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# The Experience Sampling Method: A New Way of Assessing Variability of the Emotional Dimensions of Religiosity and Spirituality in a Dutch Psychiatric Population

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## Abstract

Religiosity and spirituality (*R/S*) are often regarded as being relatively stable over time. The present exploratory experience sampling method (ESM) study aims to assess the variability of three *R/S* parameters concerning affective representations of God and spiritual experiences in a psychiatric population. Depressed in- and out-patients self-identifying as being spiritual or religious participated, from two Dutch mental health care institutions. The twenty-eight participants rated momentary affective *R/S*-variables up to 10 times per day over a 6-day period when prompted by a mobile application. All three examined *R/S* parameters varied significantly within the day. ESM examination of *R/S* showed good compliance and little reactivity. This indicates that ESM offers a feasible, usable, and valid way to explore *R/S* in a psychiatric population.

**Keywords** Religiosity · Spirituality · Experience sampling method · Depression · God representation

## Introduction

In recent years the number of studies using ecological momentary assessment methods like the experience sampling method (ESM) for longitudinal assessment of psychopathological states has increased (Russell & Gajos, 2020). ESM explores experiences and behaviour in real-time using ‘sequences of repeated measurements sufficiently frequent to allow one to characterize a separate change process for each subject’. This characterization implies ‘not only the functional form of the change but also its causes and consequences.’ (Bolger et al., 2013, p. 1).

Immense inter- and intraindividual variability in frequency and intensity of behaviours and experiences characterizes religiosity and spirituality, here defined as what humans do and experience in reference to what they consider as (an external) transcendence (Saroglou, 2011). Nevertheless, in scientific research religious and/or spiritual (*R/S*) variables are often treated as rather static phenomena, not subject to changes over the day or week. In quantitative assessment on *R/S*, test–retest reliability of the questionnaires is used frequently to assess their quality, the assumption being that variability reflects error (Koenig & Al Zaben, 2021). In many cohort studies, religious parameters are measured only at baseline, and regarded as a stable characteristic of individuals (e.g. NESDA, n.d.). Both strategies suggest relative stability over time of the *R/S*-construct. Indeed, parameters like religious affiliation are expected not to change so frequently, but other, for example affective, *R/S*-parameters are much more experiential in their nature and can be expected to be more instable or, in other words, variable. Only intensive, high-frequency sampling methods uncover high-frequent variability, by assessing parameters at several epochs (i.e. time-points) daily. ESM is such a method.

To the best of our knowledge, no study has thus far used ESM with consequent repetitive measurements multiple times a day to explore religious or spiritual parameters in a psychiatric population. To date, two studies used ESM to evaluate *R/S* in a non-clinical sample. The Soul Pulse Project reporting on items from the Daily Spiritual Experiences Scale (DSES) and other *R/S*-scales, with 20–25 questions twice a day, with four questions assessed every single survey, all others arbitrarily drawn from a larger pool of 120 questions (Brelsford et al., 2019; Finke, 2017; Kucinkas et al., 2018, p. 75). This study focused on the interplay between different variables, and only implicitly evaluated variability of these items. Wilt et al. (2021) in the other study used experience sampling methods to assess *R/S* struggles (divine, demonic, interpersonal, moral, doubt, and ultimate meaning) on a daily basis for one week in 316 undergraduates and found reliable within- and between-person variation and convergent and discriminant validity for these assessments. To gain deeper and more diverse insight into the relationship between *R/S* and mental health, robust and detailed longitudinal multifactorial explorations of *R/S* and its interrelations with the course of psychiatric disorders are needed.

An overall positive contribution of religiosity and spirituality to human health and resilience has been outlined in several reviews and meta-analyses (Koenig et al., 2012, pp. 180–186; Moreira-Almeida et al., 2016). However, ‘protective effects’ of *R/S* in mental disorders are mainly found in cross-sectional studies reporting on specific parameters like affiliation, meaning that these are, in these cases, ‘correlations’ rather than statistically demonstrated effects (Verhagen, 2019, p. 105). Subsequently, the pathway of this resilience, how people actively deploy their religiosity in order to cope with pathological states and despair in daily life, is largely unknown, although elaborated evidence-informed models have been developed (Koenig et al., 2012).

