**SUPPLEMENTARY INFORMATION**

**AA Literature Search**

In order to estimate variability of mood symptoms, we performed a PubMed literature search to identify relevant papers using ambulatory assessment ("AA") methods. We note that our goal was not to perform a comprehensive meta-analysis of these data, but rather to develop an empirically-derived estimate of variability in mood and affect observed in healthy controls and different patient populations. We used the following search term combinations:

(“ecological momentary assessment” OR “ecological” OR “experience sampling” OR “daily diary” OR “diary” OR “daily” OR “electronic diary” OR “day-to-day” OR “momentary assessments” OR “ambulatory monitoring” OR “daily life” OR “fluctuation” OR “everyday experience” OR “assessments” OR “mood assessment” OR “ratings” OR “self-ratings” OR “momentary ratings” OR “natural environment”) AND (“emotional reactivity” OR “dynamics” OR “affective lability” OR “emotion variability” OR “emotional instability” OR “affect variability” OR “instability” OR “momentary mood” OR “variability”) AND (“mood” OR “dynamics” OR “affect” OR “positive” OR “negative” OR “symptom” OR “states” OR “emotions” OR “stress” OR “activities” OR “experiences” OR “patterns” OR “intraindividual” OR “intra-individual level”) AND (“depressed” OR “depressive” OR “depression” OR “disorder” OR “control” OR “patient” OR “anxiety” OR “emotional” OR “PTSD”).

These terms resulted in an initial list of 477 articles. Of these 477, studies were included if they featured one or more self-completed assessments per day, lasted longer than four days, and included group average SDs of the individual EMA measures, and group SDs of the individual SDs, as measures of variability. These criteria resulted in 162 studies. Studies were further excluded if they did not include an AA protocol, if they did not measure an affect-related symptom, or if the authors measured the effect of a specific variable on mood, or only reported on the feasibility of a new technology or compliance rates in a specific population. Further, studies that did not involve a healthy control population or a target psychological patient population were excluded, as well as those where participants did not complete the assessments for themselves. Lastly, studies published before 2000, unavailable in English, or with outdated author contact information were excluded.

