

## ORIGINAL RESEARCH REPORT

# Psychological Overinvolvement, Emotional Distress, and Daily Affect Following Marital Dissolution

Kyle J. Bourassa, Allison M. Tackman, Matthias R. Mehl and David A. Sbarra

Marital dissolution is associated with risk for poor mental health outcomes, but less is known about the variables and processes that may explain this risk. In a sample of recently-separated adults ( $N = 138$ ), this study examined the association of psychological overinvolvement—assessed using a composite of self-reported rumination, language use, and judge-rated recounting and reconstruing—with daily affect and psychological distress. We included objective measures of sleep, behavioral displays of distress, and social engagement as potential mediators of these associations. Consistent with the preregistered hypotheses, greater psychological overinvolvement predicted higher levels of psychological distress, lower happiness, and greater sadness five months later. Psychological overinvolvement also predicted change in sadness, but not happiness or psychological distress, over five months. Contrary to our predictions, none of the candidate mediators explained these associations. Exploratory analyses suggested that the self-reported rumination component of the psychological overinvolvement composite largely accounted for the association between psychological overinvolvement and the three outcomes. People's tendency to become overinvolved in their psychological experience after divorce predicts increased risk for distress in the months following marital separation.

**Keywords:** divorce; marital dissolution; psychological distress; psychological overinvolvement; daily affect

Divorce is a relatively common life event, affecting more than 2.5 million adults in the United States every year (Arias, 2007). Compared to remaining married, marital dissolution is associated with risk for a variety of poor psychological and physical health outcomes, including decreased life satisfaction (Lucas, 2005), increased psychological distress (Bourassa, Manvelian, Mehl, Boals, & Sbarra, 2017; Lorenz, Wickrama, Conger & Elder, 2006) and increased risk of early death (Sbarra, Law & Portley, 2011; Shor, Roelfs, Bugyi, & Schwartz, 2012). It is also true that many people adjust well after the end of their marriage (Hetherington & Kelly, 2003). Although these facts may appear to be in conflict, both are accurate: the greater *average* risk for poor outcomes after separation and divorce appears to be driven largely by a subset of people who experience particularly poor outcomes (Sbarra, Hasselmo, & Bourassa, 2015; Sbarra, Emery, Beam, & Ocker, 2014). This variability points to the importance of studying individual differences—what factors differentially predict who fares well or poorly?

One key individual difference that is associated with adjustment following separation and divorce is psychological overinvolvement (Bourassa et al., 2017).

Psychological overinvolvement describes a pattern of immersion in psychological experiences and an inability to create psychological distance from painful thoughts or memories. Following stressful events, a lack of psychological distance may prevent meaning-making, an adaptive process of creating a cognitive framework for understanding stressful events that often involves the emergence of a coherent narrative of all that has unfolded (Park, 2010). The creation of meaning allows people to make sense of why difficult or hurtful events might have happened to them. People who report or demonstrate less of a tendency to become overinvolved in their experience also report that they are better able to create meaning following a separation experience (Bourassa et al., 2017). Psychological overinvolvement is likely a specific operationalization of the broader construct of self-immersion and its counterpart, self-distancing (Kross & Ayduk, 2011). People who take a more self-distanced perspective adjust better when facing negative experiences (Kross & Ayduk, 2011) and are more likely to engage in adaptive self-reflection and meaning-making following such experiences (Ayduk & Kross, 2010; Davis, Gross, & Ochsner, 2011; Ochsner & Gross, 2008). In contrast, people who are more self-immersed are at increased risk for a variety of poor outcomes after negative events (Kross, 2009). For example, parents of children with cancer diagnoses who are high in anxiety were more distressed three months later when they were more

enmeshed in their experience (as operationalized by self-reported immersion in an imagery-related task) and less able to self-distance from their child's treatments (Penner et al., 2016). Taken together, these findings suggest that psychological overinvolvement, as an index of self-distance/immersion, may be a key individual difference for determining who fares well or poorly after a separation or divorce.

Notably, psychological overinvolvement can be assessed in a variety of ways. For example, Bourassa and colleagues (2017) used a composite of self-reported rumination, a measure of language use during separation recall, and coder ratings of people's description of their separation experience to assess psychological overinvolvement. Measuring psychological overinvolvement using a multi-method approach reduces shared method variance between predictors and outcomes and is an especially valuable approach in longitudinal correlational studies that lack a focused experimental manipulation. It is equally important that the variables used to assess the construct are appropriate. The current study leveraged the composite created by Bourassa and colleagues (2017) to include the same measures of self-reported rumination and verbal immediacy. The self-focused nature of rumination (Nolen-Hoeksema, 1991) matches well with the core conceptualization of overinvolvement as an inability to create psychological distance from painful thoughts or memories. Similarly, verbal immediacy assesses linguistic entrenchment in a subjective experience through language use (Cohn, Mehl, & Pennebaker, 2004), which, for people who are highly overinvolved, may capture the difficulty of reviewing experiences from a distanced perspective. In addition, the current study used a more direct measure of overinvolvement—judge-rated recounting/reconstruing (Kross and Ayduk, 2011). This measure was designed specifically to assess patterns of self-reflection that may be differentially adaptive (reconstruing—i.e., re-examining their separation from a distanced perspective) versus maladaptive (recounting—i.e., re-experiencing the separation with psychological closure). The coding for these measures was derived from prior studies on self-distancing that find that low reconstruing and high recounting are maladaptive patterns of overinvolvement (Kross & Ayduk, 2011). To the extent that overinvolvement is associated with separation-related distress, the multi-method assessment of the construct (as proposed here) can bolster confidence in the strength of the association, rather than relying on a single method alone (e.g., self-report) to assess the predictor and outcome.