A lot of *R/S*-variables can be distilled from the literature, roughly falling into cognitive, emotional, moral, and social dimensions (Saroglou, 2011). Emotional variables could be expected to be the most variable over time. For those who believe in God or a higher power, feelings towards God (in scientific terms the affective dimensions of God image) are central emotional aspects of *R/S* (Hall & Fujikawa,

2013). Broader emotional *R/S* aspects include emotions and spiritual experiences not directly referring to a divine being, like self-transcendent experiences of hope, peace, and love (Saroglou, 2011).

The current study focusses on emotional *R/S*-variables, for these variables can be expected to be more variable than moral variables for example. Its aim is to evaluate the variability, or in statistical terms the ‘instability’, of some *R/S*-variables in a psychiatric context. If they prove to be variable over the course of the day or week, this opens up the way for a new approach to *R/S* in scientific research, and ultimately, for *R/S*-inclusive ecological momentary interventions (EMI’s).

To capture such instability, it is important to check carefully for dropouts and indicators of reactivity, especially in subjects with a depressive episode. Reactivity is a possible problem in all observational studies, including ESM-studies (van Ballegoijen et al., 2016). It means that the very act of measurement itself undermines the accuracy of data obtained. For example, after 2 days of repeatedly reporting feelings of depression, participants may become more attentive to (or alternatively habituate to) feelings of depression or avoid assessments because of confrontation with their depressed mood. This could lead to reduced quality and quantity of ESM data through reduced sampling density, totally random responses or the same responses at each sampling point (Fuller-Tyszkiewicz et al., 2013). Significant changes in instability or compliance over the course of the assessment period are indicators of reactivity.

The current study explores three selected ESM-items: ‘I experience support from God’, ‘I feel inner peace’, and ‘I feel close to God’. It tests the hypotheses that these three *R/S*-parameters of a positive God representation and daily spiritual experience (1) can be assessed in a psychiatric population using ESM without excessive reactivity, as manifested in significant changes in compliance or instability, and (2) show instability across days and within the day, both within and between persons.

## Methods

### Participants

From March to October 2019, participants were included from two Christian mental health institutes in the Netherlands, both at out- and inpatient settings. Subjects (18–70 years old) had a primary diagnosis of a major depressive episode according to DSM-5 criteria. They had reportedly been assessed for suicidality and had a current crisis/relapse-prevention plan. They also self-identified as being religious or spiritual but were not necessarily Christians.

Exclusion criteria were inability to handle a smartphone or to read and understand Dutch, or serious symptoms of psychosis or substance abuse, interfering with the ability to participate in the study. The intended number of participants was 30, which was expected to be sufficient to demonstrate at least some instability of the parameters under investigation, if at all present. A preliminary power-analysis was not possible, given the unknown instability of ESM parameters on *R/S*.

## Procedure

Informed consent was obtained from all individual participants included in the study. Participants underwent a baseline assessment one or two days before the start of a 6-day ESM assessment with 10 randomly distributed assessment points per day using experience-sampling software (PsyMate) on a smartphone, resulting in a maximum of 60 momentary assessments per participant, as well as a separate daily assessment in the morning and self-initiated assessment in the evening. A partial repetition of the baseline assessment followed after completion of the ESM assessment period. All persons who participated received a gift card of €25. The study has been approved by the Central medical ethical committee of the University Medical Center Groningen, The Netherlands, according to the Medical Research Involving Human Subjects Act (WMO).

## Measures

The baseline assessment included the Beck Depression Inventory (BDI) (Brouwer et al., 2013), the Questionnaire on God Representations (QGR) (Schaap-Jonker et al., 2008) and the Daily Spiritual Experience Scale (DSES) (Underwood, 2006), and several baseline characteristics, including the Duke University Religion Index (DUREL) (Koenig & Büssing, 2010). After the ESM-period the BDI, QGR, and DSES were administered again.

