

# Do Patients Underestimate Their Symptoms in Hindsight? An Ambulatory Assessment on the Frequency of Dissociation in Posttraumatic Stress Disorder

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Volume 4

# Frontiers in the Psychotherapy of Trauma & Dissociation

*The Official Clinical Journal of  
the International Society for the  
Study of Trauma and Dissociation*

**Do Patients Underestimate Their  
Symptoms in Hindsight? An  
Ambulatory Assessment Study  
on the Frequency of  
Dissociation in Posttraumatic  
Stress Disorder**

*Sarah Beutler, MSc*

*Judith K Daniels, PhD*

*Andreas Laddis, MD*



**International Society  
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and Dissociation**

# Frontiers in the Psychotherapy of Trauma & Dissociation

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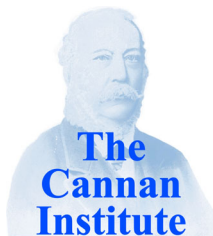
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## ARTICLE

# DO PATIENTS UNDERESTIMATE THEIR SYMPTOMS IN HINDSIGHT? AN AMBULATORY ASSESSMENT STUDY ON THE FREQUENCY OF DISSOCIATION IN POSTTRAUMATIC STRESS DISORDER

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*Assessing symptom frequencies is a core feature of psychological diagnostics and any evaluation of the effectiveness of a therapeutic approach is based on these. However, heuristic strategies are employed when estimating the frequency of past events, which can lead to recall biases. While the few studies published to date indicate that patients suffering from posttraumatic stress disorder tend to underreport dissociative symptoms, there is also some evidence for the tendency to overreport dissociative symptoms. To gain insights into absolute frequencies of dis-*

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*sociative symptoms and retrospective reporting styles we used ambulatory assessment in 42 participants with PTSD symptoms. Participants logged their symptoms via smartphone over 2 weeks and then estimated them again retrospectively for this entire period. In comparison to the daily logs, more participants tended to retrospectively underestimate experienced symptoms in their frequency for almost all items. The results reported in this sample thus argue for an underreporting style instead of overreporting of dissociative symptoms.*

**KEYWORDS** *dissociation; ambulatory assessment; PTSD; underreporting*

## INTRODUCTION

Dissociative episodes long after the traumatic experiences are common in people who suffer from posttraumatic stress disorder (PTSD) (Carlson, Dalenberg, & McDade-Montez, 2012; Dalenberg & Carlson, 2012; Waelde, Silvern, & Fairbank, 2005). Dissociation can entail a wide variety of symptoms, including emotional numbing, depersonalization, derealization, and amnesia (Cardeña & Carlson, 2011).

Although a renewed research focus on posttraumatic dissociation emerged following the implementation of the dissociative subtype of PTSD into the new Diagnostic and Statistical Manual for Mental Disorders—Fifth Edition (DSM-5) (American Psychiatric Association, 2013), the phenomenology of dissociative symptoms is still vague (for discussion see e.g. van der Hart, Nijenhuis, Steele, & Brown, 2004) and little is known regarding their symptom frequencies.

### Conceptualizations of Dissociation

The current gold-standard diagnostic instrument, the Structured Clinical Interview for Dissociative Disorders differentiates between five different components, of which three (depersonalization, derealization, and amnesia) are very common transdiagnostically (Hunter, Sierra, & David, 2004; Lyssenko et al., 2018), one which is rarer but still found transdiagnostically (identity confusion), and one which is strongly associated with dissociative identity disorder (identity alteration). Notably, the concept of absorption is not included as this is considered a non-pathological phenomenon.