Although psychological overinvolvement predicts self-reported psychological distress following marital dissolution (Bourassa et al., 2017), potentially by inhibiting the creation of a narrative of the separation experience, prior work in this area is limited by virtue of its broad measurement of self-report psychological outcomes. Such assessments tend to substantially invoke participants' semantic representations of their experiences, which can result in biased responding, such as in the direction of culturally bound normative beliefs about feelings or behavior rather than their actual lived experiences

(Conner & Barrett, 2012). Ambulatory or daily measures of self-report, in comparison, tend to more directly access participants' episodic representations of their experiences and can thereby help provide, as additional outcome measures, more narrow "read-outs" of how people actually felt and behaved at a specific time and in a specific context. This then, in turn, should be a closer reflection of people's lived daily psychological experiences. Although broad self-report measures are useful in assessing people's wellbeing and distress, more frequent and narrow assessments of daily adjustment after marital dissolution may better capture the lived experience of daily psychological wellbeing or distress. In the present report, we include measures of both broad (i.e., a composite of psychological wellbeing measures) and more narrowly assessed (i.e., daily affect) outcomes, thus assessing a more complete constellation of the adaptation to divorce.

### **What Might Explain Poorer Adjustment to Separation and Divorce?**

If a tendency toward psychological overinvolvement places people at risk for outcomes when relationships end, what mediating processes or mechanisms might explain this association (cf. Kazdin, 2007)? Here we consider three plausible mediating processes: social engagement, behavioral manifestations of distress, and sleep disturbances. Separated and divorcing adults' social environments change significantly following marital separation. Social network losses that people experience after separation are not replaced, even years later (Terhell, Broese van Groenou, & van Tilburg, 2004), likely due to changes in their patterns of social interaction following the marital separation. Individual differences in psychological overinvolvement could impact people's willingness to engage with their social networks; highly overinvolved people might self-isolate in an attempt to work through their experience. Changes in people's engagement with their social networks are particularly important following marital dissolution, as they can impact people's health and are linked to their psychological distress (Hasselmo et al., 2018). Examining divorced adults' social engagement could provide specific evidence of the type of behavior, such as social isolation or the type of conversations people are engaged in, which might be related to poorer adjustment following marital dissolution.

In addition, behavioral manifestations of distress—such as laughing, crying, or talking about an ex—may act as markers of people's adjustment that help connect people's psychological characteristics to later outcomes. Highly overinvolved people might express their enmeshment with their separation experience through expressions of affect that act as a proxy for their internal psychological states. These expressions of affect might then provide evidence of people's functioning beyond self-report. For example, the rumination inherent in overinvolvement may be expressed through greater levels of observed negative affect, including crying, or lower levels of positive affect, such as laughing. These behavioral proxies may serve as critical links between the individual difference of psychological overinvolvement and later self-reported

distress. In this way, behavioral manifestations of distress could serve as ecologically valid, methodologically distinct mediators of the total effects of interest.

Sleep is a health behavior that might also help explain why psychological overinvolvement predicts poorer outcomes following marital dissolution. Following the end of marriage, it is possible that changes in people's living situation, sleeping location, or routines could impact sleep behavior. For example, for someone who has been sharing a bed with their partner for years, it is possible their sleep quantity and/or quality might change when they no longer are sharing their bed. Similarly, people high in trait rumination—which is likely a behavior that characterizes people that are highly psychologically overinvolved—have poorer sleep quality following stressful life events (Guastella & Moulds, 2007). Sleep quantity and quality can be objectively measured in several ways, including how much a person sleeps (i.e., total sleep time), how often they wake up (i.e., number of awakenings), and the amount of time they spend asleep while trying to sleep (i.e., sleep efficiency). Lower sleep efficiency and shorter sleep times are associated with a variety of poor psychological outcomes, including increased rates of depression and anxiety (Alvaro, Roberts, & Harris, 2013; Taylor, Lichstein, Durrence, Reidel, & Bush, 2005), as well as people's mood and social interactions (Totterdell, Reynolds, Parkinson, & Briner, 1994). If people are highly psychologically overinvolved, it is possible that their sleep behavior would suffer as a result, which would in turn impact their psychological adjustment following marital dissolution.

### Present Study

The present study represents a preregistered effort to replicate and extend prior findings on the role of psychological overinvolvement in predicting adjustment following separation/divorce (Bourassa et al., 2017). This prior study relied on a broad suite of self-reported outcomes, and we sought to replicate these effects in a new sample. In addition, this current study included daily measures of affect in an attempt to examine whether these associations might extend to more frequent (i.e., narrow) assessments of wellbeing. Finally, we were also interested in examining whether people's sleep disturbances or diminished social engagement might explain the association of psychological overinvolvement and adjustment after marital dissolution. To explore these questions, we used a sample of recently-separated adults ( $N = 138$ ) assessed during five visits across five months. The preregistered analysis plan and hypotheses for this investigation were submitted to the Open Science Framework (OSF) on 9/1/2017 and can be viewed at <https://osf.io/te6uj/> along with the study data. As noted in the analysis plan, we hypothesized that greater psychological overinvolvement would predict higher absolute levels of self-reported psychological distress and sadness five months later, as well as lower happiness five months later. We also hypothesized that greater psychological overinvolvement would predict decreases in psychological distress and sadness, as well as less increases

in happiness, over the course of the study period. Finally, we hypothesized that a variety of objectively-measured candidate sleep and behavioral variables would mediate these associations. Specifically, we predicted that lower sleep efficiency, less total sleep time, and more awakenings in the night would mediate the association of greater psychological overinvolvement and the outcomes of interest. Similarly, we hypothesized that more time spent alone, less time spent in substantive conversations, less time laughing, more time crying, and more time talking about their ex-partner would mediate the association of greater psychological overinvolvement and the outcomes of interest. We used these objective measures of these sleep and behavior to limit the shared method variance in the predictors and the outcomes.