The BDI-II NL (Cronbach's  $\alpha$  0.94; these and following alphas are from the baseline measurement in the full sample) is a widely used, well-validated, and self-report instrument to measure the presence and severity of depressive disorders.

The QGR is a well-validated and widely used instrument to measure different aspects of God representation. In this study, the Dutch 34-item version was administered, which consists of three subscales concerning feelings towards God, namely Positive Feelings (POS, nine items,  $\alpha=0.94$  at baseline in the current sample), Anger (ANG, four items, including additional item on abandonment,  $\alpha=0.75$ ), and Anxiety (ANX, five items,  $\alpha=0.89$ ) and three scales concerning perceptions of God's actions (e.g. "God rules"), namely Supportive Actions (SUP, 10 items,  $\alpha=0.92$ ), Ruling/Punishing Behaviour (RULP, four items,  $\alpha=0.79$ ), and Passivity (PAS, two items,  $\alpha=0.55$ ).

The DSES is a validated 16-item self-report measure of spiritual experiences in daily life, that includes constructs such as awe, gratitude, mercy, sense of connection with the transcendent, compassionate love, and desire for closeness to God. A Dutch translation was made and after back-translation approved by the author (Cronbach's  $\alpha$  0.80).

The DUREL is a well-validated five-item measure of religious involvement that assesses the three major dimensions of religiosity: organizational religious activity, non-organizational religious activity, and intrinsic religiosity (or subjective religiosity).

A set of different *R/S*-variables was used throughout the different ESM-assessments (morning-, evening-, and repeated daily assessment). Because of the lack

of previous ESM-research on *R/S*, the ESM-items are based on existing non-ESM questionnaires. The repeated ESM-assessment contained three items concerning momentary non-behavioural aspects of *R/S*, chosen for their representativeness of emotional aspects of *R/S*, both in religious and non-religious people. All items had a positive character, to avoid the more skewed and less variable outcome expected for negatively formulated items. These items were ‘I experience support from God’, based on the QGR (subscale SUP); ‘I feel inner peace’, based on the DSES; and ‘I feel close to God’ based on both DSES and QGR (subscale POS).

## Analysis

To reveal the dynamic nature of the selected *R/S*-variables, all input was plotted per participant for all 60 assessment points. Preparation and plotting were done using RStudio (RStudio Team, 2019), ggplot2 package (Wickham, 2016).

The percentage of completion of daily repeated assessments by each individual, or overall compliance-rate, and the daily compliance means and rates were calculated as a first indicator of reactivity. Compliance rates per person per day were calculated and changes in these rates over time during the assessment-period examined, using the first day of assessment as an individual reference-value.

Instability of the *R/S* parameters was assessed using the root-mean-squared successive difference (RMSSD) per item and per person at day-level and compared with in-person and between-person. The higher the RMSSD, the more unstable, or variable, is the underlying factor over time. The RMSSD was calculated from each successive difference in item-score between assessment points, with a correction for differences in time-interval. These successive differences were squared, all differences were summed, and then averaged before the square root of the total was obtained. Additionally, RMSSD values per day per subject were calculated to check for differences in the course, direction and height of these values between ESM-items. This last outcome was used as an second indicator of reactivity.

## Results

### Sample Characteristics

Mental health professionals asked all eligible patients in their caseload during the inclusion period to participate in the study, and 31 of these agreed to participate (estimated participation rate 50%). The participants’ age ranged from 19 to 59 years ( $M$  35.7;  $SD$  11.7), 65% were females. All but two had completed at least secondary vocational education (94%). At inclusion seventy-one percent of them were staying at an inpatient setting, and 84% used psychotropic medication.

Participants scored a mean BDI of 33 (range 3–56,  $SD$  13.7) at inclusion, indicating severe depression. In total 22 participants (71%) visited a religious meeting more than once a month, 13 participants (42%) performed individual religious activities daily. Mean scores of the last three items of the DUREL, concerning experience of

the Divine and the importance of religion for the whole of one's life, were 3.6 on a scale from 1 (not true) to 5 (true of me) and the mean total score on the DSES was 60.8. Table 1 gives an overview of baseline characteristics of all participants.

