How current and past anxiety disorders affect daily life in adolescents and young adults from the general population—An epidemiological study with ecological momentary assessment

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Abstract

Background: Prior research indicated, based on retrospective assessments of symptomatology, that 25% of individuals with "remitted" anxiety disorders (AD) experience a relapse. The present study used ecological momentary assessment (EMA) to examine how ADs affect everyday life among community adolescents and young adults with current or remitted AD compared to healthy controls and to each other.

Methods: Data come from the baseline assessment of the epidemiological Behavior and Mind Health study, conducted in Dresden (Germany) from 11/2015–12/2016. The sub-sample analyzed (n = 648, age 14–21) consisted of 65 participants with current DSM-5 AD-diagnosis, 52 participants with lifetime AD-diagnosis but not within the last 6 months (remitted), and 531 healthy controls (no psychopathology; healthy controls [HC]). EMA of various constructs took place 8 times a day for 4 days.

Results: The highest levels of symptoms were reported by those with current AD, followed by remitted AD and HC. Regression analyses revealed significantly worse mood, self-efficacy, quality of life and sleep-quality and more experiential avoidance, stress, negative thoughts and pessimism in remitted and current AD compared to HC. Current AD additional differed significantly from HC in optimism and positive thoughts. Furthermore, individuals with remitted AD without comorbidities differed significantly from HC on five out of 16 constructs.

Conclusion: Not only current but also remitted AD is associated with diverse negative experiences in everyday life, which cannot merely be explained by comorbidities. As the remaining burden and impairment in individuals with remitted AD might contribute to relapse, interventions might be targeted to improve mental health.

KEYWORDS
adolescence, anxiety disorder, ecological momentary assessment, epidemiology, remission, young adults
Anxiety disorders (AD) are the most common mental disorders in childhood and adolescence (Kessler et al., 2012), which are the core risk phases for developing AD (Beesdo et al., 2009; Kessler et al., 2012; Rapee et al., 2009). In addition to the burden of AD per se, frequently developing comorbidity negatively impacts symptomatology and functioning (Hofmeijer-Sevink et al., 2012; Koenke et al., 2007). Although about two thirds of participants with AD remit after 2 years, recurrence occurs in about one fifth (Penninx et al., 2011; Scholten et al., 2013). After remission, some individuals reported functioning level comparable to healthy individuals, in turn, some reported ongoing impairment similar to chronic AD (Ianou et al., 2014). Therefore, besides investigating present ADs, to improve our understanding of “remitted” ADs is important: are these individuals fully recovered or does symptomatology or other impairments remain, which may put them at increased risk to relapse or develop other forms of psychopathology?

Traditionally, studies on ADs used retrospective information based on interviews and questionnaires (Beesdo et al., 2009). Although these measures are established with demonstrated validity and reliability, they depict only a snapshot measured once in time or with larger time-intervals between assessments. Insights into the experiences of individuals with current or past AD during everyday life are largely lacking. Ecological momentary assessment (EMA) is a diary method of gathering real time data on feelings, thoughts, and the context in which they occur (Shiffman et al., 2008). EMA has many advantages, as with its real-time assessment it is less vulnerable to recall bias and its assessment under real-life circumstances improves ecological validity (Myin-Germeyns et al., 2009).

Previous work on ADs in children and adolescents in everyday life provides some insights on daily life phenomena. For example, Magallon-Neri et al. (2016) showed that, if a convenience sample of adolescents (n = 101) did report problems associated with mental health symptoms (e.g., feelings of anxiety or lack of concentration), they were closely related to states of sadness and anxiety (Magallon-Neri et al., 2016). Comparing adolescents with and without DSM-IV ADs (each group n = 65), no significant differences in amount or type of momentary affect were found, but anxious adolescents reported greater intensity of nervousness, sadness, and feeling upset than their nonanxious counterparts (Tan et al., 2012). Another EMA-study investigated a convenience sample (n = 1723) of adolescents and defined high-, medium- and low-anxious subgroups (using a tertial split of EMA-anxiety ratings; Henker et al., 2002). They found that highly anxious teenagers reported higher levels of anxiety, stress, anger, sadness, fatigue, as well as lower levels of happiness and well-being than the low-anxious groups (Henker et al., 2002). Overall, empirical studies and findings regarding experience of everyday life in individuals with ADs show a big variety regarding investigated groups, assessment contingency, observations per day, assessment days and constructs (Walz et al., 2014). Prior research focused primarily on (negative) affect. However, other domains may be important. Symptomatology of mental disorders, mental attitudes (e.g., optimism) or reactions to environmental conditions (e.g., stress) have been linked to AD previously, but have not been examined in real life. For example, ADs and depressive disorder show high comorbidity (Kessler et al., 2005) and are both associated with anger (Hawkins & Cougle, 2011). Additional, also excessive mood has been linked to anxiety previously (French et al., 1996). As ADs are marked by inappropriate stress reactions in response to feared but mostly not dangerous stimuli, it is not surprising that participants with AD score higher on a stress scale compared to nonclinical controls (Antony et al., 1998). Besides heightened stress levels, AD has previously been linked to optimism and pessimism (Rääkkönen et al., 1999), as well as with low perceived self-efficacy (Bandura, 1988; Muris, 2002). Also, individuals with AD reported impairment in initiating and maintaining sleep (Papadimitriou & Linkowski, 2005), already present during childhood and adolescence (Alfano et al., 2006). Findings of anxious-reporting more negative and less positive thoughts compared to nonanxious children (Hogendoorn et al., 2012) highlight the role of cognition in AD symptomatology. Considering all these findings, it is not surprising that a meta-analysis revealed AD patients, independently of type of AD, to report poorer quality of life compared to healthy controls (Olatunji et al., 2007).

In summary, a range of altered affects and experiences may explain the impairment of individuals with current or past AD, beyond AD symptoms. Examining different daily life domains could therefore help to identify further targets for intervention to improve remission and to prevent relapse. Hence, the present study aims to use an EMA approach in a general population sample of adolescents and young adults considering a range of health-related domains to answer the question, how adolescents and young adults with current or past ADs experience everyday life compared to healthy peers. We assume, that adolescents and young adults with current AD show significant impairment compared to healthy controls [HC], but do they also show more impairment compared to the remitted AD group? Do individuals with remitted AD still show impairment compared to healthy controls, which may make them vulnerable for relapse?

