -- |  |  |  |
| 6. Practice Effect | 44.03 (6.73) | – | – |  | -0.002 (0.32) | 0.17 (0.30) | -0.39 (0.26) | -0.04 (0.19) | 0.009 (0.28) | -- |  |  |
| 7. Interruptions | 0.14 (0.17) | – | – |  | -0.04 (0.17) | -0.23 (0.20) | 0.02 (0.21) | -0.20 (0.93) | -0.009 (0.18) | 0.02 (0.47) | -- |  |
| 8. Decimal Time (Hours) | 14.81 (1.39) | – | – |  | -0.001 (0.15) | -0.06 (0.15) | 0.03 (0.18) | -0.21 (0.25) | 0.009 (0.13) | 0.04 (0.11) | -0.001 (0.24) | -- |

| **Table X** *Between-Person Descriptive Statistics and Correlations* | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Descriptives** |  | **Correlations** | | | | | | | | |
| **Baseline Variable** | **M (SD)** |  | **1.** | **2.** | **3.** | **4.** | **5.** | **6.** | **7.** | **8.** | **9.** |
| 1. Trait-Like Loneliness | 4.66 (2.37) |  | -- |  |  |  |  |  |  |  |  |
| 2. Loneliness Instability | 1.89 (1.43) |  | **0.33** | -- |  |  |  |  |  |  |  |
| 3. Cognitive Scores | 69.18 (15.54) |  | **-0.16** | -0.14 | -- |  |  |  |  |  |  |
| 4. Cognitive Median RT | 29.98 (5.81) |  | 0.04 | -0.02 | -0.10 | -- |  |  |  |  |  |
| 5. Social Interaction Recency | 1.30 (1.31) |  | **0.29** | -0.04 | -0.05 | **0.24** | -- |  |  |  |  |
| 6. Social Interaction Quality | 6.15 (1.34) |  | **-0.63** | **-0.33** | 0.10 | 0.13 | -0.03 | -- |  |  |  |
| 7. Age (Years) | 55.97 (8.39) |  | -0.10 | **-0.24** | 0.09 | **0.47** | **0.21** | **0.17** | -- |  |  |
| 8. Education (Years) | 16.05 (2.53) |  | **-0.22** | -0.09 | **0.24** | -0.06 | 0.01 | **0.20** | 0.07 | -- |  |
| 9. Household Income (USD) | $80,093.96 ($67,499.54) |  | **-0.25** | -0.04 | **0.20** | -0.07 | **-0.30** | 0.10 | -0.09 | **0.31** | -- |

| **Table 1** *Research Question 1: Adjusted Between-Person Associations Between Loneliness Stability and Cognitive Function and Variability* | | | |
| --- | --- | --- | --- |
|  | | **Location** | **Scale** |
| **RQ** | **Term** | **Est. [CI]** | **Est. [CI]** |
| **Cognitive Composite Score** | | | |
| RQ1a | Loneliness Instability | -0.36 [-1.20,0.48] | **0.05** **[0.01,0.09]** |
| RQ1b | Loneliness Instability x Trait-like Loneliness | -0.19 [-0.68,0.29] | 0.01 [-0.01,0.02] |
| RQ1c | Loneliness Instability x Social Interaction Recency | -0.35 [-1.10,0.40] | 0.01 [-0.03,0.05] |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.24 [-0.43,0.91] | -0.02 [-0.05,0.01] |
| Sensitivity | Loneliness Instability x Baseline Age | 0.31 [-0.40,1.03] | -0.03 [-0.08,0.02] |
| **Cognitive Composite Median RT** | | | |
| RQ1a | Loneliness Instability | 0.02 [-0.52,0.55] | 0.02 [-0.02,0.06] |
| RQ1b | Loneliness Instability x Trait-like Loneliness | 0.17 [-0.07,0.41] | 0.004 [-0.01,0.02] |
| RQ1c | Loneliness Instability x Social Interaction Recency | -0.002 [-0.47,0.46] | 0.03 [-0.01,0.07] |
| RQ1d | Loneliness Instability x Social Interaction Quality | -0.20 [-0.57,0.18] | -0.03 [-0.06,0.003] |
| Sensitivity | Loneliness Instability x Baseline Age | 0.45 [-0.04,0.94] | -0.04 [-0.10,0.01] |