## Compliance

Of the 31 participants three persons missed more than 30% of the assessment points and were excluded from further analysis. A study sample of 28 participants remained. The overall compliance-rate was 70%, calculated from the number of assessments (1175) divided by the number of possible observations (28 participants  $\times$  6 days  $\times$  10 daily assessments = 1680). Mean compliance per day varied between 7.37 (SD 2.15) for day 1 and 6.67 (SD 2.39) for day 6. See Table 2 for mean compliance over all days. Compliance did not differ significantly between the second, third, fourth, fifth, and sixth day compared to the first day of participation ( $b = -0.04$ ,  $SE = 0.43$ ,  $p = 0.92$ ;  $b = -0.10$ ,  $SE = 0.43$ ,  $p = 0.82$ ;  $b = -0.01$ ,  $SE = 0.43$ ,  $p = 0.99$ ;  $b = -0.68$ ,  $SE = 0.43$ ,  $p = 0.11$ ;  $b = -0.79$ ,  $SE = 0.43$ ,  $p = 0.07$ ; respectively), indicating no relevant reactivity.

## Instability

Instability of the ESM items 'I experience support from God', 'I feel inner peace', and 'I feel close to God' over the consecutive assessment days 1–6, as measured in the RMSSD, varied between 0.82 and 0.40. See Table 3 for all results. Logistic regression analysis was used to predict instability of the items based on day of assessment. Results are summed up in Table 4. Only the item 'I experience support from God' showed a significant decline on days 3 and 5. All other changes could not be predicted based on day of assessment.

Figure 1 shows the trajectories of all scores on the three *R/S*-parameters for each of the 28 participants. These are ordered in descending order of each individual RMSSD value over the complete assessment-period, accounting for differences in time interval between the assessments. Supplementary Figure A1 to Figure A3 show daily RMSSD per trajectory per participant. The RMSSD values ranged from respectively 0–1.29 ( $M$  0.63,  $SD$  0.41) for experienced support from God, 0–1.27 ( $M$  0.59,  $SD$  0.42) for experienced closeness of God, and 0.17–1.46 ( $M$  0.83,  $SD$  0.42) for experienced inner peace. RMSSD values, and therefore instability, differed from person to person and item to item.

Only seven participants showed any totally flat (consistently scoring zero) *R/S* scores for an ESM-item over time. This happened only in the two items on God representation: six subjects (21%) consistently scored 1 on the 7-point Likert scale for experienced closeness of God, and five (18%) consistently scored 1 for support from God, while no participants scored permanently 1 for experienced inner peace. Four of these subjects consistently scored 1 on both items, and all seven subjects showed overall a low instability on both items, with a maximum individual RMSSD per item of 0.38, and a relatively low instability on experienced inner peace, with a maximum individual RMSSD of 0.66.

**Table 1** Demographic Information, Religious Affiliation, and Total Scores on Depression and Religiosity/Spirituality at Baseline

