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Attachment orientation and dynamics of negative and positive emotions in daily life

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ABSTRACT

People's attachment orientation contributes to their emotional experiences. However, the associations between attachment orientation and emotion dynamic features have remained unclear. In this preregistered study, we tested the associations of attachment orientation with baseline level, variability, inertia, and differentiation of emotions using two ecological momentary assessment adult samples ($N = 122$; $N = 127$). Attachment anxiety predicted a higher baseline level of negative emotions in both samples and a lower baseline level of positive emotions in one sample. Attachment avoidance predicted a lower baseline level of positive emotions in both samples. After covarying baseline level, no associations of attachment orientation were detected with variability, inertia, and differentiation. Our findings suggest that attachment orientation is associated with baseline level rather than other emotion dynamic features.

1. Introduction

Emotions are crucial in shaping human behavior and driving motivation toward meaningful goals (Del Giudice, 2022). According to attachment theory, the attachment system is one essential motivational mechanism that coordinates emotions with the goal of maintaining proximity and closeness to one's attachment figures (e.g., partners; Bowlby, 1973, 1980, 1982; Del Giudice, 2022). This system is activated by threats and soothed by the attachment figure's perceived availability (Ainsworth et al., 1978). Attachment orientation captures individual differences in the functioning of the attachment system (Mikulincer & Shaver, 2016). It consists of mental representations about the availability of others and one's own coping abilities (Mikulincer & Shaver, 2016). These beliefs and expectations contribute to how people interpret and react to emotional situations and express and regulate emotions (Dykas & Cassidy, 2011; Mikulincer & Shaver, 2016). Recent meta-analyses have linked attachment orientation to the general tendency to experience negative and positive emotions (Park et al., 2022; Zhang et al., 2022). However, existing research has mainly relied on designs with a single or few measurement points, overlooking the dynamic nature of emotions, that is, their constant adaptations to changes in one's environment (Kuppens & Verduyn, 2017). Thus, we lack an understanding of how attachment orientation relates to the complex parameters that describe the temporal flow of emotions. These include the baseline levels of emotions as well as their moment-to-moment fluctuation, persistence over time, and distinctiveness from each other (Kuppens et al., 2010; Kuppens & Verduyn, 2015). To address this gap, in the current study, we employ Ecological Momentary Assessment (EMA), a method that captures the dynamic features of emotions by measuring them multiple times a day over several days (Hamaker & Wichers, 2017). The use of EMA allows us to test how attachment orientation manifests itself in daily emotional life, opening a unique opportunity to deepen our understanding of the dynamics between attachment and emotions.

Contemporary perspectives on emotions highlight different aspects in their conceptualization (Scarantino & de Sousa, 2021). Whereas some theories define emotions as universal and discrete psychophysiological responses (Ekman & Cordaro, 2011), others stress the role of appraisals

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(Lazarus, 1991) or subjective experiences (Barrett, 2013) as central components. Nevertheless, a commonly adopted framework for understanding emotions emphasizes their negative or positive valence (Eisele et al., 2021; Nesse & Ellsworth, 2009). Negative emotions are evoked by threats, failures, and other unpleasant events and direct a person to avoid or defend against harm or mitigate costs when the harm has already occurred (Nesse & Ellsworth, 2009). In turn, positive emotions are evoked by opportunities, successes, and other pleasant events and direct a person to approach, exploit, and enjoy environmental advantages (Nesse & Ellsworth, 2009).