| *Note*. Adjusted indicates that the location part of the model was adjusted for key momentary- (interruptions, practice effects, time of day) and person-level (age, relationship status, income, education) covariates. Cognitive composite score refers to average POMP-scored performance on three cognitive tests. Cognitive Composite Median RT refers to average POMP-scored reaction times on three cognitive tests. Models were estimated as mixed effects location scale models that separately predict location (i.e. levels of performance) and scale (i.e. variability in performance). Each term refers to the key hypothesis test for the corresponding research question. RQ = Research Question; Estimate = mean of the posterior; CI = 95% credible interval. | | | |

| **Table 2** *Research Question 2: Adjusted Within-Person Associations Between Momentary Loneliness and Cognitive Function and Variability* | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | | **Location** | | **Scale** | |
|  | | **Concurrent** | **Prospective** | **Concurrent** | **Prospective** |
| **RQ** | **Term** | **Estimate [*CI*]** | **Estimate [*CI*]** | **Estimate [*CI*]** | **Estimate [*CI*]** |
| **Cognitive Composite Score** | | | | | |
| RQ2a | Momentary Loneliness | 0.04 [-0.10,0.16] | -0.009 [-0.14,0.12] | **-0.02** **[-0.03,-0.004]** | -0.003 [-0.02,0.01] |
| RQ2b | Momentary x Trait-like Loneliness | -0.09 [-0.26,0.09] | -0.13 [-0.31,0.05] | 0.005 [-0.02,0.03] | 0.02 [-0.008,0.04] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | 0.01 [-0.04,0.07] | 0.009 [-0.03,0.05] | -0.001 [-0.007,0.005] | -0.001 [-0.007,0.005] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.06 [-0.02,0.14] | 0.06 [-0.01,0.13] | -0.001 [-0.009,0.008] | -0.001 [-0.009,0.007] |
| Sensitivity | Momentary Loneliness x Age | **-0.19** **[-0.32,-0.05]** | -0.15 [-0.30,0.000] | 0.008 [-0.009,0.03] | 0.005 [-0.01,0.02] |
| **Cognitive Composite Median RT** | | | | | |
| RQ2a | Momentary Loneliness | 0.003 [-0.000,0.006] | 0.000 [-0.003,0.003] | -0.01 [-0.03,0.002] | 0.005 [-0.008,0.02] |
| RQ2b | Momentary x Trait-like Loneliness | -0.000 [-0.005,0.004] | 0.001 [-0.003,0.005] | 0.001 [-0.02,0.02] | 0.01 [-0.008,0.03] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.001 [-0.002,0.000] | -0.000 [-0.001,0.001] | -0.002 [-0.007,0.003] | 0.001 [-0.005,0.007] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.000 [-0.001,0.002] | 0.001 [-0.001,0.002] | 0.005 [-0.002,0.01] | 0.004 [-0.004,0.01] |
| Sensitivity | Momentary Loneliness x Age | -0.000 [-0.004,0.004] | -0.001 [-0.004,0.003] | 0.01 [-0.004,0.03] | 0.008 [-0.008,0.02] |
| *Note*. Cognitive composite score refers to average POMP-scored performance on three cognitive tests. Cognitive Composite Median RT refers to average POMP-scored reaction times on three cognitive tests. Models were estimated as mixed effects location scale models that separately predict location (i.e. levels of performance) and scale (i.e. variability in performance). Each term refers to the key hypothesis test for the corresponding research question. RQ = Research Question; Estimate = mean of the posterior; CI = 95% credible interval. | | | | | |

| **Table 2** *Research Question 2: Adjusted Within-Person Associations Between Momentary Loneliness and Cognitive Function and Variability* | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Location** | | | | **Scale** | | | |
|  | | **Contemporaneous** | | **Prospective** | | **Contemporaneous** | | **Prospective** | |