	All participants ( <i>N</i> =31)	Participants excl. dropouts ( <i>n</i> =28)	Participants with any flat line ( <i>n</i> =7)
Age (years) ( <i>M</i> , <i>SD</i> )	19–59 (35.7; 11.7)	19–59 (35.4; 11.8)	22–45 (34.9; 8.6)
Gender—female, <i>n</i> (%)	20 (65%)	17 (61%)	3 (43%)
Treatment setting—inpatient, <i>n</i> (%)	23 (74%)	20 (71%)	6 (86%)
Use of psychotropic medication—yes, <i>n</i> (%)	26 (84%)	23 (82%)	7 (100%)
Beck Depression Index—total score range ( <i>M</i> , <i>SD</i> )	3–56 (33.6; 13.7)	5–56 (33.0; 14.1)	21–56 (36.9; 13.3)
Religious affiliation:			
Christian—protestant, <i>n</i> (%)	27 (88%)	24 (86%)	4 (57%)
Other, <i>n</i> (%)	1 (3%)	1 (4%)	0 (0%)
Not affiliated (%)	3 (10%)	3 (11%)	3 (43%)
Attends religious meetings > 1/month, <i>n</i> (%)	20 (65%)	17 (55%)	3 (43%)
Individual religious activities, daily, <i>n</i> (%)	22 (71%)	21 (75%)	4 (57%)
Importance of religion—DUREL item 3,4,5 per person mean score, range ( <i>M</i> , <i>SD</i> )	1–4.67 (3.6; 0.8)	1–4.67 (3.6; 0.8)	1–4.33 (3.1; 1.2)
QGR subscale score—per person mean score, range ( <i>M</i> , <i>SD</i> )			
POS	1–4.67 (3.0; 0.9)	1–4.67 (3.0; 0.9)	1–3.44 (2.1; 0.9)
ANG	1–4.33 (2.6; 1.0)	1–4.33 (2.6; 1.0)	1–4.33 (2.3; 1.1)
ANX	1–5 (3.0; 1.3)	1–5 (3.0; 1.3)	1–5 (2.9; 1.8)
SUP	1–4.9 (3.4; 0.9)	1–4.9 (3.4; 0.9)	1–3.5 (2.5; 0.9)
RULP	1–5 (3.3; 1.1)	1–5 (3.3; 1.1)	1–4.5 (3.1; 1.3)
PAS	1–4.5 (2.0; 1.0)	1–4.5 (2.0; 1.0)	1–4.5 (2.5; 1.3)
DSES total score, range ( <i>M</i> , <i>SD</i> )	39–83 (60.8; 10.3)	39–83 (61.3; 10.8)	63–83 (71.43; 7.1)

*DUREL* Duke University Religion Index, *QGR* questionnaire of God representations, *POS* positive feelings towards God, *ANX* anxiety, *ANG* anger towards God, *SUP* supportive actions, *RULP* ruling and/or punishing actions, *PAS* passivity, *DSES* daily spiritual experiences scale



**Table 2** Means and Standard Deviations for Compliance by Day of Assessment

Assessment day	M	SD
1	7.37	2.15
2	7.32	1.96
3	7.33	2.34
4	7.36	1.95
5	6.68	2.09
6	6.67	2.39

*N* = 28. The maximum compliance for any given day is 10

**Table 3** Descriptives of the Instability (RMSSD) per Item per Day of Assessment

Assessment day	I experience support from God		I feel inner peace		I feel close to God	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1	.68	.62	.82	.58	.56	.59
2	.64	.51	.70	.59	.57	.47
3	.44	.44	.71	.62	.43	.43
4	.50	.52	.80	.70	.53	.52
5	.43	.47	.61	.57	.40	.47
6	.51	.55	.62	.51	.50	.51

*N* = 28. *M* = mean instability (root-mean-squared successive difference; RMSSD) of the item on a given assessment day

**Table 4** Instability per Item predicted by Day of Assessment

Assessment day	I experience support from God			I feel inner peace			I feel close to God		
	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>	<i>b</i>	SE	<i>p</i>
2 <sup>a</sup>	-.06	.10	.56	-.15	.13	.24	-.02	.09	.82
3 <sup>a</sup>	-.28	.10	.01*	-.13	.13	.32	-.17	.10	.08
4 <sup>a</sup>	-.20	.10	.05	-.05	.13	.70	-.06	.09	.51
5 <sup>a</sup>	-.27	.10	.01*	-.24	.13	.06	-.18	.09	.05
6 <sup>a</sup>	-.20	.10	.05	-.23	.13	.08	-.09	.10	.32

*N* = 28. *b* = unstandardized regression coefficient

<sup>a</sup>The first assessment day is used as the reference category

\**p* < 0.1

Baseline characteristics of all seven subjects with any flat curve on one or more ESM-items are reported in Table 1. Overall scores on the baseline religious measures were not different from other participants. Only one person with flat curves also consistently reported the lowest possible responses on all baseline religious measures.