In addition to valence, another fundamental characteristic of emotions is their ongoing fluctuation (Kuppens & Verduyn, 2017). The fluctuation has sparked significant interest in a novel research framework known as affect dynamics (Waugh & Kuppens, 2021). According to this framework, baseline level, variability, inertia, and differentiation are the four basic dynamic features that describe the time-evolving flow of emotions. Baseline level, also known as mean level, refers to a long-run equilibrium of a person's average emotional state (Kuppens et al., 2010). It can be seen as a person's emotional home base, serving as a reference point from which their emotions vary over time (Kuppens et al., 2010). Variability refers to the amount of moment-to-moment oscillation in a person's emotions from one's baseline level (Kuppens et al., 2010). High variability reflects high sensitivity to respond to external and internal events, whereas low variability indicates lower levels of such sensitivity (Kuppens & Verduyn, 2015). Inertia refers to the degree to which one's emotions carry over from one moment to the next (Koval et al., 2021). High inertia reflects the resistance of emotions to change and a slower recovery to the baseline level, indicating emotional rigidity and regulatory weakness (Kuppens & Verduyn, 2015). Conversely, relatively low inertia reflects emotional flexibility and an efficient return of emotions to the baseline level when stressors are relieved (Kuppens & Verduyn, 2015). Finally, differentiation refers to the extent to which a person uses distinct labels to describe one's emotional experiences (Erbas et al., 2022; Kashdan et al., 2015). High differentiation reflects the ability to identify and make subtle distinctions between emotions, such as shame and sadness, whereas low differentiation reflects difficulties separating emotional experiences (Kashdan et al., 2015).

To gain an understanding of these emotion dynamic features in daily life, researchers have turned to EMA designs (Hamaker & Wichers, 2017). EMA involves measuring people's current emotional states as they naturally occur, allowing for modeling each dynamic feature and related individual differences (Dejonckheere et al., 2019). Previous EMA research has focused primarily on broad personality traits and mental health, revealing numerous associations between emotion dynamic features and the big five traits, common mental disorders, and psychological well-being (Dejonckheere et al., 2019; Houben et al., 2015; Kalokerinos et al., 2020; Seah & Coifman, 2021; Wendt et al., 2020). However, there is a notable lack of research examining the associations of more specific socio-motivational factors with emotion dynamic features. In particular, the associations of attachment orientation with emotion dynamic features have been understudied despite its pivotal role in shaping socioemotional processes that modify emotions. Investigating these associations can enhance our understanding of the essentiality of attachment beliefs and expectations in everyday emotion dynamics, providing insights into the complexity and richness of human emotional experiences (Obeldobel et al., 2023). Therefore, in the current study, we expand research on emotion dynamics by examining the role of attachment orientation in the baseline level, variability, inertia, and differentiation of daily negative and positive emotions.

Attachment orientation refers to a constellation of beliefs and expectations that reflect the extent to which people feel (in)secure in their close relationships (Mikulincer & Shaver, 2016). These relatively stable mental representations develop gradually through repeated experiences with one's attachment figures (Arriaga et al., 2018; Bosmans et al., 2020). In adulthood, attachment orientation is described by two dimensions: anxiety and avoidance (Raby et al., 2021). Each captures distinct forms of insecurity and unique regulatory styles in response to the perceived unavailability of others (Mikulincer & Shaver, 2016).

Attachment anxiety reflects uncertainty about others' availability and one's own ability to cope with threats independently (Fraley et al., 2000). People with high attachment anxiety rely on strategies that accelerate the activation of the attachment system (Mikulincer & Shaver, 2016). These hyperactivation strategies involve maintaining high vigilance for threats, intensifying negative emotions, and dampening positive ones (Kobak & Bosmans, 2019; Mikulincer & Shaver, 2019; Tammilehto et al., 2022; Verhees et al., 2021). The goal of hyperactivating strategies is to enhance proximity to others (Bowlby, 1973). However, this goal is not easily achieved due to the pervasive difficulties that anxiously attached people have in trusting others (Arriaga et al., 2018; Mikulincer & Shaver, 2016). As a result, people with high attachment anxiety possess turbulent emotional life characterized by escalated and undifferentiated negative emotions (Mikulincer & Shaver, 2016). Such negative emotions can also dominate and deteriorate their positive emotions (Shaver & Mikulincer, 2008; Verhees et al., 2021).

In turn, attachment avoidance reflects distrust in others' availability and discomfort with emotional closeness (Fraley et al., 2000). People with high attachment avoidance rely on strategies that inhibit the activation of the attachment system (Mikulincer & Shaver, 2016). These deactivating strategies involve avoiding threats, dismissing negative emotions, and minimizing positive ones (Gentzler et al., 2010; Kobak & Bosmans, 2019; Mikulincer & Shaver, 2019). The goal of deactivating strategies is to keep unattainable attachment needs out of awareness (Bowlby, 1980). However, this leads to defensive emotional life marked by a rigid exclusion of emotions, difficulties differentiating emotions, and insensitivity to positive social cues (Kajanoja et al., 2021; Long et al., 2020; Mikulincer & Shaver, 2019). Under high emotional burden, deactivating strategies are also vulnerable to collapse, resulting in distress from which recovery may take time (Mikulincer & Shaver, 2019).