| **RQ** | **Term** | **Estimate [*CI*]** | ***SD* [*CI*]** | **Estimate [*CI*]** | ***SD* [*CI*]** | **Estimate [*CI*]** | ***SD* [*CI*]** | **Estimate [*CI*]** | ***SD* [*CI*]** |
| **Cognitive Composite Score** | | | | | | | | | |
| RQ2a | Momentary Loneliness | 0.04 [-0.10,0.16] | 0.35 [0.16,0.55] | -0.01 [-0.14,0.12] | 0.34 [0.18,0.51] | **-0.02** **[-0.03,-0.004]** | 0.06 [0.04,0.07] | -0.003 [-0.02,0.01] | 0.06 [0.05,0.08] |
| RQ2b | Momentary x Trait-like Loneliness | -0.09 [-0.26,0.09] |  | -0.13 [-0.31,0.05] |  | 0.01 [-0.02,0.03] |  | 0.02 [-0.01,0.04] |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | 0.01 [-0.04,0.07] | 0.11 [0.05,0.18] | 0.01 [-0.03,0.05] | 0.03 [0.001,0.09] | -0.001 [-0.01,0.005] | 0.01 [0.001,0.02] | -0.001 [-0.01,0.005] | 0.01 [0.001,0.02] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.06 [-0.02,0.14] | 0.19 [0.11,0.28] | 0.06 [-0.01,0.13] | 0.10 [0.01,0.22] | -0.001 [-0.01,0.01] | 0.02 [0.004,0.03] | -0.001 [-0.01,0.01] | 0.02 [0.01,0.03] |
| Sensitivity | Loneliness x Baseline Age | **-0.19** **[-0.32,-0.05]** |  | -0.15 [-0.30,0.000] |  | 0.01 [-0.01,0.03] |  | 0.005 [-0.01,0.02] |  |
| **Cognitive Composite Median RT** | | | | | | | | | |
| RQ2a | Momentary Loneliness | 0.002 [-0.09,0.09] | 0.28 [0.17,0.40] | 0.04 [-0.04,0.12] | 0.20 [0.09,0.31] | -0.01 [-0.02,0.01] | 0.05 [0.04,0.07] | -0.01 [-0.03,0.02] | 0.06 [0.02,0.09] |
| RQ2b | Momentary x Trait-like Loneliness | -0.01 [-0.05,0.03] |  | 0.01 [-0.03,0.04] |  | -0.001 [-0.01,0.01] |  | -0.003 [-0.01,0.01] |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.01 [-0.04,0.02] | 0.04 [0.002,0.09] | 0.03 [-0.06,0.20] | 0.64 [0.005,1.49] | -0.002 [-0.01,0.003] | 0.004 [0.000,0.01] | 0.03 [-0.01,0.08] | 0.33 [0.001,0.92] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.01 [-0.03,0.04] | 0.03 [0.001,0.09] | 0.12 [-0.01,0.30] | 0.49 [0.005,0.99] | 0.004 [-0.002,0.01] | 0.01 [0.000,0.02] | 0.10 [-0.01,0.27] | 0.40 [0.002,0.83] |
| Sensitivity | Momentary Loneliness x Baseline Age | -0.02 [-0.14,0.10] |  | 0.06 [-0.04,0.16] |  | 0.01 [-0.01,0.02] |  | -0.01 [-0.03,0.02] |  |
| *Note*. Cognitive composite score refers to average POMP-scored performance on three cognitive tests. Cognitive Composite Median RT refers to average POMP-scored reaction times on three cognitive tests. Models were estimated as mixed effects location scale models that separately predict location (i.e. levels of performance) and scale (i.e. variability in performance). Each term refers to the key hypothesis test for the corresponding research question. RQ = Research Question; Estimate = mean of the posterior; CI = 95% credible interval; SD = standard deviation of random effects for within-person associations allowed to vary across people. | | | | | | | | | |

| **Table SX** *Associations between momentary loneliness and cognitive domains from mixed effects location-scale models* | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | | **Location** | | **Scale** | |
|  | | **Concurrent** | **Prospective** | **Concurrent** | **Prospective** |
| **RQ** | **Term** | **Estimate [*CI*]** | **Estimate [*CI*]** | **Estimate [*CI*]** | **Estimate [*CI*]** |
| **Memory Median RT** | | | | | |