Some conceptualizations of dissociation assumed a continuum approach, ranging from normal forms of altered consciousness such as absorption to the most severe symptoms of identity alterations. Conversely, the concept of compartmentalization was introduced to distinguish between two qualitatively different groups of symptoms—those of

detachment, encompassing derealization and depersonalization, and those of compartmentalization and a lack of integration, encompassing identity alterations (Allen, 2001; Holmes et al., 2005; Putnam, 1997). Data indicate that symptoms closely associated with dissociative identity disorder are qualitatively different, and not simply more severe variants of depersonalization or derealization (for a review see Holmes et al., 2005). Patients suffering from Depersonalization-Derealization Disorder illustrate this distinction well, in that they suffer severely from symptoms of detachment, but do not show any symptoms of compartmentalization (Baker et al., 2003; Michal et al., 2016).

### Assessment of Dissociation

The most widely used self-report screening instrument for dissociative symptoms is the Dissociative Experiences Scale (DES-II) (Carlson & Putnam, 1993). The DES assesses lifetime dissociation across the whole spectrum of symptoms, including items indicative of dissociative identity disorder, with a rating scale from 0 to 100 to reflect the percentage of time an item is experienced in daily life. Several factor analyses have been published which consistently show that absorption items cluster separately and that symptoms of detachment and of compartmentalization also load on separate factors (Holmes et al., 2005; Mazzotti et al., 2016; Ross, Joshi, & Currie, 1991). A recent latent profile analysis indicated that while the scale assesses both detachment and compartmentalization, a distinct cluster of patients can be identified which are characterized by a history of sexual childhood abuse, severe compartmentalization symptoms, and a higher probability of being diagnosed with a dissociative disorder and with DID specifically (Daniels, Timmerman, Spitzer, Lampe, submitted).

However, screening questionnaires like the DES typically force respondents to recall symptom occurrence over long time periods and do not assess absolute frequencies of dissociative phenomena. When asked to report the frequency of certain events or habits, even healthy people need to use heuristic strategies to estimate the correct answer (Schwarz, 2007), because remembering every single incident would be too difficult. However, the use of these heuristic strategies might lead to significant recall biases. Evidence for recall biases was found in non-clinical samples (Mayer, McCormick, & Strong, 1995) and in e.g. patients with panic disorder, obsessive compulsive disorder, borderline personality disorder or PTSD (see Coles & Heimberg, 2002 and Ebner-Priemer & Trull, 2009 for reviews). The risk of recall biases is further amplified in patients suffering from dissociative symptoms as dissociation has been associated with reduced performance in attention, executive functioning, working memory, immediate and delayed verbal and visual memory, autobiographical, and episodic memory (see for review: McKinnon et al., 2016). For example, Roca, Hart, Kimbrell, and Freeman (2006) found that among veterans with PTSD, subjects with

at least one comorbid dissociative disorder demonstrated greater deficits in attention, autobiographical memory and verbal memory than veterans with PTSD but without comorbid dissociative disorder. That the inherent characteristic of dissociative symptoms itself can lead to problems in recall demonstrates a study by Bergouignan, Nyberg, and Ehrsson (2014). The authors experimentally induced an illusory out-of-body experience (a phenomenon categorized as a depersonalization symptom) in healthy participants, while they were involved in a social interaction. In a recall session one week later, the group with the out-of-body experience showed significant episodic recollection deficits of this social interaction compared to the in-body experience control group.

However, others have argued that dissociative symptoms might be associated with a tendency to overreport symptom occurrence due to poor internal monitoring abilities as self-reports of dissociative experiences overlap with the tendency to over-endorse eccentric items (Merckelbach, Boskovic, Pesy, Dalsklev, & Lynn, 2017; see also Aronson, Barrett, & Quigley, 2006). Such an undetected overreporting in symptom frequency—and, related to that, severity—would inevitably produce inflated prevalence rates of dissociation. The subsequent question is: Is there also a tendency to overestimate frequencies of actually experienced dissociative symptoms? But to shed light on this question it is necessary to exclude interferences with maladaptive heuristic strategies and recall bias, thus retrospective self-reports cannot be the instrument of choice.