2 | METHOD

2.1 | Sample

Data came from the baseline investigation of the Behavior and Mind Health (BeMIND) study, an epidemiological cohort study of adolescents and young adults (14–21 years) in Dresden, Germany (Beesdo-Baum et al., 2020). The purpose of the BeMIND study is to examine developmental trajectories of mental disorders. A random age and sex stratified sample was drawn from the population registry and 1180 adolescents and young adults were assessed comprehensively between 11/2015 and 12/2016 (TO; response rate 21.7%, cooperation rate 43.4%; AAPOR, 2016). All participants provided written
informed consent or assent, and all legal guardians of minors also provided written informed consent.

Besides diagnostic, experimental, and biological assessments at two personal appointments in the study center at Technische Universität Dresden, EMA was a central study part (see details below). The present analysis sample was based on participants who completed at least 50% (<16 assessments) of the EMA assessments, thus providing sufficient and reliable data. Furthermore, for the purpose of this analysis, participants were categorized in one of three mutually exclusive groups: current AD, remitted AD, and healthy controls (HC; see details below). The flowchart of the analysis sample is shown in Figure 1. The BeMIND study protocol was reviewed by the ethics committee of the TU Dresden (EK381102014). For detailed study information, see Beesdo-Baum et al. (2020).

2.2 Diagnostic assessment

Participants were interviewed face-to-face with an updated research version of the fully standardized and computerized Munich Composite International Diagnostic Interview (DIA-X/M-CIDI; Wittchen & Pfister, 1997), which provides lifetime and 12-month diagnoses for a wide range of mental disorders according to DSM-5 (American Psychiatric Association, 2013). For the purpose of this analysis, participants were categorized in one of three mutually exclusive groups: (a) HC (n = 531), comprising participants with no lifetime DSM-5 diagnosis (see list of diagnoses in Table S1); (b) current AD (n = 65) comprising participants who fulfilled criteria of panic disorder, generalized AD, separation AD or agoraphobia within the last 4 weeks; and (c) remitted AD (n = 52) comprising participants with lifetime panic disorder, generalized AD, social AD, separation AD or agoraphobia, but indicating remission (last occurrence of anxiety or avoidance before the last 6 months). For comorbidity analyses, DSM-5 core diagnoses within the last 4 weeks were included (see Table S1).

2.3 Ecological momentary assessment

EMA was administered via smartphone eight times daily on 4 consecutive days (2 weekdays, weekend) after the diagnostic interview (within 2 weeks 98.6% of participants). One time-based morning-, 6 day-, and one evening-assessment were administered, sharing most items. Sleep-quality during the last night was additionally assessed in the morning and quality of life and self-efficacy in the evening-assessment. Variables were assessed using a seek-bar which was transformed into a scale of 0-100 (e.g., 0 = "Never"; 100 = "Always"; see Figure 2) and all items were mandatory. Assessing self-efficacy, the option "Was not necessary" was included for two items (see Table A1 in the Appendices) and if chosen no slider rating appeared. An individual reminder scheme, considering sleep times and periods during which participants did not want to be disturbed (e.g., school times), was created for each participant. Reminders were distributed symmetrically throughout the day but at unknown times for the

FIGURE 1 Flowchart of analysis sample. AD, anxiety disorder; EMA, ecological momentary assessment

FIGURE 2 Example of ecological momentary assessment question and scale
participant. Each survey could be postponed for 5 min three times, or could be omitted. Participants were instructed by trained study staff to enhance motivation and a training day with three assessments was included. After the EMA period, participants returned the smartphones to the study center and data stored on the smartphone were transferred to the study server. For a full documentation see Beesdo-Baum et al. (2020). Constructs used in this current analysis included manic symptomatology (Altman Self-Rating Mania Scale; Bräunig et al., 2009), depression, anxiety, anger (all three Patient-Reported Outcomes Measurement Information System short-form; Pilkonis et al., 2011), pleasantness, wakefulness, calmness (all three short-form of the multidimensional mental-state questionnaire, MDBF; Wilhelm & Schoebi, 2007), optimism, pessimism (Skala Optimismus-Pessimismus-2; Kemper et al., 2012), stress, positive and negative thoughts, experiential avoidance, sleep-quality (self-developed), self-efficacy (self short scale for measuring overall self-efficacy beliefs; Beierlein et al., 2017), quality of life (EUROHIS-QOL 8-item; Brähler et al., 2007). For details see Table A1 in the Appendices.

2.4 | Statistical analysis

Sample weights were applied so that the overall BeMIND sample is representative for the population of the 14–21-year-old residents of Dresden with regard to sex and age. For all EMA outcomes, the individual means over all assessments for each participant were calculated (assuming missing at random). These individual means were then used as dependent variables (DV) in regression models with group (current AD, past AD, HC) as dummy predictor variable. DVs were originally measured on a scale of 0-100, but divided by 100 to transform values to a scale of 0–1. We treated DVs as individual means of fractions and used fractional response regression models (Papke & Wooldridge, 1996) to compare the different groups. Because regression coefficients of fractional response models are hard to interpret, we calculated group predictive margins of the DVs for each group under study. A group predictive margin represents the mean of all regression-predicted DV values over all individuals within a group. In that way, it yields a best guess for the mean DV value of a group. To depict differences in margins, contrasts of predictive margins are presented and reflect a potential outcome mean contrast (i.e., the contrast of the prediction in DV if the whole sample were healthy vs. if the whole sample had current AD). This method was chosen instead of simply calculating group mean comparisons and, for example, performing a t test because (1) we can add covariates in a regression model, and more importantly, (2) the DVs are modeled directly as what they are, fractions, leading to better estimates of standard errors and therefore more reliable confidence intervals compared to a model where outcomes are assumed to be normally distributed. Significance tests are used as an exploratory helping device to pinpoint the most interesting differences and not to be interpreted as based on rigorous hypotheses. We accept a 5% Type 1 error rate for each single test as a feature of our study in exchange for a lower Type 2 error rate for each single comparison. This approach without alpha correction favors sensitivity over robustness of findings which we consider a characteristic of an exploratory study. To examine everyday life domains as a function of AD, the groups current AD, remitted AD, and HC were compared while age and sex were included as covariates. Additional consistency and reliability analyses of EMA scales can be found in Appendices A2 (including Tables A2.1 and A2.2).