| RQ2a | Momentary Loneliness | 0.005 [-0.001,0.01] | -0.001 [-0.006,0.004] | **-0.01** **[-0.03,-0.002]** | 0.004 [-0.007,0.01] |
| RQ2b | Momentary x Trait-like Loneliness | 0.005 [-0.003,0.01] | 0.001 [-0.006,0.007] | -0.008 [-0.03,0.01] | **0.02** **[0.001,0.03]** |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.001 [-0.003,0.000] | -0.001 [-0.002,0.001] | -0.001 [-0.007,0.004] | 0.005 [-0.001,0.010] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | -0.001 [-0.003,0.001] | 0.002 [-0.000,0.004] | 0.005 [-0.002,0.01] | -0.002 [-0.008,0.005] |
| Sensitivity | Momentary Loneliness x Age | -0.000 [-0.007,0.006] | -0.001 [-0.006,0.004] | 0.007 [-0.009,0.02] | 0.01 [-0.002,0.02] |
| **Memory Score** | | | | | |
| RQ2a | Momentary Loneliness | **0.009** **[0.004,0.01]** | **0.005** **[0.000,0.01]** | **-0.04** **[-0.06,-0.01]** | -0.03 [-0.05,0.000] |
| RQ2b | Momentary x Trait-like Loneliness | -0.002 [-0.007,0.004] | -0.004 [-0.009,0.002] | 0.02 [-0.02,0.06] | 0.03 [-0.01,0.07] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | 0.000 [-0.001,0.002] | -0.000 [-0.001,0.001] | -0.003 [-0.01,0.006] | 0.004 [-0.006,0.01] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | **0.004** **[0.001,0.006]** | 0.001 [-0.002,0.003] | -0.01 [-0.02,0.001] | -0.005 [-0.02,0.007] |
| Sensitivity | Momentary Loneliness x Age | -0.003 [-0.008,0.001] | **-0.005** **[-0.010,-0.000]** | 0.000 [-0.03,0.03] | 0.01 [-0.02,0.04] |
| **Processing Speed Median RT** | | | | | |
| RQ2a | Momentary Loneliness | -0.001 [-0.003,0.000] | -0.000 [-0.002,0.001] | -0.005 [-0.02,0.01] | -0.002 [-0.02,0.01] |
| RQ2b | Momentary x Trait-like Loneliness | -0.000 [-0.002,0.002] | 0.000 [-0.002,0.003] | -0.000 [-0.03,0.03] | -0.002 [-0.03,0.02] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | 0.000 [-0.000,0.001] | 0.000 [-0.001,0.001] | 0.000 [-0.007,0.007] | 0.004 [-0.003,0.01] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | -0.000 [-0.001,0.001] | -0.000 [-0.001,0.001] | 0.005 [-0.005,0.02] | 0.000 [-0.009,0.01] |
| Sensitivity | Momentary Loneliness x Age | 0.000 [-0.001,0.002] | -0.000 [-0.002,0.002] | 0.009 [-0.01,0.03] | 0.01 [-0.009,0.03] |
| **Processing Speed Score** | | | | | |
| RQ2a | Momentary Loneliness | 0.08 [-0.03,0.18] | 0.008 [-0.10,0.11] | -0.01 [-0.03,0.003] | -0.001 [-0.02,0.02] |
| RQ2b | Momentary x Trait-like Loneliness | -0.006 [-0.16,0.15] | -0.006 [-0.16,0.15] | -0.007 [-0.03,0.02] | -0.005 [-0.03,0.02] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.03 [-0.08,0.03] | -0.01 [-0.06,0.03] | 0.003 [-0.004,0.009] | 0.002 [-0.006,0.009] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | -0.002 [-0.06,0.05] | 0.03 [-0.03,0.09] | 0.007 [-0.003,0.02] | -0.001 [-0.01,0.010] |
| Sensitivity | Momentary Loneliness x Age | -0.07 [-0.20,0.06] | 0.02 [-0.12,0.15] | 0.008 [-0.01,0.03] | 0.02 [-0.004,0.04] |
| **Working Memory Median RT** | | | | | |
| RQ2a | Momentary Loneliness | -0.001 [-0.004,0.002] | -0.001 [-0.004,0.002] | -0.003 [-0.03,0.02] | 0.007 [-0.02,0.03] |
| RQ2b | Momentary x Trait-like Loneliness | -0.001 [-0.005,0.002] | -0.000 [-0.004,0.003] | 0.02 [-0.02,0.05] | 0.02 [-0.01,0.05] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.000 [-0.001,0.001] | 0.000 [-0.001,0.001] | -0.003 [-0.01,0.008] | -0.004 [-0.01,0.006] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.001 [-0.001,0.002] | 0.001 [-0.001,0.003] | 0.000 [-0.01,0.01] | -0.002 [-0.02,0.01] |