### Studies Investigating Reporting Bias

A better alternative is available in the form of ambulatory assessment methods which allow the timely capture of acute symptoms to estimate an overall frequency (Carlson et al., 2016; Kleim, Graham, Bryant, & Ehlers, 2013; Priebe et al., 2013). To our knowledge, only one study examined total frequencies of dissociative symptoms employing this approach (Pfaltz, Michael, Meyer, & Wilhelm, 2013). A subsample which met the criteria of a PTSD diagnosis, reported on average 13.9 to 18.1 dissociative phenomena within one week of time-based assessments (five times per day with gaps of three hours). However, this study did not include any retrospective reports which prevented the analysis of any under- or overreporting tendencies. Another ambulatory assessment study compared prevalence estimates (rated as “not at all” to “a lot”) to retrospective standard measures and reported a strong positive relationship, suggesting that results assessed via ambulatory assessments correspond well with outcomes of classic questionnaires (Carlson et al., 2016). However, subjects did not have to report the absolute frequency of symptoms so that these findings only indicate a strong correlation of estimated prevalence.

Priebe et al. (2013) studied reporting biases for intrusion symptoms in female in-patients with moderate to severe PTSD related to childhood



sexual abuse. Frequencies reported via electronic diaries six times per day over one week were compared to those reported retrospectively. Priebe et al. (2013) found that about 50% more intrusions and flashbacks were reported via ambulatory assessment than retrospective assessment. This, however, is in contrast to a study by Kleim et al. (2013) in a sample with and without current PTSD diagnosis following assault or motor vehicle accidents, which found no significant difference between the two frequency estimates for intrusive symptoms.

Taken together, it is currently unclear to which extent PTSD-related, and especially dissociative, symptoms are subject to difficulties in retrospective assessments. This is of particular interest, because patients with PTSD who additionally experience severe dissociative symptoms show a greater impairment in coping with everyday life (Stein et al., 2013), experience on average more severe intrusions (Frewen, Brown, Steuwe, & Lanius, 2015; Stein et al., 2013; Wolf et al., 2012), and might not profit from standard therapeutic treatments to the same degree (Cloitre, Petkova, Wang, & Lu, 2012; Resick, Suvak, Johnides, Mitchell, & Iverson, 2012).

### Goals of the Study

Thus, the aim of the current study was to assess whether severe posttraumatic dissociative experiences are over- or underreported. To this end, a two-week ambulatory assessment via smartphones in a natural non-clinical environment was combined with a retrospective self-report assessment of the same dissociative symptoms.

## MATERIALS AND METHODS

The study was approved by the ethics board of the Psychological University Berlin, Germany, and all participants provided informed consent before participation in the study. Participants received a personalized link to an online questionnaire, which they had received from their treatment providers.

### Participants

Participants were recruited by their therapists who were informed via email and through social media. Subjects were included in the study if they scored above the cut-off for PTSD diagnoses on a self-report instrument and were fluent in German. Additional inclusion criteria were an existing health insurance and availability of psychosocial support (therapist or psychosocial counselling) in case of crises. The only exclusion criterion was in-patient treatment during the assessment period.

In total,  $n = 72$  finished online-pre-testing and  $n = 56$  of them installed the smartphone application. Of those participants who started the smartphone assessment,  $n = 45$  also provided full data on the online post-test.

Subsequently,  $n = 3$  participants were excluded due to implausible entries (repeated entries of exactly 999 symptoms within 3 hours or exactly 400 symptoms within the last 6 hours), which likely do not represent an accurate count but rather a general indication of high disease burden.