## Method

### Participants

The current study used participants who participated in the Divorce, Sleep, and (Social) Environment (DSE) Study conducted at the University of Arizona, which included 140 total participants assessed across 5 study visits over 5 months. One hundred twenty-two participants completed the study, whereas the remaining 18 participants completed some portion of the study. Of these participants, 2 did not complete any of the relevant study occasions and were excluded from our analyses as a result. Data collection began in 2012 and continued until 2015, when the study exceeded the 120 participant sample specified in the original project design. The University of Arizona IRB approved of the study design and procedures, and all participants gave informed consent to participation in the study. All participants reported experiencing a marital separation or divorce within the previous five months at the beginning of the study and were provided monetary compensation for their participation. The average age of the sample was 43 years old, with ages ranging from 21 to 65, and was majority female (70.1%). The sample was 63.2% Caucasian, 21.3% Hispanic, 5% African American, and the remaining racial/ethnic categories were below 5%. The median annual income for the sample was between \$25,000 and \$35,000. Sixty one percent of the sample had children with their former partner. The participants who did not complete the study did not significantly differ from the participants that did in terms of their gender (Cohen's  $d = -0.23$ ), time since separation ( $d = -0.19$ ), or income ( $d = -0.38$ ), nor their psychological overinvolvement ( $d = 0.15$ ), psychological distress ( $d = 0.21$ ), sadness ( $d = -0.03$ ), and happiness ( $d = -0.29$ ) at the first study occasion, but they were significantly younger ( $d = -0.52$ ) and were married for a significantly shorter period of time ( $d = -0.99$ ). All 138 participants with data (whether they completed the study or not) were included in all of our analyses, as described below in the Data Analysis section of the Methods.

### Procedure

Participants were recruited from the local Tucson area using a variety of online, print, and video media. Participants were then screened for relevant inclusionary

and exclusionary criteria and eligible participants were then enrolled in the study for five visits over five months. The general study procedure varied between the odd (1, 3, and 5 month visits; T1, T3, and T5) and even numbered visits (2 and 4 month visits; T2 and T4). On odd month visits, participants were mailed a packet of self-report measures that they completed prior to their visit. On the date of their visit, research assistants conducted their study visit either in a lab area at the University of Arizona or in the participant's home. During study visits, the research assistants collected the self-report measures, provided the participants with the Electronically Activated Recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) and Actiwatch 2, and had the participants complete a 4-minute stream of consciousness (SOC) recording. For the SOC recording, participants were instructed to complete a mood induction, during which participants were asked to create a detailed image of their former partner's face or of the two of them doing something together for 30 seconds. They were then provided a digital recorder and instructed to speak continuously for four minutes about their strongest thoughts and feelings regarding their marital separation/divorce experience.

After the visit, the participants then wore the EAR device during the day for the following three days (Friday afternoon to Sunday night). During these three days, the participants also wore an Actiwatch 2 while sleeping and completed a sleep diary immediately before going to bed and after waking up. Participants continued to wear the Actiwatch 2 and complete the sleep diary for four additional consecutive days beyond the first three days. After a week, research assistants collected the participants' materials. The visits at months two and four (T2 and T4) differed in that no lab or home visit was required. Instead, participants were mailed the sleep diary and packet of self-report measures, which upon completion were mailed to the lab or collected by the research assistants.

### Measures

**Demographic and Relationship Characteristic Covariates.** A variety of demographic and relationship characteristic variables were collected via self-report at T1. Participants' age in years, gender, time since separation in months, income, and length of marriage in years were used as covariates in the current study.

**Psychological Overinvolvement.** Psychological overinvolvement was assessed using an arithmetic mean of self-reported rumination, verbal immediacy, and judge-rated recounting/reconstructing. This measure conceptually replicated a previous investigation of psychological overinvolvement that used multiple methods (self-report, language use, and independent coding) to assess overinvolvement (Bourassa et al., 2017). Identical to the previous investigation, we used the same self-report scale and language use composite, however, the judge-rating coding system was a different, but a conceptually similar, method of coding participants' data. The composite of these three items did not evidence strong internal reliability ( $\alpha = 0.34$ ), in contrast to the internal reliability in previous samples (e.g.,  $\alpha = 0.70$ ; Bourassa et al., 2017).

**Self-reported Rumination.** The Rumination Response Scale (RRS; Nolen-Hoeksema, 1991) was used to assess rumination at T1. The RRS is composed of 22 items measuring people's tendency to engage in perseveration about one's mood. Items include "I think 'What am I doing to deserve this?'" and "I analyze my personality to try to understand why I am depressed", and are evaluated by a 4-point Likert Scale ranging from 1 (*almost never*) to 4 (*almost always*). The measure evidenced good internal reliability ( $\alpha = 0.93$ ).

**Verbal Immediacy.** Research assistants transcribed the verbal SOC recordings from T1. These transcriptions were analyzed using the Linguistic Inquiry Word Count (LIWC; Pennebaker, Booth, & Francis, 2015), which gives the percentage of words that fall into over 80 word categories. Verbal immediacy, more specifically, is a factor-analytically derived composite of five LIWC word categories (Pennebaker & King, 1999), including first-person singular pronouns (e.g., I, me, my), discrepancy words (e.g., should, would, could), and present focus words, and inverse scores for articles (e.g., a, an, the), and words with more than six letters. These categories are standardized using z-scoring and averaged to create a final verbal immediacy scale. Conceptually, verbal immediacy is characterized by present-moment attention, where participants tend to use more experiential language and feel more entrenched in their subjective feelings (Cohn et al., 2004). Immediacy has been used in a variety of studies to assess psychological enmeshment when reflecting on experiences (Borelli & Sbarra, 2011; Lee et al., 2011). The internal reliability at T1 was adequate ( $\alpha = .64$ ).

**Judge-rated Recounting and Reconstructing.** Six independent coders judged (Whatton, 2017) and scored the level to which the participant experienced their emotions and separation experience, rather than reconstructing it during the SOC recordings from T1 (Whatton, 2018). The coding system was constructed based on the studies comparing recounting and reconstructing memories (Kross & Ayduk, 2008). After listening to the SOC recordings from each participant, judges were asked to rate the degree of recounting or reconstructing based on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Two groups of three coders each triple coded 50% of the SOC recording. The mean two-way random interclass correlations for the global recounting and reconstructing ratings were  $r = 0.68$  and  $0.47$ , respectively. The two scores were standardized using z-scoring, the reconstructing variable was reversed coded to account for the directionality of the measures, and the two scales were averaged to create the final judge-rated recounting/reconstructing variable.