To date, seven EMA studies have inspected the links of attachment orientation with emotion dynamic features (Dančík et al., 2021; Dugan et al., 2022; Kerr et al., 2021; Kerr et al., 2019; Sheinbaum et al., 2015; Somers et al., 2020; Torquati & Raffaelli, 2004). While this research has mainly focused on baseline level, a few studies have also targeted variability and inertia (Sheinbaum et al., 2015; Somers et al., 2020). People with high attachment anxiety have shown a higher baseline level of negative emotions and a lower baseline level of positive emotions, as well as higher variability of negative and positive emotions (Dančík et al., 2021; Dugan et al., 2022; Kerr et al., 2019; Sheinbaum et al., 2015; Somers et al., 2020). In turn, people with high attachment avoidance have shown a lower baseline level and higher inertia of positive emotions (Dančík et al., 2021; Dugan et al., 2022; Somers et al., 2020).

However, these previous EMA studies have limitations. First, the role of attachment orientation has not been examined in certain emotion dynamic features. These involve the inertia of negative emotions, which could be a key emotion dynamic feature for people with high attachment avoidance. This is because avoidantly attached people's rigid and vulnerable deactivating strategies may manifest in the resistance of their emotions to change and slow recovery from stress (Mikulincer & Shaver, 2019). Further, no study exists on differentiation, though this feature may be relevant to both attachment dimensions. Research using traditional self-reports has shown that attachment avoidance is associated with difficulties describing and differentiating one's own emotions, while attachment anxiety is linked to undifferentiated negative emotions (Kajanoja et al., 2021; Mikulincer & Shaver, 2016).

Second, previous studies (Sheinbaum et al., 2015; Somers et al., 2020) have not considered the possible overlap with baseline level when examining the associations of attachment orientation with more complex emotion dynamic features. Recent research demonstrates that controlling for baseline level diminishes the associations of various personality and mental health indicators with variability, inertia, and differentiation (Dejonckheere et al., 2019; Kalokerinos et al., 2020; Wendt et al., 2020). Therefore, many of the associations between personality, mental health, and the more complex emotion dynamic features can be partly explained by their shared associations with the baseline level. However, none of the attachment studies have considered this more parsimonious explanation when examining the more complex emotion dynamic features. This raises the risk that the detected associations of attachment orientation with more complex emotion dynamic features may reflect spurious by-products of their associations with the baseline level.

1.1. *The current study*

In the current preregistered EMA study, we aimed to examine the associations of people's attachment orientation with their baseline level, variability, inertia, and differentiation of negative and positive emotions. As shown by our conceptual model in Fig. 1, we attempted to build bridges between the frameworks of adult attachment theory (Mikulincer & Shaver, 2016) and affect dynamics (Waugh & Kuppens, 2021) that share the goal of depicting people's emotional life. We used two adult EMA samples to improve the robustness of our answers to the research questions. Further, to increase the rigor of our design, we tested whether the associations of the attachment dimensions with variability, inertia, and differentiation remain after controlling for the baseline level. This allowed us to sharpen the prior findings linking attachment orientation to more complex emotion dynamic features without controlling for baseline level (Sheinbaum et al., 2015; Somers et al., 2020).

First, we expected that the turbulent emotional life of people with high attachment anxiety manifests in their higher baseline level of negative emotions and lower baseline level of positive emotions, higher variability of both negative and positive emotions, and lower differentiation of negative emotions. Second, we expected that the defensive emotional life of people with high attachment avoidance manifests in their lower baseline level of positive emotions and higher inertia and lower differentiation of both negative and positive emotions.