### Pretesting – Online Questionnaires

The online questionnaire assessed sociodemographic data as well as any clinical diagnosis the participant had received by treatment providers. In addition, posttraumatic stress symptoms during the last month were assessed with the Essen Trauma-Inventory (ETI), a screening instrument which showed high sensitivity (97.3%) and specificity (98%) in previous studies (Tagay & Senf, 2014). The 23 items were rated on a 4-point Likert-scale (0 = "not at all", to 3 = "very often"). Sum scores of 27 points and higher on the PTSD scale are considered to indicate clinically relevant PTSD symptoms (Tagay & Senf, 2014). In the current sample, the PTSD scale showed acceptable internal consistency (Cronbach's  $\alpha = .72$ ).

Dissociative symptoms were assessed with the German version of the Dissociative Experiences Scale (Fragebogen zu Dissoziativen Symptomen, FDS-20; Spitzer, Mestel, Klingelhöfer, Gänsicke, & Freyberger, 2004), consisting of 20 items rated for percentage of time the symptom was present during the last two weeks (from 0% to 100%; current sample: Cronbach's  $\alpha = .88$ ).

### Ambulatory Assessment

After answering the online questionnaire, participants installed the custom-built smartphone application for two weeks. The application automatically prompted each participant three times per day to report the total number of symptoms he or she experienced since the last prompt. In addition, participants could activate the application themselves whenever they noticed a symptom. Each time, participants were asked to report the occurrence of nine dissociative items (see Table 1) in the preceding time interval as "No", "Yes, once" and "Yes, more often" followed by the absolute frequency. Two items (D1, D2) were adapted from the German version of the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) (Müller-Engelmann et al., 2018) assessing depersonalization and derealization, the remaining seven items (D3-D9) were adapted from the Brief Dissociative Experiences Scale (DES-B) (Dalenberg & Carlson, 2010) and assess absorption, amnesia, and analgesia. All items were presented in first person and referred to the time since the last reporting time point ("Since the last entry, I . . ."; s. Table 1).

Follow-up questions assessed the estimated duration and intensity of the reported dissociative phenomena, as well as suspected triggers and successful exit strategies, which will not be the subject of this analysis. In addition, two re-experiencing items (R1, R2) adapted from the German Version of the Posttraumatic Stress Diagnostic Scale (PDS; Griesel, Wessa, & Flor, 2006) were presented.

**TABLE 1** Items used during ambulatory assessment to report dissociation (D1–D9) and re-experiencing (R1, R2).

	Item
D1	I felt as if I was separated from myself, like I was watching myself from the outside or observing my thoughts and feelings as if I was another person
D2	There have been times when things going on around me seemed unreal or very strange and unfamiliar
D3	I found myself staring into space and thinking of nothing
D4	I find that I did things that I do not remember doing
D5	When I was alone, I talked out loud to myself
D6	I felt as though I were looking at the world through a fog so that people and things seem far away or unclear
D7	I was able to ignore pain
D8	I was acting so differently from one situation to another that it is almost as if I were two different people
D9	I could do things very easily that would usually be hard for me
R1	I had upsetting thoughts or images about the traumatic event that came into my head when I didn't want them to
R2	I relived the traumatic event, acted or felt as if it was happening again

## Retrospective Assessment

Following 14 days of smartphone assessment, participants were automatically redirected to an online post-test. Among other questions, subjects had to estimate how often (in total numbers) they experienced the nine dissociative and two re-experiencing symptoms that were assessed via the smartphone application during the preceding two weeks. For this purpose, the instructions were changed to “During the last two weeks, did you. . .”.

## Data Analysis

We included smartphone assessments of  $n = 42$  participants in the data analysis. Compliance was computed as the ratio of made entries in relation to demanded entries. Assessments were excluded from analysis, if participants took longer than 30 minutes to answer and if less than two thirds of an assessment were completed. A participant had a compliance of 100% if she or he filled out the questionnaire at least 42 times (3 times per day for 14 days).

The total frequency of dissociative symptoms over the ambulatory assessment period was calculated as a total frequency score. This score was subsequently compared with the total frequency score reported in the retrospective self-report. As all items were not normally distributed, we used non-parametric Wilcoxon tests for paired data and a statistical threshold of  $p < .05$ , two-sided.