**Sleep Behaviors.** Total Sleep Time, Sleep Efficiency, and Awakenings were measured by having participants wear an Actiwatch 2 for seven consecutive nights while sleeping at T1 and T3. The Actiwatch 2 is an activity monitor that records body movement and is worn on a person's non-dominant wrist while they are asleep. For each night that the Actiwatch was worn, the participants' data was scored by trained research assistants using Philips Respironics Actiware software (version 6.0.7). Sleep intervals were assessed using a combination of participant markers and



sleep diary data, consistent with the recommendations by Ancoli-Israel et al., (2015). The actigraphy data was scored using an epoch length of 1 minute with 5 1-min epochs used to calculate sleep onset and awakening, as well as a medium wake threshold at a value of 40. Total Sleep Time was calculated by subtracting Wake After Sleep Onset (the time in minutes when participants were awake during the sleep period) from the Sleep Period (the time in minutes between when participants fell asleep and their final awakening). Sleep efficiency, which refers to the percentage of time asleep while trying to sleep, was calculated by dividing Total Sleep Time by the Rest Period (the time in minutes between when participants tried to fall asleep at night and when they got out of bed in the morning), and multiplying the result by 100. Awakenings was calculated as the number of times a participant woke up after sleep onset. For each measurement occasion, we then calculated the average value for each of the three sleep variables only if participants had at least three of the seven nights of data.

**Daily Behaviors.** Various aspects of participants' daily life were assessed using the Electronically Activated Recorder (EAR; Mehl et al., 2001). The EAR is an observational, real-time, ecological data capture method that consists of an audio sampling app installed on an iPod Touch device. The device is minimally obtrusive to participants and those around them, and compliance rates are generally high (Mehl & Holleran, 2007; Manson & Robbins, 2017). For the current study, the app recorded 30 seconds of ambient sound every 12 minutes while participants went about their days, therefore capturing between 5–10% of the participants' waking hours. Participants wore the EAR from approximately 6:00pm on Friday to 11:59pm on Sunday, with programmed six-hour black-out periods on Friday and Saturday nights during sleep. At the completion of the study, participants had the opportunity to review their sound files and delete any that they did not want the researchers to hear (for more information on participant and bystander privacy protection, see Mehl, 2017; Robbins, 2017). Trained research assistants coded each sound file for the presence of a variety of behaviors using a modified version of the Social Environment Coding of Sound Inventory (SECSI; Mehl & Pennebaker, 2003). Each sound file was given a binary code (behavior present versus absent) within each behavioral coding category. These raw codes were converted into a relative frequency variable indicating the number of waking EAR sound files in which a coding category applied (e.g., the percentage of time over the course of the weekend during which the participant was engaged in the target behavior). The behaviors used in the current study included time spent alone, in substantive conversations, laughing, crying, and talking about their ex-partner or the separation at T1 and T3. The coding system with detailed explanations of each behavior can be found on the OSF EAR Repository at <https://osf.io/4yb97/>. The intraclass correlations (ICC[1;2]) were satisfactory for all behaviors and ranged from .78 to .94 at T1 and .52 to .92 at T3.

**Psychological Distress.** Psychological distress was assessed using an arithmetic mean of four self-report measures combined into a single composite of distress at both T1 and T5. Prior to computing the mean, the four measures were rescaled with a linear transformation to Percent of Maximum Possible (POMP) scores, giving them a theoretical range from 0 to 100 (Cohen, Cohen, Aiken, & West, 1999). The POMP means were 30.8 points at T1 and 20.7 points at T5.

**Loss of Self and Rediscovery of Self Scale.** The Loss of Self and Rediscovery of Self Scale (LOSROS; Lewandowski & Bizzoco, 2007) was used to assess the degree to which participants report losing their sense of self and rediscovering their sense of self after a romantic separation. The LOSROS includes both the Loss of Self Scale and the Rediscovery of Self Scale—which is reverse coded—and combines these two 6-item scales into a single overall scale. Items are assessed on a 7-point Likert-scale ranging from 1 (*not at all*) to 7 (*a great deal*) with higher scores representing great loss of self. The LOSROS evidenced strong internal reliability ( $\alpha = .90$  and  $.93$  for the T1 and T5 respectively).

**Impact of Events Scale – Revised.** The Impact of Events Scale – Revised (IES-R; Weiss, 2007) assessed the degree to which people were experiencing ongoing emotional intrusion and somatic hyperarousal related to a specific stressful event. The scale has 22 questions using a 5-point Likert-scale ranging from 0 (*not at all*) to 4 (*extremely*). The total IES-R had high internal consistency at T1 and T5 ( $\alpha_s = .94, .95$ ).

**Beck Depression Inventory.** The Beck Depression Inventory II (BDI; Beck, Steer, & Carbin, 1988) assessed participants' self-reported psychological and somatic symptoms of major depressive episodes. Higher scores on this inventory reflected endorsement of more depressive symptoms and emotional disturbance. Internal consistencies of the BDI-II were high at T1 and T5 ( $\alpha_s = .91, .93$ ).

**Inventory of Complicated Grief.** The Inventory of Complicated Grief (ICG; Prigerson et al., 1995) assessed participants' self-reported grief associated with the loss of the marriage. Higher scores on this inventory represented greater symptoms of complicated grief associated with an inability to move past the loss. The total ICG had high internal consistency at T1 and T5 ( $\alpha_s = .94, .93$ ).