In cases where studies were missing some of the required descriptive statistics, study authors were contacted by email. Ultimately, we were able to use data from a total of 49 unique studies in total, representing data from a combined total of 9,628 unique healthy/low-symptom controls, and 2,815 psychiatric patients. A summary of studies and sample characteristics is provided in Table S1.
| Study | Sample description | Sample N | Days | Observations per day | Contingency |
|-------|--------------------|----------|------|----------------------|-------------|
| Hohn et al., 2013 | MDD; HC | Patient = 43; HC = 39 | 5 | 10 | Signal |
| Moser & Watkins, 2008 | Moderate depression; HC | Patient = 9; HC = 54 | 7 | 8 | Signal |
| Moser & Watkins, 2008 | Severe depression; HC | Patient = 9; HC = 54 | 7 | 8 | Signal |
| O'Hara et al., 2014 | Remitted depression; HC | Patient = 78; HC = 1064 | 30 | 1 | Time |
| O'Hara et al., 2014 | Recent depression; HC | Patient = 207; HC = 1064 | 30 | 1 | Time |
| Geschwind et al., 2011 | MDD; HC | Patient = 64; HC = 66 | 9 | 10 | Signal |
| Chepenik et al., 2006 | MDD; HC | Patient = 25; HC = 70 | 14 | 1 | Time |
| Chepenik et al., 2006 | Misc. depressive disorders; HC | Patient = 33; HC = 70 | 14 | 1 | Time |
| Knowles et al., 2007 | Remitted unipolar disorder; HC | Patient = 16; HC = 19 | 7 | 2 | Time |
| Geschwind et al., 2011 | MDD; HC | Patient = 64; HC = 66 | 9 | 10 | Signal |
| Mata et al., 2012 | MDD; HC | Patient = 53; HC = 53 | 7 | 8 | Signal |
| Koval et al., 2013 | Range of depressive symptoms | Patient = 99 | 7 | 10 | Signal |
| Wigman et al., 2015 | MDD; HC | Patient = 129; HC = 207 | 6 | 10 | Signal |
| Wigman et al., 2015 | Psychosis; HC | Patient = 263; HC = 207 | 6 | 10 | Signal |
| Smyth et al., 2007 | BN | Patient = 131 | 14 | 6 | Signal |
| Thompson et al., 2012 | MDD; HC | Patient = 53; HC = 53 | 7 | 8 | Signal |
| Kashdan & Farmer, 2014 | SAD; HC | Patient = 43; HC = 43 | 14 | 5 | Signal |
| Kashdan & Farmer, 2014 | SAD; HC | Patient = 43; HC = 43 | 14 | 5 | Signal |
| Bowman et al., 2004 | Anxiety; HC | Patient = 10; HC = 22 | 14 | 2 | Time |
| Hofmann et al., 2006 | Medium HPS; Low HPS | Patient = 19; HC = 18 | 28 | 1 | Time |
| Hofmann et al., 2006 | High HPS; Low HPS | Patient = 17; HC = 18 | 28 | 1 | Time |
| Knowles et al., 2007 | BD; HC | Patient = 18; HC = 19 | 7 | 2 | Time |
| Bentall et al., 2011 | Medium BD risk; Low BD risk | Patient = 20; HC = 25 | 7 | 1 | Time |
| Bentall et al., 2011 | High BD risk; Low BD risk | Patient = 26; HC = 25 | 7 | 1 | Time |
| Peters et al., 2012 | Psychoysis | Patient = 12 | 6 | 10 | Signal |
| Habets et al., 2012 | Psychoysis; HC | Patient = 32; HC = 90 | 6 | 10 | Signal |
| Russell et al., 2007 | BPD; HC | Patient = 41; HC = 119 | 20 | 6 | Varied |
| Karr et al., 2013 | BN + PTSD | Patient = 20 | 14 | 6 | Signal |
| Karr et al., 2013 | BN | Patient = 99 | 14 | 6 | Signal |
| Skirrow et al., 2014 | ADHD; HC | Patient = 41; HC = 47 | 5 | 8 | Signal |
| Wigman et al., 2013 | Psychotic; HC | Patient = 57; HC = 75 | 6 | 10 | Signal |
| Myrin-Germeyns et al., 2000 | SCZ; HC | Patient = 58; HC = 65 | 6 | 10 | Signal |
| Oorschot et al., 2014 | SCZ; HC | Patient = 14; HC = 14 | 3 | 10 | Signal |
| Bowen et al., 2006 | Anxiety; HC | Patient = 28; HC = 28 | 7 | 2 | Time |
| Engel et al., 2013 | AN | Patient = 118 | 14 | 6 | Signal |
| Helbig-Lang et al., 2012 | PD | Patient = 21 | 7 | 5 | Signal |
| Selby et al., 2013 | NSSI | Patient = 47 | 14 | 5 | Signal |
| Bresin et al., 2014 | NSSI; HC | Patient = 61; HC = 57 | 14 | 1 | Time |
| Beckham et al., 2013 | Smokers with PTSD; Smokers | Patient = 54; HC = 52 | 14 | Varied | Signal |
| Pishva et al., 2014 | Remitted MDD | Patient = 126; HC = 112 | 6 | 10 | Signal |
| Pishva et al., 2014 | Psychotic | Patient = 14; HC = 14 | 6 | 10 | Signal |
| Bresin & Gordon, 2013 | HC | HC = 105 | 14 | 1 | Time |
| Hohn et al., 2013 | HC | HC = 540 | 5 | 10 | Signal |
| Schilling & Diehl, 2014 | HC | HC = 289 | 30 | 1 | Time |
| Meyer & Hofmann, 2005 | HC | HC = 59 | 28 | 1 | Time |
| Bresin et al., 2012 | HC | HC = 147 | 15 | 1 | Time |
| Simpson et al., 2008 | HC | HC = 41 | 7 | 4 | Time |
| Simpson et al., 2008 | HC | HC = 41 | 7 | 4 | Time |
| Cikara et al., 2010 | HC | HC = 73 | 24 | Every third night | Time |
| Jacob et al., 2011 | HC | HC = 416 | 5 | 10 | Signal |
| Scott et al., 2014 | HC | HC = 190 | 10 | 5 | Signal |
| Scott et al., 2014 | HC | HC = 2022 | 8 | 1 | Time |
| Wenzel 2007 | HC | HC = 102 | 7 | 4 | Signal |
| Jacobs et al., 2013 | HC | HC = 279 | 5 | 10 | Signal |
| Gruber et al., 2013 | HC | HC = 244 | 6 | 10 | Signal |
| Wenzel et al., 2012 | HC | HC = 115 | 7 | 4 | Signal |
| Fleeson et al., 2001 | HC | HC = 46 | 13 | 5 | Time |
| Brose et al., 2011 | HC | HC = 101 | 87–107 | 1 | Signal |
| Brose et al., 2011 | HC | HC = 103 | 87–107 | 1 | Signal |
| Takano & Tanno, 2011 | HC | HC = 68 | 7 | 8 | Signal |
| Takano & Tanno, 2010 | HC | HC = 31 | 7 | 8 | Signal |
| Komulainen et al., 2014 | HC | HC = 104 | 7 | 10 | Signal |
| Heron & Smyth, 2013 | HC | HC = 131 | 14 | 5 | Signal |
| Stawski et al., 2010 | HC | HC = 1202 | 8 | 1 | Time |
| Wigman et al., 2013 | HC | HC = 610 | 5 | 10 | Signal |