In addition, we opted to employ a very conservative approach to quantify overall under- and overestimation rates, assuming that only strong deviances would be considered relevant, e.g., in the realm of psychotherapy evaluation. We therefore decided to accept all answers that either over- or underestimated the reported frequencies by a third as acceptable estimations. Hence, only answers that under- or overestimated the reported frequencies by more than a third were counted. For this purpose, we calculated a quotient for each item by dividing the difference of remembered symptoms (retrospective minus smartphone-based) by all symptoms entered via smartphone. In order to calculate scores, even when a symptom was never experienced during the time of assessment, we added plus one to the denominator. On the basis of these quotients participants were categorized into three groups of “underestimating” (quotient  $\leq -34$ ), “almost correct to correct estimates” (quotient between  $-33$  and  $.33$ ) and “overestimating” (quotient  $\geq .34$ ), so that “almost correct to correct estimates” included up to one third of made over- and underestimates. All analyses were conducted with IBM SPSS 19.0 Statistics.

## RESULTS

### Participant Characteristics

Participants were on average  $M = 38.9$  ( $SD = 9.8$ ) years old and predominantly female ( $n = 38$ ; 90.5%). Approximately half reported to have received higher education ( $n = 22$ ; 52.4%) and 59.5% ( $n = 25$ ) (were unemployed or unfit to work at the time of the assessment).

On average, they reported 3.8 ( $SD = 1.8$ , range: 0–7) lifetime diagnoses of mental disorders, PTSD (85.7%), affective disorders (76.2%) and anxiety disorders (40.5%) being the most frequently reported ones. Of the  $n = 42$  participants,  $n = 11$  participants (26.2%) were diagnosed with dissociative identity disorder and  $n = 10$  participants with other dissociative disorders (23.8%). Additionally, 5 participants (11.9%) reported to be diagnosed with dissociative identity disorder and at least one further dissociative disorder. Participants had a mean sum score of 37.4 ( $SD = 5.2$ , range: 27.0–47.0) on the ETI and a mean sum score of 40.7 ( $SD = 15.09$ , range: 4.5–74.0) on the FDS-20. Participants reported an average of 5.9 ( $SD = 2.5$ ) different traumatic experiences. Half of the sample ( $n = 21$ , 50.0%) indicated that childhood sexual assault constituted their worst traumatic experience.

Participants who finished online pretesting but did not finish or even start the ambulatory assessment ( $n = 27$ ) did not significantly differ in age  $M = 35.2$  ( $SD = 11.4$ ) from the participants who completed the retrospective assessment ( $T(70) = -1.36$ ,  $p = .177$ ). With a mean sum score of 41.0 ( $SD = 5.7$ , range: 28.0–49.0) on the ETI, they had significantly more severe PTSD symptoms ( $T(70) = 2.96$ ,  $p = .004$ , Cohen's  $d = 0.72$ )

as well as more severe dissociative symptoms with a mean sum score of 51.7 ( $SD = 24.9$ , range: 6.5–89.5) on the FDS-20 ( $T(39) = 2.10$ ,  $p = .042$ , Cohen's  $d = 0.57$ ). The two groups did not differ significantly ( $T(70) = -1.9$ ,  $p = .062$ ) regarding the number of lifetime diagnoses of mental disorders ( $M = 4.7$ ,  $SD = 1.8$ , range: 0–7).

### Reported Frequency of Symptoms and Reporting Tendencies

Frequencies were obtained from on average  $M = 30.02$  ( $SD = 7.5$ , range = 7–39) entries in two consecutive weeks, which represents a compliance rate of 71.5%. On 5.1% of all assessment days, participants did not report any data.