**Daily Affect.** Mean daily self-report ratings from the sleep diary at the end of day for both happiness and sadness were assessed at each visit. Both happiness and sadness were assessed using the average of participants' responses to a single-item daily ratings (e.g., "How happy were you today?") on a 5-point scale averaged across the week (7 days of assessment) at both T1 and T5. The scale ranged from 1 (*not at all*) to 5 (*extremely*).

#### **Data Analysis Plan**

In the current study, we specified structural equation models (SEMs) to assess the association of psychological overinvolvement and psychological distress five months later. To test the primary preregistered hypotheses of interest, we first included the main effect of T1

psychological overinvolvement predicting psychological distress levels at T5. We then included T1 psychological distress predicting T5 psychological distress to examine whether T1 psychological overinvolvement predicted change in distress from T1 to T5. We next constructed two similar sets of models, but with daily self-reported happiness and sadness levels as the outcome variables in each model, respectively. This approach resulted in six independent models, two for each outcome with one predicting the level of the outcome, the other predicting the change in the outcome from T1 to T5. We next specified mediation models using the objectively-measured candidate mediator variables at T3—sleep efficiency, total sleep time, awakenings in the night, time spent alone, time spent in substantive conversations, time spent laughing, time spent crying, and amount of time spent talking about their ex-partner—within independent models predicting both level and change in the three outcomes of interest. All models also included our pre-specified covariates of interest—age in years, gender, time since separation in months, income, and length of marriage in years—predicting the outcomes of interest. We also ran all models without covariates and note where the substantive results differ when including covariates or not in the text. Finally, once we analyzed our preregistered hypotheses, we also conducted additional analyses examining the association between the outcomes of interest and the individual variables making up the psychological overinvolvement composite to provide exploratory evidence regarding which variables were accounting for the most variance in our outcomes of interest.

We conducted all analyses in Mplus version 7.2 (Muthén & Muthén, 2012) using robust maximum likelihood (ML) estimation and simultaneous regression. All of our models were fully saturated, and as a result we do not report fit statistics. Estimates included standardized regression weights to allow for comparison between differently scaled predictors. The values represent the amount of a SD change in the outcome variable predicted by a 1 SD change in the predictor. The standardized values are calculated using the formula  $\beta = b \cdot SD(x) / SD(y)$  for continuous predictors, and  $\beta = b / SD(y)$  for dichotomous variables, which is described in further detail in Muthén & Muthén (2012). We used full information maximum likelihood (FIML) estimation for all missing data.

## Results

**Table 1** displays the descriptive statistics and correlation matrix of the variables used in the study.

### Analyses of Preregistered Hypotheses

We first examined the association between psychological overinvolvement at T1 and the relevant outcomes of interest: psychological distress, happiness, and sadness. Greater psychological overinvolvement predicted greater psychological distress levels at T5,  $\beta = 0.54$ , 95% CI [0.50, 0.68],  $p < .001$ ; however, psychological overinvolvement did not predict change in psychological distress from T1 to T5,  $\beta = 0.11$ , 95% CI [-0.14, 0.34],  $p = .349$ . Similarly, psychological overinvolvement predicted lower self-

reported daily happiness levels at T5,  $\beta = -0.35$ , 95% CI [-0.52, -0.18],  $p < .001$ , but did not predict change in happiness from T1 to T5,  $\beta = -0.08$ , 95% CI [-0.24, 0.08],  $p = .310$ . Finally, psychological overinvolvement predicted greater self-reported daily sadness levels at T5,  $\beta = 0.51$ , 95% CI [0.38, 0.64],  $p < .001$ , as well as change in sadness from T1 to T5,  $\beta = 0.34$ , 95% CI [0.17, 0.51],  $p < .001$ . **Table 2** includes the full results of these model.

We next examined the mediation models using our objectively-measured candidate mediator variables. We found no evidence for significant (i.e., non-zero) indirect effects from psychological overinvolvement to the three outcomes through any of the eight candidate mediators. The majority of the direct effects between psychological overinvolvement and the mediators, as well as the mediators and the three outcomes of interest were non-significant. There was, however, one notable direct effect to report. Psychological overinvolvement predicted change in sleep efficiency from T1 to T3,  $\beta = -0.13$ , 95% CI [-0.26, -0.00],  $p = .044$ , but not sleep efficiency level at T3,  $\beta = -0.15$ , [-0.31, 0.01],  $p = .070$ . The association between overinvolvement and T3 sleep efficiency was attenuated when including sleep efficiency at T1 as a predictor. Despite the fact that this association was preregistered, these effects should be considered with caution due to the large number of direct associations tested in the mediation models.

### Exploratory Analyses

Given the findings observed when conducting the preregistered analyses, we explored a series of additional models to contextualize the results. First, we examined the covariation of psychological overinvolvement and psychological distress at T1 in our models examining change in the outcomes of interest. Greater psychological overinvolvement was significantly associated with greater psychological distress,  $r = 0.67$ , 95% CI [0.57, 0.77],  $p < .001$ , lower self-reported daily happiness,  $r = -0.49$ , 95% CI [-0.53, -0.35],  $p < .001$ , and higher self-reported daily sadness,  $r = 0.25$ , 95% CI [0.16, 0.34],  $p < .001$ , at T1. The high levels of covariation among the predictors, particularly among psychological overinvolvement and psychological distress, may have impacted the results by attenuating the predictive strength of psychological overinvolvement. Notably, psychological overinvolvement predicted change in daily sadness, which was half or less the strength of the other correlations and these substantive results replicated when all three measures of overinvolvement were included in a single model.