3 | RESULTS

3.1 | Sample characteristics and assessment distribution

Sample characteristics and EMA compliance are shown in Table 1. For the present analysis, data of 648 participants (current AD = 65, remitted AD = 52, HC = 531) are used. In respect to the measured variables, different amounts of assessments were available for the analysis, as participants sometimes quit the EMA assessment somewhere in between (current AD = 1788–1806; remitted = 1373–1381; HC = 14,315–14,444 assessments). The compliance rate as well as SD within each group over the course of the assessment days are shown in Figures S1 and S2, respectively, in the Supporting Information. Distribution of assessments in the diagnostic groups over the months of the year and the hours of the day are shown in Figure S3 in the Supporting Information.

| Samples                      | N   | Age (mean [SD]) | Sex (female %) | Compliance (mean %) |
|------------------------------|-----|-----------------|----------------|---------------------|
| Total analysis sample        | 648 | 17.55 (2.36)    | 49.9           | 85.4                |
| Remitted anxiety disorder    | 52  | 18.67 (2.15)    | 63.7           | 83.0                |
| Without comorbidity          | 38  | 18.37 (2.25)    | 60.5           | 84.2                |
| Current anxiety disorder     | 65  | 18.31 (1.94)    | 75.8           | 86.8                |
| Without comorbidity          | 27  | 18.01 (2.01)    | 63.0           | 86.9                |
| Healthy controls             | 531 | 17.35 (2.38)    | 45.5           | 85.5                |

Note: Relative frequencies are weighted percentages absolute frequencies (N) are reported unweighted. Compliance: percentage of completed EMA assessments of analysis (sub-) sample (only participants with a minimum of 50% of EMA assessments included in analysis sample).


3.2 Current AD versus remitted AD vs healthy controls

We note again that measures originally assessed on a slider from 0 to 100 were transformed to a 0–1 scale. In general, participants with current AD differed significantly from HC on almost all measures (except for manic symptomatology) and showed the biggest contrasts compared to the other groups (see Table 2). The smallest significant contrast was found for anger symptomatology (contrast: −0.06; confidence interval [CI]: [−0.08, −0.04]), the biggest for negative thoughts (contrast: −0.14; CI: [−0.19, −0.09]). Symptom domains showed highest levels in the current AD group, followed by remitted AD and lowest in the HC group, except for manic symptomatology. The remitted AD group differed significantly from the HC group on all domains except for manic symptomatology, with effects of the same size for depressive, anxious, and anger symptomatology (contrasts: 0.04; CI depressive and anxious: [0.02, 0.06], anger: [0.02, 0.07]). The remitted AD group showed significant lower levels in depressive and anxious symptomatology than current AD, with the biggest effect for depressive symptomatology (contrast: −0.07; CI: [−0.11, −0.02]). Regarding mood scales, participants with remitted AD revealed significant worse mood in compared to HCs, with the biggest difference found for calmness (contrast: −0.09; CI: [−0.12, −0.05]). The remitted AD group did not differ significantly from the current AD group (biggest contrast on pleasantness: −0.01; CI: [−0.06, 0.04]). Remitted ADs differed significantly on the negative valence scales from the HC group with the biggest effect for stress (contrast: 0.09; CI: [0.06, −0.13]), but showing no significant difference in optimism or positive thoughts. The remitted AD group showed significant less negative thoughts as well as more optimism (biggest contrast: 0.08; CI: [0.00, 0.16]) compared to the current AD group. On the psychological constructs, remitted ADs differed significantly from the HC but not the current AD group, with remitted AD showing lower self-efficacy than the HC group (biggest contrast: −0.10; CI: [−0.15, −0.06]). Again, only significant differences were found between remitted AD and the HC group regarding sleep-quality and quality of life (biggest contrast: −0.09; CI: [−0.14, −0.04]). Margins and confidence intervals of all constructs are depicted in Figure 3.

3.3 Remitted AD without comorbidity versus HC

To examine whether differences between remitted AD and HC are due to current comorbidity, remitted AD cases without comorbidities were compared to HC. Comorbidities do not seem to explain the above reported differences in everyday life between remitted AD and HCs, as there were still significant differences in non-comorbid remitted AD versus HCs (significant differences on 12 out of 16 constructs; Table 3). Contrasts were also comparable in size. In the domain of symptomatology, the biggest significant contrast was shown for anger symptomatology (contrast: −0.04; CI: [−0.07, −0.02]). Within the mood scales the biggest difference was found for calmness (contrast: 0.09; CI: [0.04, 0.13]; regarding the valence scales, the biggest contrast was found for stress (contrast: −0.09; CI: [−0.13, −0.04]). Self-efficacy showed the biggest contrast in the domain of psychological constructs (contrast: 0.10; CI: [0.04, 0.15]). For sleep-quality the contrast was 0.05 (CI: [0.00, 0.09]), and the contrast on quality of life was 0.10 (CI: [0.04, 0.15]).

4 DISCUSSION

The aim of this study was to explore everyday experience in adolescents and young adults with current and remitted AD compared to HCs and to each other. Exploratory findings showed that not only current AD but also remitted AD showed impairments in a range of health related constructs when compared to HCs and this was not explained by comorbidities. Further, remitted AD differed from current AD in some but not all investigated constructs of everyday life experience.

The differences between the current AD and the HC group is in line with previous research using retrospective measures, showing associations between anxiety or an AD diagnosis and different constructs, including symptomatology (French et al., 1996; Hawkins & Cougle, 2011; Kessler et al., 2005), attitudes such as optimism (Räikkönen et al., 1999), self-efficacy (Bandura, 1988; Muris, 2002), stress (Antony et al., 1998), quality of life (Olatunji et al., 2007) and sleep (Papadimitriou & Linkowski, 2005). As impairment due to prior AD is still ongoing in individuals with remitted ADs (Iancu et al., 2014), it is not surprising that the remitted AD group also showed elevated levels of symptomatology, experiential avoidance, as well as worse mood, self-efficacy, quality of life and sleep-quality compared to HCs. In addition, on all three mood scales, in self-efficacy as well as in quality of life contrasts between remitted AD and HCs were bigger than between the two AD groups. While the current AD group differed significantly from HCs on all valence scales, remitted ADs only differed significantly from HCs on the negative scales (stress, negative thoughts, pessimism). These findings indicate that positive scales (positive thoughts and optimism) might be able to distinguish between remitted and current AD participants. To our knowledge, this difference has not previously been investigated and may be a promising target for further research examining potential risk, or also protective factors for stability versus remission.

Given the evidence for continued symptomatology and impairments in everyday life in remitted AD, we tested whether this effect is a mere consequence of existing other mental disorders. The assumption that comorbidities explain differences was not supported, as the group of remitted AD without comorbidities still differed significantly from the HC group. However, remaining subclinical AD could explain these results.