| Sensitivity | Momentary Loneliness x Age | -0.002 [-0.004,0.001] | -0.000 [-0.003,0.003] | 0.03 [-0.001,0.05] | 0.01 [-0.02,0.04] |
| **Working Memory Score (d')** | | | | | |
| RQ2a | Momentary Loneliness | 0.001 [-0.002,0.003] | -0.001 [-0.003,0.001] | 0.01 [-0.002,0.02] | 0.003 [-0.009,0.02] |
| RQ2b | Momentary x Trait-like Loneliness | **-0.005** **[-0.008,-0.001]** | -0.001 [-0.004,0.002] | -0.01 [-0.03,0.009] | 0.005 [-0.01,0.02] |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.000 [-0.001,0.001] | 0.000 [-0.001,0.001] | -0.005 [-0.01,0.001] | -0.001 [-0.007,0.005] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.001 [-0.000,0.002] | 0.000 [-0.001,0.001] | 0.003 [-0.004,0.01] | -0.002 [-0.009,0.005] |
| Sensitivity | Momentary Loneliness x Age | -0.001 [-0.004,0.002] | -0.002 [-0.004,0.001] | **0.02** **[0.008,0.04]** | -0.004 [-0.02,0.01] |
| *Note*. Adjusted indicates that the location part of the model was adjusted for key momentary- (interruptions, practice effects, time of day) and person-level (age, relationship status, income, education) covariates. Cognitive composite score refers to average POMP-scored performance on three cognitive tests. Cognitive Composite Median RT refers to average POMP-scored reaction times on three cognitive tests. Models were estimated as mixed effects location scale models that separately predict location (i.e. levels of performance) and scale (i.e. variability in performance). Each term refers to the key hypothesis test for the corresponding research question. RQ = Research Question; Estimate = mean of the posterior; CI = 95% credible interval. | | | | | |

| **Table SX** *Associations between momentary loneliness and cognitive domains from mixed effects location-scale models* | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Location** | | | | | | **Scale** | | | | |
|  | | **Contemporaneous** | | | **Prospective** | | | **Contemporaneous** | | | **Prospective** | |
| **RQ** | **Term** | **Estimate [*CI*]** | ***SD* [*CI*]** | **Estimate [*CI*]** | | ***SD* [*CI*]** | **Estimate [*CI*]** | | ***SD* [*CI*]** | **Estimate [*CI*]** | | ***SD* [*CI*]** |
| **Processing Speed Score** | | | | | | | | | | | | |
| RQ2a | Momentary Loneliness | -0.07 [-0.16,0.02] | 0.18 [0.01,0.34] | 0.01 [-0.10,0.11] | | 0.24 [0.09,0.39] | 0.01 [-0.003,0.03] | | 0.07 [0.05,0.09] | -0.001 [-0.02,0.02] | | 0.06 [0.05,0.08] |
| RQ2b | Momentary x Trait-like Loneliness | 0.01 [-0.04,0.05] |  | -0.005 [-0.05,0.04] | |  | 0.000 [-0.01,0.01] | |  | 0.001 [-0.01,0.01] | |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | **0.04** **[0.002,0.08]** | 0.04 [0.002,0.11] | -0.01 [-0.06,0.03] | | 0.03 [0.001,0.10] | -0.003 [-0.01,0.004] | | 0.01 [0.01,0.02] | 0.002 [-0.01,0.01] | | 0.02 [0.004,0.03] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | -0.01 [-0.06,0.05] | 0.07 [0.003,0.16] | 0.03 [-0.03,0.09] | | 0.08 [0.01,0.18] | 0.01 [-0.002,0.02] | | 0.03 [0.02,0.04] | -0.001 [-0.01,0.01] | | 0.03 [0.02,0.04] |
| Sensitivity | Momentary Loneliness x Baseline Age | 0.06 [-0.07,0.18] |  | -0.01 [-0.14,0.12] | |  | -0.01 [-0.03,0.01] | |  | -0.01 [-0.04,0.01] | |  |