**Abbreviations:** AN = Anorexia Nervosa; BD = Bipolar Depression; BN = Bulimia Nervosa; BPD = Borderline Personality Disorder; HC = Healthy Control; MDD = Major Depressive Disorder; NSSI = Non-Suicidal Self-Harm
Within-Subject Variability Estimates

All included studies were selected based on the requirement that they provided descriptive statistics for both the mean level of positive or negative affect (or both) as well as mean within-subject variability for each group (psychiatric patients and/or healthy or low-risk controls). To compare group-average within-subject variability across studies, we first looked at the ratio of average within-subject variability to average mean level for a given group (patients or controls/low symptom group). This provided an index of the proportion of mean-level affect (for a given group/rating instrument) that could be expected to vary within subjects over time. The distribution of within-subject variability across studies was non-parametric, and non-parametric tests were used for the analyses described below.

Relationships between Within-Subject Variability and Study Design

One important consideration for our estimate of within-subject variability is the extent to which affective variability measurement may be influenced by study design. To assess this, we looked at non-parametric (spearman) correlations between within-subject variability and various study design elements, including the number of observations per day, the total number of observations per subject (days X observations per day) and study the sample size (assessed separately for patient and control groups). For measures of negative affect there were no significant relationships between within-subject variability and sample size (spearman r = 0.119, p = 0.25) or observations per day (spearman r = 0.074, p = 0.469). There was, however, a significant positive relationship between within-subject variability and total number of observations (spearman r = 0.274, p = 0.008) for NA. For PA, there were no significant relationships with sample size (spearman r = 0.014, p = 0.90), observations per day (spearman r = 0.071, p = 0.53) or total number of observations (spearman r = 0.101, p = 0.38).

Because AA studies can differ in their timing of data collection (e.g., at fixed intervals during the day or random in response to random signals sent to a portable collection device), we were also interested to see whether this appeared to have any effect on estimates of within subject variability. Using Mann-Whitney Tests, we did not find any evidence that fixed vs. random signals influenced within-subject variability for PA (p =
0.428). For measures of NA, within-subject variability was slightly higher for studies using random (M = 0.37) as compared to fixed (M = 0.34; Mann-Whitney p = 0.0486) modes of data collection.

Taken together, these data suggest that our estimates of within-subject variability were not heavily influenced by basic factors surrounding study design.

*Relationships between Within-Subject Variability and Patients vs. Controls*

Using the within-subject variability index described above, we compared healthy control/low-symptom groups to patient groups using a Mann-Whitney test. Variability was significantly higher for PA in patients than controls (p = 0.003), but not for NA (p = 0.785). For within-subject variability/between-subject variability there were no significant group differences between patients and controls for either PA (p = 0.98) or NA (p =0.24).
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