Next, we decomposed the psychological overinvolvement composite by running three separate models with each of the components of the psychological overinvolvement composite predicting our outcomes of interest independently. Psychological distress level at T5 was significantly predicted by rumination,  $\beta = 0.57$ , 95% CI [-0.60, -0.44],  $p < .001$ , but not observed recounting/reconstruing,  $\beta = 0.08$ , 95% CI [-0.10, 0.25],  $p = .317$ , or verbal immediacy,  $\beta = 0.10$ , 95% CI [-0.03, 0.23],  $p = .125$ . Similarly, daily reported happiness level at T5 was significantly predicted by rumination,

**Table 1:** Descriptive Statistics and Correlation Matrix for Selected Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
T1 Psychological overinvolvement (1)	1.00														
T1 Psychological distress (2)	0.67*	1.00													
T1 Sadness (3)	0.54*	0.52*	1.00												
T1 Happiness (4)	-0.48*	-0.55*	-0.70*	1.00											
T3 Sleep Efficiency (5)	-0.21*	-0.15	-0.05	0.03	1.00										
T3 Awakenings (6)	-0.06	-0.06	-0.09	0.01	-0.21*	1.00									
T3 Total sleep time (7)	-0.05	-0.15	-0.02	-0.06	0.58*	0.27*	1.00								
T3 Time spent alone (8)	0.06	0.23*	0.11	-0.21*	-0.05	-0.14	0.06	1.00							
T3 Substantive conversation (9)	-0.07	-0.15	-0.05	0.14	0.23*	0.03	0.09	-0.59*	1.00						
T3 Conversation about ex (10)	0.04	0.14	0.06	-0.02	0.04	0.02	0.01	-0.11	0.21*	1.00					
T3 Laughing (11)	-0.13	-0.22*	-0.09	0.28*	0.05	0.27*	0.14	-0.49*	0.32*	0.08	1.00				
T3 Crying (12)	-0.03	0.06	0.16	-0.06	0.09	-0.21*	-0.00	-0.04	-0.10	0.10	-0.04	1.00			
T5 Psychological distress (13)	0.50*	0.70*	0.52*	-0.51*	-0.10	-0.06	-0.15	0.21*	-0.14	-0.03	-0.25*	0.08	1.00		
T5 Sadness (14)	0.44*	0.38*	0.47*	-0.41*	-0.03	-0.17	-0.10	0.14	-0.08	-0.11	-0.15	0.16	0.62*	1.00	
T5 Happiness (15)	-0.32*	-0.42*	-0.36*	0.57*	0.11	-0.02	0.07	-0.21*	0.11	0.04	0.18*	-0.07	-0.64*	-0.62*	1.00
Mean	0.00	3.09	2.15	3.08	82	0.02	3.70	58.33	15.86	0.69	5.91	0.03	2.09	1.88	3.21
SD	0.60	1.58	0.76	0.75	0.09	0.08	0.65	24.15	11.44	1.22	4.92	0.15	1.53	0.76	0.78

All means and SDs were calculated using full information maximum likelihood estimation. T3 Sleep efficiency, awakenings, and total sleep time were divided by 100 to reduce their covariances, whereas T3 time spent alone, substantive conversation, conversation about ex, laughing, and crying were multiplied by 100 to increase their covariances.

\* =  $p < .05$ .

**Table 2:** Model Results for the Preregistered Hypotheses.

<b>Outcome: Psychological distress at T5</b>	$\beta$	95% CI	<i>B</i>	$\beta$	95% CI	<i>B</i>
T1 Psychological overinvolvement	0.54**	[0.41, 0.67]	13.84**	0.10	[-0.12, 0.33]	2.73
Age	0.18*	[0.00, 0.35]	0.25*	0.07	[-0.09, 0.22]	0.10
Gender	-0.24**	[-0.37, -0.11]	8.09**	-0.11	[-0.24, 0.01]	-3.83
Relationship length	-0.07	[-0.29, 0.15]	-0.98	0.05	[-0.14, 0.23]	0.67
Time since separation	0.13*	[0.01, 0.26]	0.98*	0.13	[0.02, 0.24]	0.97*
Income	0.04	[-0.11, 0.18]	0.22	0.00	[-0.15, 0.15]	0.00
T1 Psychological distress				0.61**	[0.42, 0.80]	0.59**
<b>Outcome: Sadness at T5</b>	$\beta$	95% CI	<i>B</i>	$\beta$	95% CI	<i>B</i>
T1 Psychological overinvolvement	0.51**	[0.38, 0.65]	0.66**	0.34**	[0.17, 0.51]	0.43**
Age	0.07	[-0.15, 0.28]	0.05	0.08	[-0.12, 0.28]	0.06
Gender	-0.13	[-0.28, 0.02]	-0.22	-0.10	[-0.25, 0.05]	-0.17
Relationship length	0.10	[-0.14, 0.33]	0.07	0.10	[-0.13, 0.32]	0.07
Time since separation	0.04	[-0.13, 0.20]	0.01	0.04	[-0.10, 0.18]	0.02
Income	0.15	[-0.08, 0.32]	0.04	0.13	[-0.04, 0.29]	0.04
T1 Sadness				0.29**	[0.10, 0.49]	0.29**
<b>Outcome: Happiness at T5</b>	$\beta$	95% CI	<i>B</i>	$\beta$	95% CI	<i>B</i>
T1 Psychological overinvolvement	-0.35**	[-0.51, -0.18]	-0.46**	-0.08	[-0.24, 0.08]	-0.11
Age	-0.19	[-0.42, 0.05]	-0.14	-0.22*	[-0.42, -0.01]	-0.16*
Gender	0.23	[0.06, 0.40]	0.40*	0.15*	[0.00, 0.29]	0.25*
Relationship length	0.06	[-0.19, 0.30]	0.04	0.10	[-0.12, 0.31]	0.07
Time since separation	-0.05	[-0.25, 0.14]	-0.02	-0.05	[-0.21, 0.11]	-0.02
Income	-0.05	[-0.26, 0.17]	-0.01	-0.03	[-0.20, 0.15]	-0.01
T1 Happiness				0.51**	[0.31, 0.66]	0.54**

Note: 95% CI = 95% confidence interval. The first column contains the models result predicting level of the outcome, whereas the second column contains the model results predicting change in the outcome.

\*  $p < .05$ . \*\*  $p < .01$ .