Our findings indicate daily life experience in remitted AD to be more alike to the experience of current AD than HCs. On 10 constructs the comparison of remitted AD and HC show bigger differences compared to the AD group-comparisons, which only show two bigger contrasts. This is partly in line with findings of Iancu et al. (2014), reporting that 28.5% of participants with remitted AD still reported functioning similar to chronic AD participants (Iancu et al., 2014). One could assume that people with remitted AD are not really
### TABLE 2  Contrasts of margins of diagnostic groups

| Constructs                      | Current AD (n = 65) | Remitted AD (n = 52) | HC (n = 531) | Current AD vs. HC | Remitted AD vs. HC | Remitted AD vs. Current AD |
|---------------------------------|---------------------|----------------------|--------------|------------------|-------------------|---------------------------|
|                                 | Contrast CI (95%)   | Contrast CI (95%)   | Contrast CI (95%) |                  |                   |                           |
| Symptomatology                  |                     |                      |              |                  |                   |                           |
| Manic symptomatology            | 0.21                | 0.22                 | 0.19         | 0.02             | 0.06, -0.02       | 0.04                      | 0.09, -0.01 | 0.00 | -0.05, 0.05 |
| Depressive symptomatology       | 0.14                | 0.07                 | 0.03         | 0.10             | 0.14, 0.07*       | 0.04                      | 0.06, 0.02* | -0.07 | -0.11, -0.02* |
| Anxious symptomatology          | 0.11                | 0.07                 | 0.03         | 0.07             | 0.10, 0.05*       | 0.04                      | 0.06, 0.02* | -0.04 | -0.07, 0.00* |
| Anger symptomatology            | 0.10                | 0.09                 | 0.05         | 0.06             | 0.08, 0.04*       | 0.04                      | 0.07, 0.02* | -0.01 | -0.04, 0.02 |
| Mood Scales                     |                     |                      |              |                  |                   |                           |
| Pleasantness                    | 0.67                | 0.70                 | 0.77         | -0.10            | -0.05, -0.14*     | -0.07                     | -0.03, -0.11* | 0.01 | -0.04, 0.06 |
| Wakefulness                     | 0.52                | 0.53                 | 0.60         | -0.07            | -0.03, -0.11*     | -0.06                     | -0.02, -0.09* | 0.00 | -0.05, 0.05 |
| Calmness                        | 0.67                | 0.68                 | 0.76         | -0.09            | -0.05, -0.14*     | -0.09                     | -0.05, -0.12* | 0.00 | -0.06, 0.05 |
| Valence Scales                  |                     |                      |              |                  |                   |                           |
| Stress                          | 0.26                | 0.25                 | 0.16         | 0.10             | 0.14, 0.06*       | 0.09                      | 0.13, 0.06* | 0.00 | -0.06, 0.05 |
| Positive thoughts               | 0.60                | 0.67                 | 0.68         | -0.09            | -0.04, -0.15*     | -0.02                     | 0.03, -0.07 | 0.05 | -0.01, 0.12 |
| Negative thoughts               | 0.31                | 0.24                 | 0.17         | 0.14             | 0.19, 0.09*       | 0.07                      | 0.11, 0.04* | -0.06 | -0.12, 0.00* |
| Optimism                        | 0.61                | 0.69                 | 0.72         | -0.12            | -0.06, -0.19*     | -0.03                     | 0.02, -0.08 | 0.08 | 0.00, 0.16* |
| Pessimism                       | 0.28                | 0.21                 | 0.15         | 0.13             | 0.18, 0.08*       | 0.06                      | 0.10, 0.02* | -0.06 | -0.12, 0.00 |
| Psychological constructs        |                     |                      |              |                  |                   |                           |
| Experiential avoidance          | 0.10                | 0.06                 | 0.03         | 0.07             | 0.10, 0.03*       | 0.03                      | 0.06, 0.01* | -0.03 | -0.07, 0.01 |
| Self-efficacy                   | 0.67                | 0.69                 | 0.79         | -0.12            | -0.06, -0.18*     | -0.10                     | -0.06, -0.15* | 0.01 | -0.07, 0.08 |
| Quality of life                 | 0.67                | 0.71                 | 0.81         | -0.13            | -0.09, -0.18*     | -0.09                     | -0.05, -0.14* | 0.03 | -0.04, 0.09 |
| Sleep quality                   | 0.67                | 0.73                 | 0.79         | -0.10            | -0.06, -0.14*     | -0.06                     | -0.02, -0.09* | 0.04 | -0.01, 0.09 |

Note: Significant results ($p < .05$) are marked with*.  
Abbreviations: AD, anxiety disorders; CI, confidence interval; HC, healthy controls.
"remitted," in the sense of being healthy again, but the absence of a diagnosis is not equal to wellbeing. This would also be in line with the WHO definition of health, being "... a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948). The results of the present study show that participants labeled as "remitted" still seem to be impaired in everyday life.

This is important, as ongoing impairments could be risk factors for relapse, explaining the increased risk for a waxing and waning course of anxiety (Wittchen et al., 2000) and the risk to have symptoms of the same or other mental disorders later in life (Beesdo et al., 2009; Kim-Cohen et al., 2003; Woodward & Fergusson, 2001). Further research should therefore address the question whether symptoms and impairments in everyday life predict relapse of ADs. If this would be the case, practical implications include to not only assure full remission on a symptomatology basis but also to focus more broadly on other domains of functioning and well-being to possibly prevent relapse.
Our findings must be viewed in light of some limitations. First, beside the smaller sample size of the AD-comparisons compared to the HC-comparisons, the number of participants within some of the investigated subgroups is quite small. The smallest group consists of 38 participants (remitted AD without comorbidity), which could be considered too small for appropriate analyses. Therefore, the present results have to be interpreted with caution, with regard to generalizability and are needed to be replicated in larger samples. However, the analyzed data comprises assessments over several days, increasing the validity of the findings. Second one has to keep in mind that the HC group was defined as a super-healthy group without any lifetime diagnosis, which may not be considered a typical population reference. Although this allows to estimate the effect of current and past AD, it does not provide insights into the specificity of findings with regard to other psychopathology. Third, we considered participants with lifetime AD without anxiety or avoidance behavior regarding the respective AD in the past 6 months as “remitted AD.” There is no gold standard for defining remission in ADs. Age at last occurrence reports of participants may also have been biased by recall error. However, time based information of the Composite International Diagnostic Interview revealed good ICCs (Hoyer et al., 2020; Kessler & Üstün, 2004; Wittchen et al., 1998). Fourth, the present study did not control for inflation of Type 1 error. As the aim was to exploratively examine daily life in the different diagnostic groups, Type 1 error inflation was accepted in return for higher sensitivity to detect existing differences. However, future studies will be needed to replicate the present findings using confirmatory analyses. Fifth, another source of potential error could be the self-developed items. However, Cronbach’s alpha, correlation coefficients and absolute differences of assessments and assessment days are reported, providing information on sufficient reliability. Last, we did not take into account the advantage of EMA to investigate dynamic changes in affect over hours and days and their role in AD. This is a promising approach that should be used in further research to provide a more detailed picture of everyday experience in affected individuals.