| **Processing Speed Median RT** | | | | | | | | | | | | |
| RQ2a | Momentary Loneliness | 0.58 [-0.20,1.36] | 1.60 [0.06,3.66] | 0.16 [-0.64,0.95] | | 1.51 [0.08,3.53] | 0.005 [-0.02,0.03] | | 0.10 [0.07,0.12] | 0.000 [-0.02,0.02] | | 0.08 [0.06,0.11] |
| RQ2b | Momentary x Trait-like Loneliness | -0.12 [-0.58,0.34] |  | -0.03 [-0.51,0.44] | |  | 0.000 [-0.01,0.01] | |  | -0.001 [-0.01,0.01] | |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.35 [-0.85,0.16] | 0.75 [0.06,1.58] | -0.03 [-0.53,0.48] | | 0.38 [0.01,1.16] | 0.001 [-0.01,0.01] | | 0.03 [0.02,0.04] | -0.004 [-0.01,0.004] | | 0.02 [0.01,0.04] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | -0.02 [-0.55,0.55] | 0.64 [0.02,1.82] | -0.24 [-0.85,0.37] | | 0.74 [0.03,1.89] | 0.003 [-0.01,0.01] | | 0.04 [0.03,0.05] | -0.002 [-0.01,0.01] | | 0.03 [0.01,0.04] |
| Sensitivity | Momentary Loneliness x Baseline Age | -0.15 [-0.99,0.67] |  | 0.002 [-0.83,0.83] | |  | -0.01 [-0.04,0.01] | |  | -0.01 [-0.03,0.01] | |  |
| **Memory Score** | | | | | | | | | | | | |
| RQ2a | Momentary Loneliness | **0.30** **[0.11,0.50]** | 0.30 [0.02,0.66] | 0.20 [-0.01,0.41] | | 0.40 [0.03,0.78] | **-0.02** **[-0.04,-0.01]** | | 0.06 [0.04,0.07] | -0.005 [-0.02,0.01] | | 0.06 [0.04,0.07] |
| RQ2b | Momentary x Trait-like Loneliness | -0.07 [-0.15,0.01] |  | **-0.10** **[-0.20,-0.01]** | |  | 0.002 [-0.005,0.01] | |  | 0.003 [-0.004,0.01] | |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.01 [-0.08,0.06] | 0.05 [0.002,0.14] | -0.01 [-0.08,0.06] | | 0.04 [0.001,0.13] | -0.001 [-0.01,0.004] | | 0.01 [0.000,0.01] | 0.003 [-0.003,0.01] | | 0.01 [0.001,0.02] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | **0.17** **[0.04,0.30]** | 0.19 [0.01,0.43] | 0.03 [-0.08,0.15] | | 0.09 [0.003,0.28] | **-0.01** **[-0.02,-0.002]** | | 0.01 [0.002,0.03] | -0.004 [-0.01,0.003] | | 0.01 [0.000,0.02] |
| Sensitivity | Momentary Loneliness x Baseline Age | -0.13 [-0.35,0.08] |  | -0.06 [-0.33,0.19] | |  | 0.002 [-0.02,0.02] | |  | 0.001 [-0.02,0.02] | |  |
| **Memory Median RT** | | | | | | | | | | | | |
| RQ2a | Momentary Loneliness | 0.01 [-0.95,0.98] | 1.13 [0.03,4.30] | -0.07 [-1.04,0.90] | | 0.97 [0.02,3.59] | -0.01 [-0.02,0.004] | | 0.05 [0.03,0.06] | 0.002 [-0.01,0.01] | | 0.04 [0.03,0.06] |
| RQ2b | Momentary x Trait-like Loneliness | 0.06 [-0.87,0.99] |  | -0.03 [-0.97,0.92] | |  | -0.003 [-0.01,0.004] | |  | 0.004 [-0.002,0.01] | |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.35 [-1.29,0.60] | 1.15 [0.03,3.80] | -0.20 [-1.16,0.76] | | 1.20 [0.03,3.88] | -0.002 [-0.01,0.004] | | 0.01 [0.001,0.01] | 0.004 [-0.002,0.01] | | 0.01 [0.001,0.02] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | -0.13 [-1.08,0.82] | 1.18 [0.03,4.24] | 0.16 [-0.81,1.11] | | 0.92 [0.03,3.30] | 0.001 [-0.01,0.01] | | 0.01 [0.001,0.02] | 0.002 [-0.01,0.01] | | 0.02 [0.01,0.03] |
| Sensitivity | Momentary Loneliness x Baseline Age | -0.01 [-0.98,0.96] |  | -0.03 [-1.02,0.95] | |  | 0.01 [-0.01,0.02] | |  | **0.02** **[0.002,0.03]** | |  |
| **Working Memory Score (d')** | | | | | | | | | | | | |
| RQ2a | Momentary Loneliness | -0.02 [-0.17,0.12] | 0.23 [0.01,0.51] | 0.03 [-0.11,0.16] | | 0.18 [0.01,0.46] | -0.003 [-0.02,0.01] | | 0.06 [0.04,0.08] | 0.01 [-0.01,0.02] | | 0.07 [0.05,0.09] |