$\beta = -0.39$ , 95% CI [-0.58, -0.20],  $p < .001$ , but not observed recounting/reconstructing,  $\beta = -0.00$ , 95% CI [-0.18, 0.17],  $p = .317$ , or verbal immediacy,  $\beta = -0.09$ , 95% CI [-0.23, 0.06],  $p = .189$ . Daily reported sadness level at T5 was also significantly predicted by rumination,  $\beta = 0.52$ , 95% CI [0.36, 0.68],  $p < .001$ , but not observed recounting/reconstructing,  $\beta = 0.11$ , 95% CI [-0.05, 0.27],  $p = .155$ , or verbal immediacy,  $\beta = 0.08$ , 95% CI [-0.05, 0.21],  $p = .224$ . This results suggest that rumination was primarily responsible for the psychological overinvolvement composite predicting the participants' outcome levels at T5, rather than observed recounting/reconstructing or verbal immediacy.

In our next analyses, rumination predicted change in the psychological distress composite from T1 to T5,  $\beta = 0.57$ , 95% CI [-0.60, -0.44],  $p < .001$ , but observed recounting/reconstructing,  $\beta = -0.03$ , 95% CI [-0.20, 0.14],  $p = .766$ , and verbal immediacy,  $\beta = -0.01$ , 95% CI [-0.14, 0.12],  $p = .91$ , did not. Similarly, rumination predicted change in daily reported sadness from T1 to T5,  $\beta = 0.39$ , 95% CI [0.20, 0.58],  $p < .001$ , but not judge-rated recounting/reconstructing,  $\beta = 0.11$ , [-0.04, 0.26],

$p = .137$ , or verbal immediacy,  $\beta = 0.04$ , 95% CI [-0.11, 0.17],  $p = .533$ . None of the three variables making up the psychological overinvolvement composite predicted change in daily reported happiness from T1 to T5. This pattern of results suggest that the majority of the variance in the outcomes were explained by rumination, rather than observed recounting/reconstructing or verbal immediacy. Notably, using rumination at T1 in place of psychological distress at T1 in our mediation models did not result in substantively different results than those reported for the full overinvolvement composite.

## Discussion

The current study replicated and extended prior research linking psychological overinvolvement and psychological adjustment among adults who recently experienced marital dissolution ( $N = 138$ ). Psychological overinvolvement, characterized by a pattern of immersion in difficult psychological experiences, predicts increased subjective distress following the end of marriage (Bourassa et al., 2017). In a series of preregistered analyses, we observed that psychological overinvolvement—assessed



using self-report, judge-rated coding, and language use—predicted psychological distress five months after entering the study. The association between overinvolvement and distress in this study,  $\beta = 0.54$ , [0.50, 0.68],  $p < .001$ , were larger than the standardized results reported by Bourassa and colleagues (2017),  $\beta = 0.35$  [0.04, 0.66],  $p = .020$ , and the estimate was more precise. We extended prior work by also investigating the association of overinvolvement with daily reports of participants' happiness and sadness. As predicted, participants with greater psychological overinvolvement reported less daily happiness and more daily sadness levels five months later, suggesting that beyond broad subjective outcomes, psychological overinvolvement is associated with more frequent daily ratings of affect after a separation experience. The size of these effects were medium to large, with the three predictors explaining an additional 25.7%, 10.7%, and 23.5% of variance in participants' distress, happiness, and sadness, respectively. Overinvolvement was associated with psychological distress above and beyond the variance accounted for by our competing predictors, including participants' age, gender, income, relationship length prior to the separation, and time since the separation.

We also sought to extend the prior analyses from Bourassa and colleagues (2017) and the models described by studying *changes* in the outcomes of interest. As predicted, greater psychological overinvolvement significantly predicted slower decrease in daily reported sadness over five months, accounting for an additional 5.6% of the variance when accounting for sadness and relevant covariates at the study's start. The overinvolvement composite did not, however, predict change in overall psychological distress or happiness across the course of the study when accounting for distress and happiness at the initial study occasion. Taken together, these analyses provide only mixed evidence that psychological overinvolvement is a useful predictor of change in adjustment when accounting for initial distress levels.

These null results should be understood in the context of the time course of the study visits and the results from the additional exploratory analyses. The current study had measures designed to specifically assess daily experiences following separation, but did not begin to assess participants until an average of nearly four months after their separation occurred. Combined with the high correlation between psychological overinvolvement and both psychological distress ( $r = 0.67$ ) and happiness ( $r = -0.49$ ) at the initial study occasion, it is difficult to determine whether any associations between psychological overinvolvement, distress/happiness and psychological adjustment over time may already have been accounted for statistically by the time of the initial study visit. This would result in a high correlation at the study's start, as well as high levels of multicollinearity between overinvolvement and our initial measures of distress/happiness at the study's start in the models, which would attenuate these effects. In contrast, overinvolvement predicted change in daily reported sadness, and notably overinvolvement and sadness also had a lower correlation at the initial study assessment ( $r = 0.25$ ) than with distress/happiness.

Unfortunately, we cannot assess from our current data whether people's psychological overinvolvement prior to marital dissolution might predict their adjustment to their separation.

The timing of the measurement of psychological overinvolvement and adjustment in this study highlights a primary concern when investigating reactions to stressful life events: How can we assess adjustment *prior* to their stressful life event? Whether investigating marital dissolution, or similar stressors like bereavement, only a handful of studies examine people's recovery in the context of their status prior to the event in question (see Bonanno, Wortman, & Nesse, 2004; Bourassa, Knowles, Sbarra, & O'Connor, 2015; Bourassa, Sbarra, & Whisman, 2015; Lucas, 2005; Vable Subrahmanian, Rist, & Glymour, 2015 for examples). Notably, such studies consistently draw their samples from larger, secondary datasets with multiple waves of longitudinal data that are rarely designed to study people's reactions to psychologically stressful life events specifically, limiting their usefulness in terms of the measures used and the time course of their assessments. Future studies examining people's reactions to stressful life events would benefit from innovative methods allowing pre-event assessment using more sophisticated psychological measures. For example, Sbarra (2006) recruited participants into a study of romantic separation from a larger study of intact romantic relationships, which allowed for assessment of participants both prior to, and immediately following, their separation. Innovative methods such as this should be used in the context of divorce in future investigations to explore whether individual differences in people's psychological overinvolvement prior to marital dissolution predicts people's adjustment following the separation event.