Despite these limitations, the study has its strengths. First, the investigated groups were derived from a general population sample of adolescents and young adults, which is expected to not be biased by the severity or comorbidity usually seen in clinical samples. Second, our broad measures in EMA allowed to provide a comprehensive description of various facets of everyday life in (previously) anxious and HC groups. Third, the EMA approach ensures ecological validity and low to minimal recall bias. Along with the standardized clinical examination, our study is one of the first to use an epidemiological approach to shed light on the real life experiences of adolescents and young adults with current or past AD.

| TABLE 3 | Contrasts of margins of remitted AD without comorbidity versus healthy controls |
| Constructs | Margins | Remitted AD without comorbidity (n = 38) | HC (n = 531) | Contrasts | CI (95%) |
| --- | --- | --- | --- | --- | --- |
| Symptomatology | Manic symptomatology | 0.22 | 0.19 | 0.04 | −0.02, 0.09 |
| | Depressive symptomatology | 0.07 | 0.03 | 0.03 | 0.01, 0.06* |
| | Anxious symptomatology | 0.06 | 0.03 | 0.03 | 0.01, 0.05* |
| | Anger symptomatology | 0.08 | 0.05 | 0.04 | 0.02, 0.07* |
| Mood scales | Pleasantsness | 0.70 | 0.77 | −0.07 | −0.11, −0.02* |
| | Wakefulness | 0.54 | 0.60 | −0.05 | −0.09, −0.01* |
| | Calmness | 0.68 | 0.76 | −0.09 | −0.13, −0.04* |
| Valence scales | Stress | 0.25 | 0.16 | 0.09 | 0.04, 0.13* |
| | Positive thoughts | 0.67 | 0.68 | −0.02 | −0.07, 0.04 |
| | Negative thoughts | 0.24 | 0.17 | 0.07 | 0.02, 0.12* |
| | Optimism | 0.69 | 0.72 | −0.04 | −0.09, 0.02 |
| | Pessimism | 0.21 | 0.15 | 0.06 | 0.02, 0.11* |
| Psychological constructs | Experiential Avoidance | 0.06 | 0.03 | 0.03 | 0.00, 0.05* |
| | Self-efficacy | 0.70 | 0.78 | −0.10 | −0.15, −0.04* |
| Quality of life | 0.71 | 0.81 | −0.10 | −0.15, −0.04* |
| Sleep quality | 0.74 | 0.79 | −0.05 | −0.09, 0.00 |

Note: Significant results (p < .05) are marked with *. Abbreviations: AD, anxiety disorder; CI, confidence interval; HC, healthy controls.
Taken together, the present study showed impaired everyday life experience not only in current, but also remitted AD. Important next steps include replication of the present findings and longitudinal follow-up studies to investigate daily life as possible predictor for course including relapse. A better understanding of daily life experiences among individuals with AD might provide promising starting points for improved interventions to foster health and wellbeing and prevent long-term negative outcomes of AD.

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The authors declare that there are no conflict of interests.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES
Alfano, C. A., Beidel, D. C., Turner, S. M., & Lewin, D. S. (2006). Preliminary evidence for sleep complaints among children referred for anxiety. *Sleep Medicine*, 7(6), 467–473.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment*, 10(2), 176–181.

Bandura, A. (1988). Self-efficacy conception of anxiety. *Anxiety research*, 1(2), 77–98.

Beesdo, K., Knappe, S., & Pine, D. S. (2009). Anxiety and anxiety disorders in children and adolescents: developmental issues and implications for DSM-V. *Psychiatric Clinics of North America*, 32(3), 483–524. https://doi.org/10.1016/j.psc.2009.06.002

Beesdo-Baum, K., Voss, C., Venz, J., Hoyer, J., Berwanger, J., Kische, H., Ollmann, T. M., & Pieper, L. (2020). The Behavior and Mind Health (BeMIND) study: Methods, design and baseline sample characteristics of a cohort study among adolescents and young adults. *International Journal of Methods in Psychiatric Research*, 29, e1804.

Beierlein, C., Kemper, C. J., Kovaleva, A., & Rammstedt, B. (2017). Short scale for measuring general self-efficacy beliefs (ASKU). *methods, data, analyses*, 7(2), 28.

Brähler, E., Mühlhan, H., Albani, C., & Schmidt, S. (2007). Teststatistische Prüfung und Normierung der deutschen Versionen des EUROHIS-QOL Lebensqualität-Index und des WHO-5 Wohlbefinden-index. *Diagnostica*, 53(2), 83–96.

Bräunig, P., Sarkar, R., Effenberg, S., Schoofs, N., & Krüger, S. (2009). Gender differences in psychotic bipolar mania. *Gender medicine*, 6(2), 356–361.

French, C. C., Richards, A., & Scholfield, E. J. C. (1996). Hypomania, anxiety and the emotional Stroop. *British Journal of Clinical Psychology*, 35(4), 617–626.

Hawkins, K. A., & Cougle, J. R. (2011). Anger problems across the anxiety disorders: findings from a population-based study. *Depression and Anxiety*, 28(2), 145–152.

Henker, B., Whalen, C. K., Janner, L. D., & Delfino, R. J. (2002). Anxiety, affect, and activity in teenagers: Monitoring daily life with electronic diaries. *Journal of the American Academy of Child and Adolescent Psychiatry*, 41(6), 11. https://doi.org/10.1097/00004583-200206000-00005

Hofmeijer-Sevink, M. K., Batelaan, N. M., van Megen, H. J. G. M., Penninx, B. W. J. H., Cath, D. C., van den Hout, M. A., & van Balkom, A. J. L. M. (2012). Clinical relevance of comorbidity in anxiety disorders: A report from the Netherlands Study of Depression and Anxiety (NESDA). *Journal of Affective Disorders*, 137(1-3), 106–112. https://doi.org/10.1016/j.jad.2011.12.008

Hogendoorn, S. M., Prins, P. J. M., Vervoort, L., Walters, L. H., Nauta, M. H., Hartman, C. A., Moorslag, H., de Haan, E., & Boer, F. (2012). Positive thinking in anxiety disordered children reconsidered. *Journal of Anxiety Disorders*, 26(1), 71–78.

Hoyer, J., Voss, C., Strehle, J., Venz, J., Pieper, L., Wittchen, H. U., Ehrlich, S., Beesdo-Baum, K., Hoyer, J., Voss, C., Strehle, J., Venz, J., Pieper, L., Wittchen, H. U., Ehrlich, S., & Beesdo-Baum, K. (2020). Test-Retest Reliability of the Computer-Assisted DIA-X-5 Interview for Mental Disorders. *BMC Psychiatry*, 20, 364.