With the exception of item D6 ('I felt as though I were looking at the world through a fog so that people and things seem far away or unclear'), the frequency of all dissociative symptoms reported via smartphone differed significantly from the frequency assessed retrospectively via self-report questionnaires (see Table 2), with medium to large effect sizes (Cohen's  $d$  between 0.75 and 1.35). The largest effects were observed in item D9 ('I could do things very easily that would usually be hard for me';  $z = -3.65$ ,  $p < .001$ , Cohen's  $d = 1.35$ ) and item D1 ('I felt as if I was separated from myself, like I was watching myself from the outside or observing my thoughts and feelings as if I was another person';  $z = -3.02$ ,  $p = .003$ , Cohen's  $d = 1.05$ ).

**TABLE 2** Descriptive statistics and Wilcoxon test of perceived dissociative (D1–D9) and re-experiencing (R1, R2) symptoms within two consecutive weeks.

	D1	D2	D3	D4	D5	D6	D7	D8	D9	R1	R2
App-logged											
Med	12.0	11.5	13.5	6.0	8.5	11.5	2.5	4.0	3.0	23.5	10.5
$M$	18.14	20.10	22.24	9.64	19.57	17.31	12.98	13.45	12.57	34.60	22.50
$SD$	22.67	32.34	27.42	10.90	35.48	23.34	33.38	23.70	46.70	31.53	42.37
Range	0113	0205	0128	052	0190	0136	0211	0113	0304	3129	0238
Retrospectively reported											
	8.0	10.0	10.0	3.5	4.0	10.0	2.0	3.0	2.0	11.5	5.5
$M$	10.55	12.50	14.64	8.60	11.36	15.12	6.45	8.00	3.45	15.57	10.21
$SD$	11.41	14.59	17.71	14.33	14.91	15.48	9.97	14.61	5.33	13.55	15.02
Range	050	070	090	070	050	070	048	060	030	160	080
Wilcoxon test for paired data											
$z(p)$	-3.02 (.003)	-2.51 (.012)	-2.60 (.009)	-2.32 (.020)	-2.35 (.019)	-0.73 (.468)	-2.58 (.010)	-2.23 (.023)	-3.65 ( $< .001$ )	-5.07 ( $< .001$ )	-3.46 (.001)
$d$	1.05	0.84	0.88	0.77	0.78		0.87	0.75	1.36	2.51	1.26