## Discussion

This study was designed to evaluate whether the ESM method offers a feasible, usable, and valid way to explore *R/S* in a psychiatric population, as a preliminary step towards modelling dynamic associations between different *R/S*-parameters and clinical outcomes. Its outcomes demonstrate two main points: (1) It is feasible to collect data on *R/S*-experience in a psychiatric population using ESM. The compliance is satisfactory, and reactivity or dropout limited. (2) The selected *R/S*-parameters show statistically significant instability and follow different trajectories from individual to individual, with specific trajectories per item. Further analyses are recommended to investigate if this variability reflects meaningful and clinically significant patterns. A N-of-1 descriptive analysis of one of the cases from the current sample suggests that this may indeed be the case (Hoeve et al., 2020).

Reactivity could easily arise during an intensive assessment of *R/S* because of irritation, shame, or other unwanted feelings. The overall results of the analysed 28 participants with regard to the three affective *R/S*-items show no important reactivity. A slight decline in both compliance and instability across the consecutive assessment days seems to be present at a first glance. This occurs in our experience in all ESM data collections due to the fact that subjects often calibrate their answers after day one, giving rise to a slight reduction in variability.

None of the further analyses point out that instability could be predicted by day of assessment (with day 1 as reference). Only the presence of flat lines in seven individuals gives a hint of reactivity. Two of the three participants who stopped preliminary reported doing so because they experienced the iterative questions on suicidality, not those on *R/S* experiences, as too confronting. No adverse effects, especially no suicide attempts, were reported during the study period.

Affects have different natural time patterns. In this study, instability is used to assess the variability of three positive affective *R/S*-parameters. It can be assumed that the natural flow of each distinct religious item is different throughout the day. All three presented parameters follow a trajectory that fits the concept of affective instability as defined by Renaud and Zacchia (2012). Affects, as these authors describe, are by nature reactive to in- and external stimuli and can last from a few minutes up to a few hours. They are continuously processed, leading to and interacting with more prolonged emotions, arising from associations and memories of thoughts, feelings, and actions. A short-term speed of reactivity to stimuli is technically termed labile or unstable, which does not implicate pathological lability. Rapid emotional shifting, occurring within minutes or hours, as in this study, is according to Renaud and Zacchia (2012) best defined as affective lability.

ESM is an intensive method, but samples at maximum 10–12 times a day, with average lags of circa 90 min. Perhaps this sampling frequency is even insufficient for capturing some short-term reactivity (S. J. W. Verhagen et al., 2016). This implies the need for high-frequency sampling of these variables, if the time pattern of a specific factor has not yet been established, especially when intended for use for within-subject time-lagged or multi-level analyses. In the

**Fig. 1** Panel plots of (a) ‘I feel inner peace’, (b) ‘I feel close to God’ and (c) ‘I experience support from God’, per participant. *Note* Panel plots of (a) ‘I feel inner peace’, (b) ‘I feel close to God’ and (c) ‘I experience support from God’, per participant. Trajectories of each separate ESM-item for all 28 participants, plotted per participant, sorted in order of RMSSD. Assessment points ranges from 1 to 60 (over the 6 days assessment period). Parameter level ranges from 1 to 7. RMSSD=Root-Mean-Square of Successive Differences. Every single frame represents a 6-day period with all assessment points for a specific participant. Day 1 has assessment point 1–10, day 2 11–20, day 3 21–30, to day 6 51–60. Only available assessments are plotted, and a line is drawn between these points