Iancu, S. C., Batelaan, N. M., Zweekhorst, M. B. M., Bunders, J. F. G., Veltman, D. J., Penninx, B. W. J. H., & Van Balkom, A. J. L. M. (2014). Trajectories of functioning after remission from anxiety disorders: 2-year course and outcome predictors. *Psychological Medicine*, 44(3), 593–605.

Kemper, C. J., Beierlein, C., Kovaleva, A., & Rammstedt, B. (2012). Eine Kurzskala zur Messung von Optimismus-Pessimismus: Die Skala Optimismus-Pessimismus-2 (SOP2).

Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 617–627.

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research*, 21(3), 169–184. https://doi.org/10.1002/mpr.1359

Kessler, R. C., & Üstün, T. B. (2004). The world mental health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). *International Journal of Methods in Psychiatric Research*, 13(2), 93–121.

Kim-Cohen, J., Caspi, A., Moffitt, T. E., Harrington, H., Milne, B. J. & Poulton, R. (2003). Prior juvenile diagnoses in adults with mental disorder - Developmental follow-back of a prospective-longitudinal cohort. *Archives of General Psychiatry*, 60(7), 709–717. https://doi.org/10.1001/archpsyc.60.7.709

Kroenke, K., Spitzer, R. L., Williams, J. B. W., Monahan, P. O., & Löwe, B. (2007). Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine*, 146(5), 317–325.

Magallon-Neri, E., Kirchner-Nebot, T., Forns-Santacana, M., Calderon, C., & Planellas, I. (2016). Ecological Momentary Assessment with smartphones for measuring mental health problems in adolescents.
World Journal of Psychiatry, 6(3), 303–310. https://doi.org/10.5498/wjp.v6.i3.303

Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. *Personality and Individual Differences, 32*(2), 337–348.

Myin-Germeys, I., Oorschot, M., Collip, D., Lataster, J., Delespaauw, P., & van Os, J. (2009). Experience sampling research in psychopathology: opening the black box of daily life. *Psychological Medicine, 39*(9), 1533–1547. https://doi.org/10.1017/S0033291708004947

Olatunji, B. O., Cisler, J. M., & Tolin, D. F. (2007). Quality of life in the anxiety disorders: a meta-analytic review. *Clinical Psychology Review, 27*(5), 572–581.

Papadimitriou, G. N., & Linkowski, P. (2005). Sleep disturbance in anxiety disorders. *International Review of Psychiatry, 17*(4), 229–236.

Papke, L. E., & Wooldridge, J. M. (1996). Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics, 11*(6), 619–632. https://doi.org/10.1002/(SICI)1099-1255(199611)11:6<619::AID-JAE418>3.0.CO;2-1

Penninx, B. W. J. H., Nolen, W. A., Lamers, F., Zitman, F. G., Smit, J. H., Spinhoven, P., Cuijpers, P., de Jong, P. J., van Marwijk, H. W. J., den Meer, K., Verhaak, P., Laurant, M. G. H., de Graaf, R., Hoogendijk, W. J. d., Wee, N., Ormel, J., van Dyck, R., & Beekman, A. T. F. (2011). Two-year course of depressive and anxiety disorders: Results from the Netherlands Study of Depression and Anxiety (NESDA). *Journal of Affective Disorders, 133*(1-2), 76–85. https://doi.org/10.1016/j.jad.2011.03.027

Pilkonis, P. A., Choi, S. W., Reise, S. P., Stover, A. M., Riley, W. T., Cella, D., & Group, P. C. (2011). Item banks for measuring emotional distress from the Patient-Reported Outcomes Measurement Information System (PROMIS®): depression, anxiety, and anger. *Assessment, 18*(3), 263–283.

Rapee, R. M., Schniering, C. A., & Hudson, J. L. (2009). Anxiety Disorders During Childhood and Adolescence: Origins and Treatment. *Annual review of clinical psychology, 5*, 311–341. https://doi.org/10.1146/annurev.clinspy.032408.153628

Räikkönen, K., Matthews, K. A., Flory, J. D., Owens, J. F., & Gump, B. B. (1999). Effects of optimism, pessimism, and trait anxiety on ambulatory blood pressure and mood during everyday life. *Journal of Personality and Social Psychology, 76*(1), 104–113.

Scholten, W. D., Batelaan, N. M., van Balkom, A., Penninx, B., Smit, J. H., & van Oppen, P. (2013). Recurrence of anxiety disorders and its predictors. *Journal of Affective Disorders, 147*(1-3), 180–185. https://doi.org/10.1016/j.jad.2012.10.031

Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual review of clinical psychology, 4*, 1–32.

Tan, P. Z., Forbes, E. E., Dahl, R. E., Ryan, N. D., Siegel, G. J., Ladouceur, C. D., & Silk, J. S. (2012). Emotional reactivity and regulation in anxious and nonanxious youth: a cell-phone ecological momentary assessment study. *Journal of Child Psychology and Psychiatry, 53*(2), 197–206. https://doi.org/10.1111/j.1469-7610.2011.02469.x

Walz, L. C., Nauta, M. H., & aan het Rot, M. (2014). Experience sampling and ecological momentary assessment for studying the daily lives of patients with anxiety disorders: A systematic review. *Journal of Anxiety Disorders, 28*(8), 925–937. https://doi.org/10.1016/j.janxdis.2014.09.022

Wilhelm, P., & Schoebei, D. (2007). Assessing mood in daily life. *European Journal of Psychological Assessment, 23*(4), 258–267.

Wittchen, H. U., Kessler, R. C., Pfister, H., Höfler, M., & Lieb, R. (2000). Why do people with anxiety disorders become depressed? A prospective-longitudinal community study. *Acta Psychiatrica Scandinavica, 102*, 14–23.

Wittchen, H. U., Lachner, G., Wunderlich, U., & Pfister, H. (1998). Test-retest reliability of the computerized DSM-IV version of the Munich-Composite International Diagnostic Interview (M-CIDI). *Social Psychiatry and Psychiatric Epidemiology, 33*(11), 568–578.

Wittchen, H. U., & Pfister, H. (1997). DIA-X Interview. Frankfurt, DE: Swets & Zeitlinger.

Woodward, L. J., & Fergusson, D. M. (2001). Life course outcomes of young people with anxiety disorders in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(9), 1086–1093. https://doi.org/10.1097/00004583-200109000-00018

World Health Organization. (1948). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. http://www.who.int/governance/eb/who_constitution_en.pdf

**SUPPORTING INFORMATION**

Additional Supporting Information may be found online in the supporting information tab for this article.