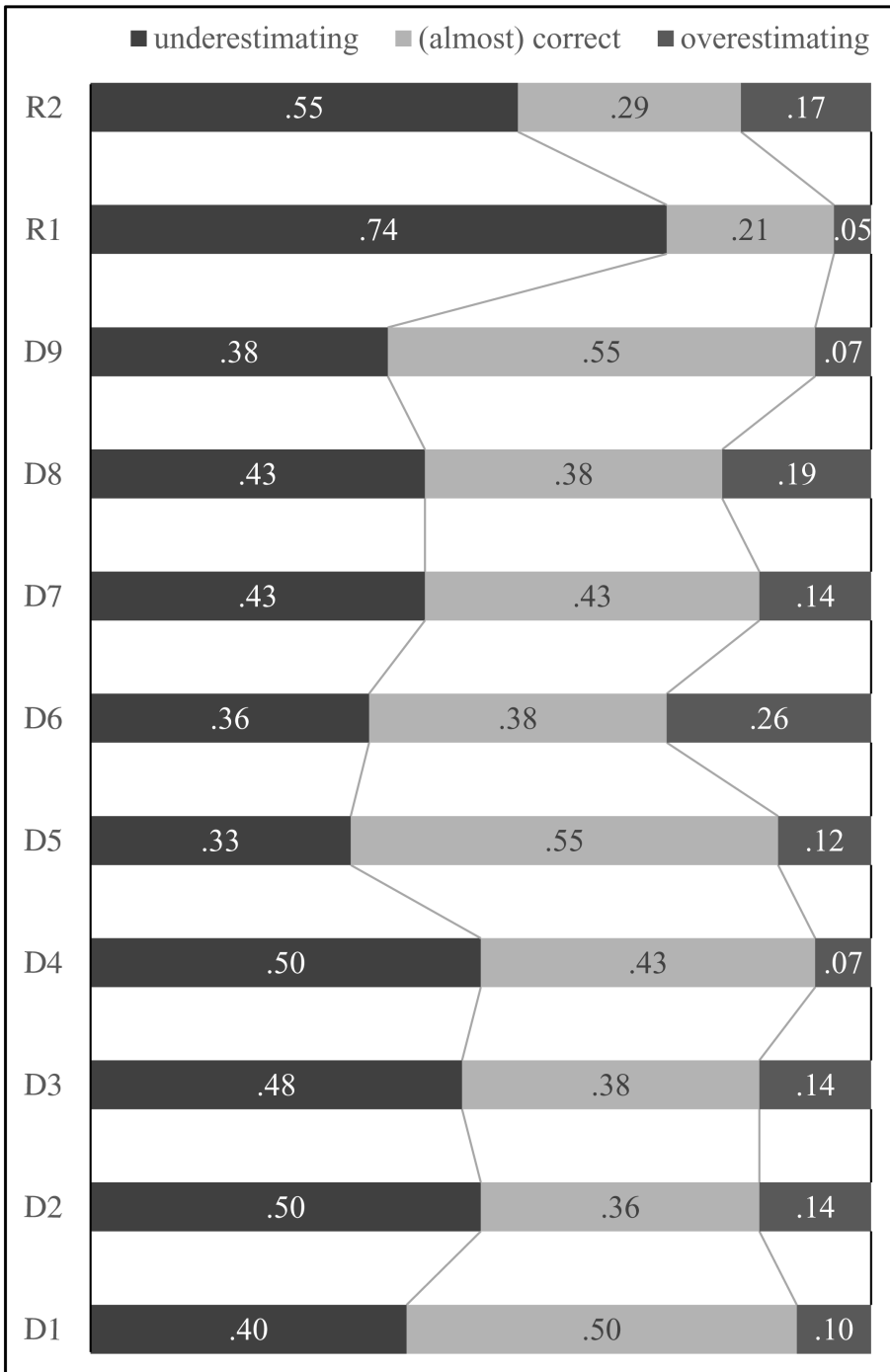
Furthermore, the two re-experiencing items R1 and R2 exhibited significant differences in reported frequency with large effect sizes of Cohen's  $d = 2.51$  (item R1) and Cohen's  $d = 1.26$  (item R2). The re-experiencing item R1 (intrusions) showed the largest significant differences of all assessed items ( $z = -5.07, p < .001$ ) with an average number of 23.5 intrusions for two weeks and 11.5 retrospectively assessed symptoms.

All symptoms were more often retrospectively underreported than overreported. According to the quotients calculated to categorize participants into three reporting-groups, 97.6% of the participants were categorized as "underestimating" for at least one item and 42.9% for more than half (at least six) of all items. In comparison, 83.3% of the participants were categorized as "overestimating" for at least one item, but only 4.8% for more than half of all items. Figure 1 depicts over- and underestimation tendencies for each symptom.

## DISCUSSION

Little is known with regard to the frequency of dissociative symptoms in people suffering from posttraumatic stress disorder, as most of the commonly used diagnostic instruments to measure dissociation refer to a wide time span and rely on retrospective recall processes.