An important aspect of the current study's results is that the effects observed between the overinvolvement composite and adjustment in the current study were largely due to self-reported rumination levels. Our exploratory analyses examined which of the variables that made up the psychological overinvolvement composite predicted our outcomes of interest independently and found that self-reported rumination was strongly associated with these outcomes (and changes in distress over time), whereas the judge-rated recounting/reconstruing and verbal immediacy did not evidence significant associations with any of the outcomes of interest. It is unclear from our study whether the stronger associations between self-report rumination and our self-reported outcomes of interest are due to higher levels of method variance shared between the predictor and the outcomes, or whether rumination is a stronger independent predictor of people's outcomes following marital separation. For example, it is possible that rumination makes up a significant portion of the variance in the construct of overinvolvement and is responsible for much of the prediction of subsequent psychological wellbeing as a result. Future research should aim to investigate whether rumination is a distinct aspect of the broader constructs of psychological distance or overinvolvement, or represents a unique construct and risk factor predicting people's recovery following marital

dissolution. The low reliability of the overinvolvement construct suggests each of the three variables may be assessing a different underlying process.

We also note that none of the objectively-measured candidate sleep, daily social engagement, or behavioral displays of distress mediated the associations of psychological overinvolvement with distress, happiness, or sadness. We observed a negative association between the overinvolvement composite (at T1) and objective sleep efficiency (measured via actigraphy at T3), but the effect was small and should be considered with caution, given eight different potential mediating variables were tested. This study was designed to test time-based mediators of change in psychological adjustment, and the absence of meaningful effects along the *a*-path (i.e., the path from the initial predictor to mediating variable) of a potential mediating model is noteworthy and can be viewed from several different perspectives. First, perhaps it is the case that overinvolvement is not a unique predictor of adjustment, but instead an element of adjustment itself; if this is the case, there is not an effect to mediate over time. Second, it is possible that the measurement resolution of the EAR and/or actigraphy does not capture the correct causal window for change; it may well be the case that changes in subjective distress follows from changes in social engagement in the weeks after the separation, and that assessing social engagement four months later misses this causal window for change. Finally, it is also possible this study did not assess the true mechanisms of change; given the subjective nature of rumination and the distress outcomes, perhaps it is the case that overinvolvement slows people's ability to make meaning of their loss, a largely subjective process which, in turn, explains changes or lack of changes in distress over time. In many ways, this latter point reflects a larger observation across this literature: Despite a growing number of papers on the topic of adjustment to marital separation, we continue to know little about the mechanistic processes that explain who does well or poorly.

The current study should be understood in the context of its limitations. First, there were mixed results linking psychological overinvolvement to changes in our outcomes of interest. Although we preregistered our prediction that overinvolvement would be associated with change in sadness, the lack of consistency across outcomes makes determining whether overinvolvement predicts changes in people's adjustment following marital dissolution difficult. This combined with the sample size ( $N = 138$ ) raises questions of power. It is possible that the associations between psychological overinvolvement and psychological distress following stressful life events is smaller in size, and would benefit from meta-analytic techniques that leverage the combined sample sizes possible from many studies. Second, as noted, the psychological overinvolvement composite did not evidence strong internal reliability in the current sample ( $\alpha = 0.34$ ), in contrast to previous studies using a conceptually similar composite ( $\alpha = 0.70$ ; Bourassa et al., 2017). This lack of internal consistency may have attenuated the associations of interest in the

study, though the additional exploratory analyses suggest that the associations replicate when using self-reported rumination within independent models. Regardless, this lower level of reliability makes the associations in the current study more difficult to interpret. Third, the current study assessed people 3.7 months following separation on average. Although it is standard in the study of stressful life events to assess people after such events have occurred, the lack of pre-separation data makes it difficult to conclude whether psychological overinvolvement is a broad risk factor that can be assessed prior to marital separation, or if overinvolvement specifically related to marital dissolution predicts people's adjustment following marital dissolution. Finally, the current study was correlational in nature and the results cannot be assumed to be causal. Future experimental aiming to impact people's psychological overinvolvement and assessing people's subsequent adjustment is needed to determine whether overinvolvement is causally related to people's recovery following marital dissolution.

## Conclusions

The current study replicated and extended the link between psychological overinvolvement and psychological adjustment following marital dissolution. The study followed a preregistered analysis plan complemented with additional exploratory analyses using a sample of recently-separated adults ( $N = 138$ ). Psychological overinvolvement predicted psychological distress, happiness, and sadness levels five months following the initial study occasion. Overinvolvement also predicted change in daily reported sadness over the five months of the study, but did not predict change in psychological distress or daily reported happiness. None of the objectively-measured candidate sleep, behavioral displays of distress, and social engagement variables mediated these associations. Additional exploratory analyses evidenced that self-reported rumination was largely responsible for the association of the overinvolvement composite with the outcomes of interest. Greater psychological overinvolvement is an individual difference that is associated with poorer psychological adjustment following marital dissolution.

## Data Accessibility Statement

The preregistration and a copy of the dataset including the relevant variables can be found on this paper's project page at <https://osf.io/te6uj/>.

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## Competing Interests

The authors have no competing interests to declare.

## Author Contributions

- Contributed to conception and design: KJB, AMT, MRM, and DAS

- Contributed to acquisition of data: KJB, MRM, and DAS
- Contributed to analysis and interpretation of data: KJB, AMT, MRM, and DAS
- Drafted and/or revised the article: KJB, AMT, MRM, and DAS
- Approved the submitted version for publication: KJB, AMT, MRM, and DAS

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