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**APPENDICES**

**Information on reliability of the constructs**

The Internal consistency for the scales (calculated over all assessments) is mostly acceptable to good. Questionable alpha was only found for experiential avoidance, which showed also a big range between single assessments. This big range is also found for anxious symptomatology and can be explained due to assessing different aspects of symptomatology in both cases.

As alpha depicts how similar the singe items within each scale are, but does not provide further psychometric properties, we also calculated correlations and absolute differences for person-day-means of each scale between EMA Days 1 and 2, and between EMA Days 3 and 4. EMA days took place almost always either on Thursday–Sunday, or on Saturday–Tuesday, so that Days 1 and 2 and then Days 3 and 4 are both weekdays or are both weekend days. We expected the day means of consecutive days of the same type to be fairly comparable and thus decided to use this comparison as a measure of reliability.

We decided against comparing assessments within a day because we assume EMA ratings to be heavily influenced by everyday life context changes over the course of a day and hence they are not suitable to compute a reliability coefficient as a psychometric measure of a scale. A deep analysis of reliability in EMA context and investigation of all possibilities to do it is an extensive topic in itself and not the scope of the present paper. Pearson correlation was found to be high on all constructs. Additionally we calculated the absolute difference of the mean scores between the respective days, which are not exceeding a number of 14 (keeping in mind the original scale: 0–100).
| Construct                   | Reference                                                                 | Item                                                                 | Answers                                                                 | Answer scheme | Assessment |
|-----------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|---------------|------------|
| Sleep-quality               | DSM-5 Level 2 Cross-Cutting Symptom Measure—Sleep Disturbance             | My sleep was restless.                                               | Not at all—a little—very restless                                      | Slider (0–100) | Morning    |
|                             |                                                                           | I was satisfied with my sleep.                                       | Not at all—a little—very satisfied                                      | Slider (0–100) | Morning    |
|                             |                                                                           | My sleep was refreshing.                                             | Not at all—a little—very relaxing                                      | Slider (0–100) | Morning    |
|                             |                                                                           | I had difficulty falling asleep.                                      | No difficulties—a little—big difficulties                              | Slider (0–100) | Morning    |
|                             |                                                                           | I had troubles staying asleep.                                        | No difficulties—a little—big difficulties                              | Slider (0–100) | Morning    |
|                             |                                                                           | I had trouble sleeping.                                               | No difficulties—a little—big difficulties                              | Slider (0–100) | Morning    |
|                             |                                                                           | I had enough sleep.                                                  | Not at all—absolutely—very good                                        | Slider (0–100) | Morning    |
|                             |                                                                           | My sleep quality was...                                               | Very bad—normal—very good                                              | Slider (0–100) | Morning    |
| Optimism                    | Skala Optimismus-Pessimismus-2 (SOP2)                                     | Currently I am optimistic                                             | Not at all—absolutely                                                  | Slider (0–100) | All        |
|                             |                                                                           | Currently I am pessimistic                                           | Not at all—absolutely                                                  | Slider (0–100) | All        |
| Mood pleasant–unpleasant    | 6-Item short-form of the Multidimensional mental-state questionnaire (MDBF) | At the moment I feel...                                               | Satisfied—dissatisfied                                                 | Slider (0–100) | All        |
|                             |                                                                           |                                                                   | Unwell—well                                                           | Slider (0–100) | All        |
| Mood awake–sleepy           |                                                                           | At the moment I feel...                                               | Tired—awake                                                           | Slider (0–100) | All        |
|                             |                                                                           |                                                                   | Full of energy—shiftless                                              | Slider (0–100) | All        |
| Mood calm–restless          |                                                                           | At the moment I feel...                                               | Relaxed—tense                                                         | Slider (0–100) | All        |
|                             |                                                                           |                                                                   | Restless—calm                                                         | Slider (0–100) | All        |
| Stress                      | Self developed                                                            | Since the last beep I felt stressed                                   | At no time—all the time                                               | Slider (0–100) | All        |
| Positive thoughts           | Self developed                                                            | Since the last beep I thought about positive or pleasant things      | No positive thoughts—frequently positive thoughts                      | Slider (0–100) | All        |
| Negative thoughts           | Self developed                                                            | Since the last beep I thought about negative or unpleasant things    | No negative thoughts—frequently negative thoughts                      | Slider (0–100) | All        |
| Social interaction quality  | Self developed                                                            | How did you experience this social interaction?                      | Pleasant—unpleasant                                                   | Slider (0–100) | All        |
|                             |                                                                           | Reserved—close                                                       | Slider (0–100)                                                       |               |            |
|                             |                                                                           | Confictual—harmonious                                                | Slider (0–100)                                                       |               |            |
|                             |                                                                           | Objective—emotional                                                  | Slider (0–100)                                                       |               |            |
| Construct                        | Reference                                                                 | Item                                                                 | Answers                                                                 | Answer scheme | Assessment |
|---------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|---------------|------------|
| Manic symptomatology            | Mania (Altman Self-Rating Mania Scale [ASRM, adapted items in EMA])      | Since the last beep I felt happier or more cheerful than usual.       | Not at all—half the time—all the time                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I felt more self-confident than usual.           | Not at all—half the time—all the time                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I talked more than usual.                        | Not at all—half the time—all the time                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I was more active than usual.                    | Not at all—half the time—all the time                                  | Slider (0–100) | All        |
| Depression                      | Patient-Reported Outcomes Measurement Information System (PROMIS        | Since the last beep I felt worthless                                 | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 | Emotional Distress—Depression—short-form)                                | Since the last beep I felt helpless.                                 | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I felt depressed.                                | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I felt hopeless.                                 | Never—sometimes—always                                                  | Slider (0–100) | All        |
| Anxiety                         | Patient-Reported Outcomes Measurement Information System (PROMIS        | Since the last beep I felt fearful.                                 | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 | Emotional Distress—Anxiety—short-form)                                  | Since the last beep I found it hard to focus on anything other than my anxiety. | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I felt worried.                                 | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I felt uneasy.                                   | Never—sometimes—always                                                  | Slider (0–100) | All        |
| Anger                           | Patient-Reported Outcomes Measurement Information System (PROMIS        | Since the last beep I was irritated more than people knew.          | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 | Emotional Distress—Anger—short-form)                                   | Since the last beep I felt angry.                                    | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I felt like I was ready to explode               | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I was grouchy.                                  | Never—sometimes—always                                                  | Slider (0–100) | All        |
|                                 |                                                                           | Since the last beep I was grouchy.                                  | Never—sometimes—always                                                  | Slider (0–100) | All        |
| Experiential avoidance          | Self developed                                                            | Since the last beep I was upset and concerned about my feelings or thoughts. | Never—sometimes—always                                                  | Slider (0–100) | All        |
| Quality of life                 | EUROHIS-QOL 8-item                                                        | Today I had enough energy for everyday life.                         | Not at all—moderate—all the time                                       | Slider (0–100) | Evening    |
|                                 |                                                                           | Today I had enough money to meet my needs.                          | Not at all—moderate—all the time                                       | Slider (0–100) | Evening    |
|                                 |                                                                           | Today I was satisfied with my health.                               | Very unsatisfied—very satisfied                                         | Slider (0–100) | Evening    |
|                                 |                                                                           | Today I was satisfied with myself.                                  | Very unsatisfied—very satisfied                                         | Slider (0–100) | Evening    |
| Construct | Reference | Item | Answers | Answer scheme | Assessment |
|-----------|-----------|------|---------|---------------|------------|
|           |           | Today I was satisfied with my abilities to perform my daily activities. | Very unsatisfied—very satisfied | Slider (0–100) | Evening |
|           |           | Today I was satisfied with my personal relationships. | Very unsatisfied—very satisfied | Slider (0–100) | Evening |
|           |           | Today I was satisfied with my place to live. | Very unsatisfied—very satisfied | Slider (0–100) | Evening |
|           |           | Today I am satisfied with my life. | Very unsatisfied—very satisfied | Slider (0–100) | Evening |
|           |           | Today I felt like I am not able to meet the challenges that are coming up to me. | Never—sometimes—frequently | Slider (0–100) | Evening |