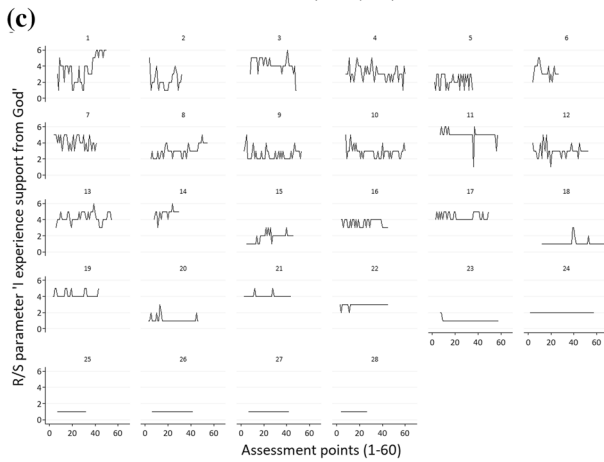
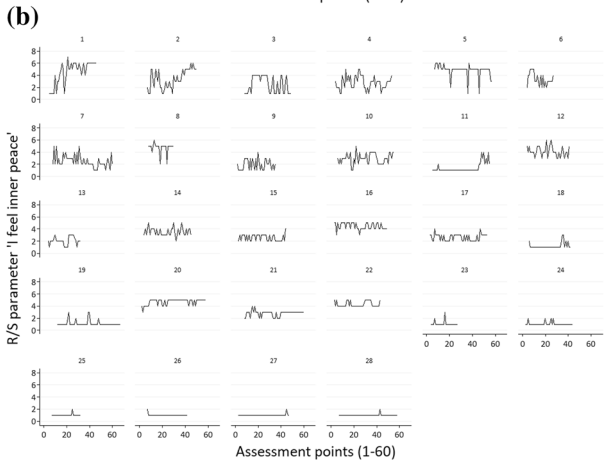
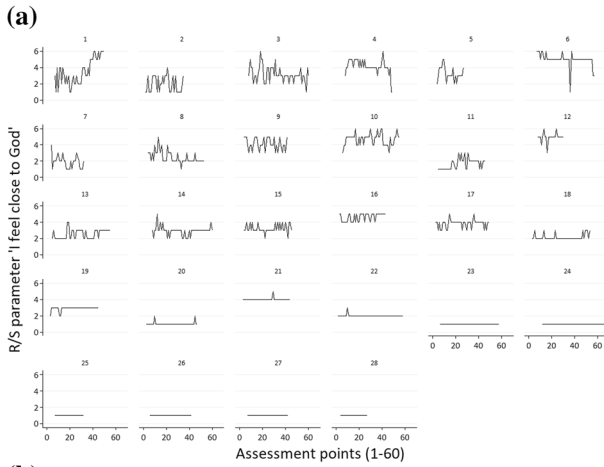
current sample, affective lability proves applicable to both the affective items on God representation and to the item on inner peace. This affective lability differs from person to person, from item to item, and sometimes even from day to day (see Fig. 1).

The nature of affect instability for different affective parameters is unclear (Crowe et al., 2019), at least not clear enough yet to compare the lability found in this study to prior studies on other affective parameters. The current items assessed positive effects. These show in general less instability and inertia than negative effects. This means that less emotion intensity at a given time carries over to the next time point (measured in terms of autocorrelation), especially in psychopathological conditions (Houben et al., 2015; Pawluk et al., 2021).

One could further hypothesize that patterns differ between persons with differing psychopathological states. In the current sample neither comorbid disorders nor people with a low BDI-score were excluded. However, a post-hoc analysis shows no significant difference in RMSSD between people with different degrees of depression, with BDI-scores varying over their full range.

The presence of flat curves on the two items relating to God representation in seven subjects is consistent with the previous conclusion of differing patterns per person. A specific explanation for these flat curves could be the absence of any representation of a personal God, or in more psychotherapeutic terminology the lack of activation of an internalized object-relation with regard to God, although participants were instructed to report their experienced support from, and closeness of God, or an otherwise personally experienced higher power instead. For all seven subjects with flat curves, most other ESM-items were variable. Nevertheless, the ESM-item on experienced inner peace showed low variability. Also, six of these participants had variable scores in the baseline-assessment on items directly referring to ‘God’ (in DUREL, DSES and QGR) and in the evening-assessments (including negative affects towards God). Absence of positive experiences in the God representation due to severe depressive symptomatology perhaps better fits these outcomes.