| RQ2b | Momentary x Trait-like Loneliness | -0.03 [-0.09,0.04] |  | -0.02 [-0.09,0.05] | |  | 0.002 [-0.01,0.01] | |  | 0.002 [-0.01,0.01] | |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.01 [-0.09,0.05] | 0.13 [0.02,0.22] | 0.05 [-0.01,0.11] | | 0.05 [0.002,0.14] | -0.003 [-0.01,0.01] | | 0.03 [0.02,0.04] | -0.001 [-0.01,0.004] | | 0.01 [0.000,0.02] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.01 [-0.07,0.09] | 0.12 [0.01,0.27] | 0.05 [-0.05,0.16] | | 0.22 [0.03,0.38] | -0.001 [-0.01,0.01] | | 0.03 [0.02,0.04] | -0.002 [-0.01,0.01] | | 0.02 [0.01,0.04] |
| Sensitivity | Momentary Loneliness x Baseline Age | -0.08 [-0.28,0.10] |  | -0.02 [-0.23,0.17] | |  | 0.02 [-0.000,0.04] | |  | 0.003 [-0.02,0.02] | |  |
| **Working Memory Median RT** | | | | | | | | | | | | |
| RQ2a | Momentary Loneliness | -0.20 [-0.99,0.59] | 3.46 [1.26,5.33] | -0.001 [-0.003,0.001] | | 0.01 [0.002,0.01] | 0.01 [-0.01,0.03] | | 0.06 [0.04,0.08] | 0.003 [-0.01,0.02] | | 0.03 [0.02,0.05] |
| RQ2b | Momentary x Trait-like Loneliness | -0.44 [-0.93,0.06] |  | -0.001 [-0.004,0.002] | |  | -0.005 [-0.01,0.002] | |  | 0.005 [-0.01,0.02] | |  |
| RQ2c | Momentary Loneliness x Social Interaction Recency | -0.000 [-0.001,0.001] | 0.001 [0.000,0.002] | 0.000 [-0.001,0.001] | | 0.002 [0.000,0.003] | -0.005 [-0.01,0.001] | | 0.01 [0.004,0.02] | -0.001 [-0.01,0.005] | | 0.01 [0.000,0.02] |
| RQ2d | Momentary Loneliness x Social Interaction Quality | 0.26 [-0.29,0.82] | 1.14 [0.05,2.33] | 0.000 [-0.001,0.001] | | 0.001 [0.000,0.003] | 0.003 [-0.01,0.01] | | 0.02 [0.002,0.03] | -0.002 [-0.01,0.005] | | 0.01 [0.000,0.02] |
| Sensitivity | Momentary Loneliness x Baseline Age | -0.09 [-0.93,0.76] |  | -0.002 [-0.004,0.001] | |  | 0.02 [-0.002,0.04] | |  | -0.004 [-0.02,0.01] | |  |
| *Note*. Adjusted indicates that the location part of the model was adjusted for key momentary- (interruptions, practice effects, time of day) and person-level (age, relationship status, income, education) covariates. Cognitive composite score refers to average POMP-scored performance on three cognitive tests. Cognitive Composite Median RT refers to average POMP-scored reaction times on three cognitive tests. Models were estimated as mixed effects location scale models that separately predict location (i.e. levels of performance) and scale (i.e. variability in performance). Each term refers to the key hypothesis test for the corresponding research question. RQ = Research Question; Estimate = mean of the posterior; CI = 95% credible interval. | | | | | | | | | | | | |

| **Table SX** *Research Question 1: Adjusted Between-Person Associations Between Loneliness Stability and Cognitive Function and Variability* | | | |
| --- | --- | --- | --- |
|  | | **Location** | **Scale** |
| **RQ** | **Term** | **Estimate [CI]** | **Estimate [CI]** |
| **Processing Speed Score** | | | |
| RQ1a | Loneliness Instability | -0.45 [-1.15,0.28] | **0.06** **[0.03,0.10]** |
| RQ1b | Loneliness Instability x Trait-Like Loneliness | -0.12 [-0.47,0.23] | -0.004 [-0.02,0.01] |
| RQ1c | Loneliness Instability x Social Interaction Recency | -0.46 [-1.06,0.12] | **0.05** **[0.01,0.09]** |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.10 [-0.41,0.60] | -0.02 [-0.05,0.01] |