| Self-efficacy | Self Short Scale for Measuring overall Self-efficacy Beliefs (ASKU) | Today I could rely on my abilities in difficult situations.† | Was not necessary/not at all—absolutely | Checkbox/slider (0–100) | Evening |
|              |                                                               | Today I could manage most of my problems on my own. | Not at all—absolutely | Slider (0–100) | Evening |
|              |                                                               | Today I was able to solve exhausting and complicated tasks.† | Was not necessary/not at all—absolutely | Checkbox/slider (0–100) | Evening |

Note: †Regarding the self-efficacy scale, the option "was not necessary" (and therefore no slider-rating was presented) was chosen in about 50%–65% of all assessments (1: healthy controls (HC) = 66, 1%, REM = 56, 7%, CUR = 54, 0%; 3: HC = 60, 8%, REM = 48, 9%, CUR = 57, 1%).
### TABLE A2.1 Cronbach’s alpha for each scale

| Scale                        | Alpha   | Minimum alpha | Maximum alpha |
|------------------------------|---------|---------------|---------------|
| Manic symptomatology        | .902    | .870          | .922          |
| Depressive symptomatology   | .896    | .830          | .931          |
| Anxious symptomatology      | .731    | .531          | .844          |
| Anger symptomatology        | .844    | .780          | .882          |
| Pleasantness                | .788    | .687          | .858          |
| Wakefulness                 | .796    | .729          | .821          |
| Calmness                    | .788    | .620          | .851          |
| Experiential avoidance      | .673    | .558          | .873          |
| Self-efficacy               | .863    | .850          | .874          |
| Quality of life             | .882    | .873          | .895          |
| Sleep quality               | .852    | .827          | .860          |

### TABLE A2.2 Correlation and differences between days within each construct

| Scale                        | Correlation Days 1-2 | Correlation Days 3-4 |
|------------------------------|-----------------------|-----------------------|
|                              | $r$  | CI    | Mean absolute difference | CI difference | $r$  | CI   | Mean absolute difference | CI difference |
| Manic symptomatology         | 0.79 | 0.76, 0.82 | 7.72 | 7.10, 8.34 | 0.83 | 0.81, 0.86 | 7.29 | 6.67, 7.91 |
| Depressive symptomatology    | 0.75 | 0.72, 0.79 | 3.22 | 2.80, 3.63 | 0.86 | 0.84, 0.88 | 2.62 | 2.28, 2.96 |
| Anxious symptomatology       | 0.74 | 0.70, 0.77 | 2.77 | 2.45, 3.09 | 0.80 | 0.77, 0.82 | 2.32 | 2.0, 2.64 |
| Anger symptomatology         | 0.69 | 0.65, 0.73 | 3.67 | 3.28, 4.06 | 0.74 | 0.70, 0.77 | 3.18 | 2.83, 3.54 |
| Pleasantness                 | 0.71 | 0.67, 0.75 | 8.33 | 7.74, 8.91 | 0.77 | 0.74, 0.80 | 7.95 | 7.32, 8.57 |
| Wakefulness                  | 0.56 | 0.50, 0.61 | 10.35 | 9.66, 11.03 | 0.66 | 0.61, 0.70 | 9.43 | 8.70, 11.17 |
| Calmness                     | 0.73 | 0.69, 0.77 | 8.18 | 7.65, 8.71 | 0.77 | 0.74, 0.80 | 7.34 | 6.68, 8.01 |
| Stress                       | 0.63 | 0.58, 0.67 | 9.62 | 8.96, 10.28 | 0.71 | 0.67, 0.74 | 9.20 | 8.47, 9.94 |
| Positive thoughts            | 0.74 | 0.70, 0.77 | 10.21 | 9.49, 10.93 | 0.82 | 0.80, 0.85 | 9.29 | 8.57, 10.00 |
| Negative thoughts            | 0.73 | 0.69, 0.77 | 8.19 | 7.60, 8.77 | 0.74 | 0.71, 0.78 | 8.43 | 7.75, 9.10 |
| Optimism                     | 0.79 | 0.76, 0.82 | 9.72 | 9.01, 10.43 | 0.85 | 0.83, 0.87 | 8.38 | 7.70, 9.06 |
| Pessimism                    | 0.71 | 0.67, 0.74 | 8.07 | 7.39, 8.76 | 0.78 | 0.74, 0.80 | 7.27 | 6.60, 7.93 |
| Experiential avoidance       | 0.76 | 0.72, 0.79 | 2.96 | 2.59, 3.33 | 0.84 | 0.81, 0.86 | 2.45 | 2.08, 2.81 |
| Self-efficacy                | 0.55 | 0.49, 0.61 | 13.49 | 12.24, 14.74 | 0.56 | 0.50, 0.62 | 13.18 | 11.92, 14.44 |
| Quality of life              | 0.63 | 0.57, 0.68 | 9.51 | 8.56, 10.46 | 0.70 | 0.65, 0.4 | 8.56 | 7.65, 9.47 |
| Sleep quality                | 0.46 | 0.39, 0.53 | 12.26 | 11.28, 13.24 | 0.45 | 0.37, 0.52 | 12.65 | 11.45, 13.85 |

Abbreviations: $r$, correlation coefficient; CI, 95% confidence interval.