Apart from this, future ESM-studies on God representation in a sample of people possibly not employing a God-concept or not using ‘God’ as representing a transcendental reality, will have to account for a possibly skewed overall outcome on items relating to God representation. In more secularised groups, other aspects of spirituality may deserve further attention. The item on experiencing inner peace in the current study offers a clear example that this may be feasible.



## Strengths and Limitations

Two main differences distinguish this study from the two previous studies using ESM to evaluate *R/S*-variables: (1) its application in a psychiatric population and (2) its intensive, high-frequency sampling. A new and potentially relevant factor is introduced in intensive longitudinal research of mental disorders: religiosity/spirituality. Unlike traditional longitudinal methods, ESM enables researchers to examine the unfolding of relevant parameters over the course of a day for separate individuals, moving *R/S* research from the trait to the state level, and from between-person effects to within-person effects. It unpacks the natural measurement error of standard questionnaires that are based on recall over days or weeks. Especially for *R/S* one could suppose strong moral values to influence scoring based on recall.

ESM opens a more direct way to explore thoughts, feelings, physiology and behaviour in both phenomenological and correlational analyses over time (Bolger et al., 2013, p. 5). This enables researchers to integrate multiple dimensions and levels, and to account for multivalence of *R/S*, thereby uncovering lived religion in times of existential struggle, and even psychopathological states (Pargament, 2013, pp. 5–10).

The scope of the current study is limited to persons experiencing a major depressive episode. In other psychopathological conditions, for example during a primary psychotic disorder, the dynamics of *R/S* and suicidality may show different patterns. A limitation of the current study is its focus on exclusively positive *R/S*-items.

A larger and more diverse sample would overcome the central limitation of this study: its small sample size limits the power of this study, and its mainly protestant Christian participants affect its generalizability to people of other religious or spiritual backgrounds.

## Conclusion

The ESM method offers a feasible, usable, and valid way to explore *R/S* in a psychiatric population, as a preliminary step towards modelling dynamic associations between different *R/S*-parameters and clinical outcomes. This opens up the possibility to integrate a basic human attribute, meaning-making in the transcendent form of *R/S* in intensive research.

## Implications for Further Research and Clinical Practice

Future ESM-studies on *R/S* could benefit from this study: high frequency assessments with consistent iterative repetition of a standard set of ESM-items in the course of the day enables assessment of the dynamic interaction between affective states and religious experiences within a subject. This fits findings for non-*R/S* items thus far. Repetitive assessment up to 10 times a day is advised (Verhagen et al., 2016), and the most volatile item determines the sampling frequency. About 10

times a day is the highest sampling frequency accomplishable. Other current ongoing studies indicate less dropout for a sampling frequency of 8 to 10 times a day compared to lower sampling frequencies.

These first explorations can be used to prepare multi-level analyses (Bolger et al., 2013, p. 23) and select other items for the repeated and day-level questionnaires. Careful fine-tuning is needed in order to translate available knowledge of relevant constructs from previous non-intensive studies to ESM-items. Direct and unaltered implementation of items from cross-sectional questionnaires is discouraged because of their non-ecological nature.

In conclusion, this study shows that it is possible to assess affective dimensions of *R/S* in a psychiatric population using the experience sampling method. ESM has the capacity of becoming the ‘preferred [method] in attempts (in research or practice) to understand personal or environmental contingencies that predict faster-moving changes in *R/S*[-variables]’ (Wilt et al., 2021) and even pave the way for personalized and just in time-interventions (Kleiman et al., 2022).

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**Data Availability** Due to privacy regulations the data cannot be made available. The research protocol and ESM-questionnaires are available as a supplement.

## Declarations

**Conflict of interest** The authors have no other relevant financial or non-financial interests to disclose.

**Human and Animal Rights** The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Approval was granted by the Ethics Committee of Universitair Medisch Centrum Groningen (2018/370). The authors affirm that human research participants provided informed consent for publication of the images in Fig. 1a, b and c.

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