| Sensitivity | Loneliness Instability x Baseline Age | -0.19 [-0.77,0.40] | -0.03 [-0.08,0.02] |
| **Processing Speed Median RT** | | | |
| RQ1a | Loneliness Instability | 0.05 [-0.93,1.02] | 0.05 [-0.01,0.11] |
| RQ1b | Loneliness Instability x Trait-Like Loneliness | 0.21 [-0.73,1.14] | 0.01 [-0.01,0.04] |
| RQ1c | Loneliness Instability x Social Interaction Recency | 0.21 [-0.75,1.18] | 0.05 [-0.01,0.11] |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.03 [-0.95,0.99] | -0.04 [-0.09,0.002] |
| Sensitivity | Loneliness Instability x Baseline Age | 0.17 [-0.81,1.13] | -0.03 [-0.11,0.05] |
| **Memory Score** | | | |
| RQ1a | Loneliness Instability | -0.35 [-1.24,0.55] | 0.02 [-0.02,0.06] |
| RQ1b | Loneliness Instability x Trait-Like Loneliness | -0.36 [-0.94,0.21] | 0.01 [-0.01,0.03] |
| RQ1c | Loneliness Instability x Social Interaction Recency | 0.09 [-0.76,0.90] | -0.02 [-0.06,0.03] |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.30 [-0.46,1.06] | **-0.04** **[-0.07,-0.002]** |
| Sensitivity | Loneliness Instability x Baseline Age | 0.69 [-0.13,1.50] | -0.05 [-0.11,0.004] |
| **Memory Median RT** | | | |
| RQ1a | Loneliness Instability | -0.02 [-1.01,0.96] | 0.02 [-0.01,0.06] |
| RQ1b | Loneliness Instability x Trait-Like Loneliness | 0.06 [-0.92,1.03] | 0.01 [-0.01,0.02] |
| RQ1c | Loneliness Instability x Social Interaction Recency | 0.02 [-0.95,1.00] | 0.01 [-0.03,0.05] |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.003 [-0.97,0.98] | -0.03 [-0.05,0.003] |
| Sensitivity | Loneliness Instability x Baseline Age | 0.10 [-0.87,1.08] | -0.03 [-0.07,0.02] |
| **Working Memory Score (d')** | | | |
| RQ1a | Loneliness Instability | -0.37 [-1.24,0.49] | **0.05** **[0.01,0.10]** |
| RQ1b | Loneliness Instability x Trait Loneliness | -0.22 [-0.75,0.28] | 0.01 [-0.01,0.03] |
| RQ1c | Loneliness Instability x Social Interaction Recency | -0.43 [-1.21,0.37] | 0.02 [-0.02,0.07] |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.40 [-0.32,1.10] | -0.01 [-0.04,0.03] |
| Sensitivity | Loneliness Instability x Baseline Age | 0.22 [-0.52,0.96] | -0.01 [-0.07,0.05] |
| **Working Memory Median RT** | | | |
| RQ1a | Loneliness Instability | -0.01 [-0.99,0.96] | 0.02 [-0.02,0.07] |
| RQ1b | Loneliness Instability x Trait Loneliness | 0.21 [-0.72,1.14] | 0.01 [-0.02,0.03] |
| RQ1c | Loneliness Instability x Social Interaction Recency | 0.25 [-0.71,1.21] | **0.07** **[0.02,0.12]** |
| RQ1d | Loneliness Instability x Social Interaction Quality | 0.003 [-0.95,0.96] | -0.03 [-0.06,0.01] |
| Sensitivity | Loneliness Instability x Baseline Age | 0.32 [-0.66,1.29] | -0.06 [-0.12,0.01] |

|  |
| --- |
| *Note*. Adjusted indicates that the location part of the model was adjusted for key momentary- (interruptions, practice effects, time of day) and person-level (age, relationship status, income, education) covariates. Models were estimated as mixed effects location scale models that separately predict location (i.e. levels of performance) and scale (i.e. variability in performance). Each term refers to the key hypothesis test for the corresponding research question. RQ = Research Question; Estimate = mean of the posterior; CI = 95% credible interval. |