This study therefore assessed posttraumatic dissociative and intrusive symptoms in a natural environment via two-week ambulatory self-report using smartphone prompts and compared these entries with a retrospective report of an overall frequency estimation. For almost all dissociative items, we found a significant retrospective symptom underestimation. For re-experiencing items assessing intrusive, involuntary memories, the retrospective underestimation was even more pronounced. Differences in smartphone-based assessments and retrospective reports showed middle to large effect sizes. Considering that some symptoms occurred quite rarely within the two-week time period, we opted to accompany these analyses with an additional, very conservative approach to reporting biases. We thus accepted all answers that either under- or overestimated the reported frequency by a third as adequate reporting, i.e., not indicating a reporting bias. Hence, only frequency estimates that deviated by more than a third were considered indicative of a reporting bias. Based on this very conservative approach, we categorized retrospective reporting tendencies for each participant as "underestimating," "almost correct or correct estimates" or "overestimating." The data indicate that retrospective underestimation outweighs retrospective overestimation as a reporting tendency amongst the participants. More precisely, more than one third of the participants were categorized as "underestimating" for more than half of all items, while only 5% simultaneously overestimated the same amount. This tendency of



**FIGURE 1** Percentage of participants ( $n = 42$ ) retrospectively under-, over and (almost) correct estimating dissociative (D1–D9) and re-experiencing (R1, R2) symptoms (in percentage).

PTSD patients to underestimate symptoms has previously been shown for intrusive symptoms (Priebe et al., 2013) and the current study now extends this to dissociative symptoms. This is relevant as a sample with multiple comorbidities and high levels of dissociation has to remember more events retrospectively than people with lower disease burden. In addition, dissociative amnesia might impact the reporting in patients with dissociative disorders due to lapses in their episodic memory. This is, on the one hand, a methodological limitation of the current study as patients suffering dissociative identity disorder were not excluded. On the other hand, this also constitutes a strength of the current study as we preserved the ecological validity and provide useful comparison data for typical patient populations to be studied in treatment effectiveness studies

To our knowledge, no study analyzing over- and underreporting tendencies regarding dissociative symptoms is currently available and thus a direct comparison with the results reported here is not feasible. In terms of the reported absolute frequency of intrusions, we detected fewer symptoms than Priebe et al. (2013) but more than Kleim et al. (2013), what can be partially explained by our sample characteristics: Our participants reported high rates of comorbid dissociative disorders and unfitness for work. Another important consideration is the used ambulatory assessment design. We used a mixed sampling approach (time-based and event-based), whereby time-based samplings seem to generate higher frequencies of symptoms (Priebe et al., 2013; Kleindienst et al., 2017). In addition, Priebe et al. (2013) reported arithmetic means with high standard deviations (up to  $\pm 62$ ), measures which are vulnerable to outliers. In contrast, we chose to report more robust medians and to exclude participants with implausible high symptom frequencies as a conservative study approach. Taken together, under the prior assumptions, our data is consistent with the present literature.

The data of the current sample do not confirm previous indications of a potential tendency to largely overreport dissociative symptoms in retrospective self-reports (Merckelbach et al., 2017). This effect could, of course, be masked by the effect of dissociative amnesia. However, it is also conceivable that the complexity and vagueness of many dissociative symptoms makes it harder to identify and remember each symptom in hindsight.

Nevertheless, several limitations of this study need to be discussed: First, we report clinical diagnoses that were not externally validated. Second, self-selection processes need to be considered. Of the 72 persons who finished the online testing, only 45 finished the study. The subjects who have stopped participation reported higher PTSD and dissociation severity in the pretest. Third, we tried to minimize retrospective effects but could not fully eliminate them. Smartphone-assessments only asked three times per day for the number of dissociative symptoms "since the last entry," which still renders these data vulnerable to short-term memory effects. Due



to the small sample size we opted to include all participants, even if they only reported on average every second day. This decision potentially aggravates the memory effect. However, assuming that patients would then have underreported the true symptom load in the ambulatory assessment, this would only indicate an even stronger tendency for retrospective under-reporting.

Small sample size in conjunction with the limitations discussed above indicates that a replication is needed before the results can be generalized to the population of PTSD patients with high comorbidity. However, this study is a first attempt to shed light on potential reporting biases with regard to posttraumatic dissociative symptoms, which should be taken into account when evaluating treatment effectiveness for dissociative symptoms.

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