2. Materials and methods

2.1. *Participants and procedure*

Our Sample I came from the Daily Emotions research project (Tammilehto et al., 2022, 2023). In turn, Sample II was a subsample of the Miracles of Development research project (https://projects.tuni.fi/kehi). The hypotheses and analysis plan were preregistered before handling the data.[1] We conducted all preregistered analyses and added one set of supplementary analyses to strengthen our interpretations. The justifications for the latter analyses, which are pointed out by calling them "non-preregistered analyses", are presented in the Results -section (3.2. Associations of Attachment Orientation with Dynamics of Negative Emotions).

Regarding Sample I of the Daily Emotions project, 125 participants were initially recruited via Tampere University email lists and paper flyers distributed in the campus areas. The inclusion criteria were (a) age over 18 years old, (b) the possibility to use a smartphone, and (c) being fluent in Finnish. The Ethics Committee for Humanities of the Tampere Region approved the study. The data collection comprised two phases. The participants first completed an online questionnaire regarding psychological traits and demographic factors, including attachment orientation. Two weeks later, in the EMA phase, they completed short questionnaires sent to their smartphones seven times daily for seven days. The sending time for each questionnaire was randomized within seven blocks between 10:00 and 22:00, with each block lasting 1 h and 43 min (e.g., 10:00–11:43). Participants had 30 min to answer the EMA questionnaire upon receiving it. The questionnaire data in the first phase were unavailable for one participant, and two participants had the same EMA identity number due to a technical error. These participants were excluded from the analyses. The final sample was 122 participants (M_{age} = 26.43 years, SD = 8.33, range: 19–52; 88.5% women), comprising 65 university students, 49 open university students, five other students, and three non-students. Of the participants, 82 were in a romantic relationship (67.2%). The EMA observations totaled 4628, with an average of 38/49 observations per participant.

Sample II was an EMA subsample of the Miracles of Development longitudinal study. The study has tracked Finnish families from the second trimester of pregnancy to their children's early adulthood. The original sample consisted of (a) naturally conceiving couples (n = 469) and (b) couples with infertility histories who had conceived with assisted reproductive treatment (n = 484). The Ethical boards of Helsinki University Central Hospital have approved all data collections. For more information about the original sample, see (Punamäki et al., 2022; Tammilehto et al., 2021).

The current EMA subsample (Sample II) on young adults in those families was collected at the ages of 20 to 22 years. The inclusion criteria were (a) a lack of severe developmental disorders, (b) the availability of address information in the Finnish digital and population data services agency, and (c) not having expressed a willingness to stop participating during the previous data collections. Of the 710 young adults contacted via mailed letters, 130 expressed their willingness to participate and were thus included in this subsample. Attrition was assessed using Welch t-tests and Pearson's χ^2 tests. The attrition was independent of mothers' and fathers' age, families' infertility status, early obstetric risks, and maternal depression, anxiety, somatic symptoms, and social dysfunction during pregnancy and infancy, $ps > 0.050$, $ds < 0.17$. However, females were more likely to participate than males, $\chi^2(1) = 14.56$, $p < .001$, and the education level of mothers, $t(186.62) = -2.21$, $p = .028$, $d = 0.20$, and fathers, $t(183.17) = -2.16$, $p = .032$, $d = 0.20$, during pregnancy was higher in our EMA sample compared to those that did not participate.

As in Sample I, the data collection of Sample II consisted of two phases. The participants first completed an online questionnaire regarding psychological traits and demographics, including attachment orientation. Then, a couple of days later, in the EMA phase, they completed short questionnaires sent to their smartphones ten times daily for seven days. The sending time for each questionnaire was randomized within ten blocks between 08:00 and 22:00, with each block lasting 1 h and 24 min (e.g., 08:00–09:24). Participants had 20 min to answer the EMA questionnaire upon receiving it. Two participants had less than three EMA answers (<3%), and one participated in neither study phase. These participants were excluded from the analyses. The final sample was 127 participants (M_{age} = 20.98, SD = 0.45, range: 20–22; 66.9% women). Of the participants, three had the highest education level of the undergraduate degree (2.4%), 107 matriculation examination (84.3%), 12 vocational education and training (9.4%), and five comprehensive school (3.9%). Sixty-four participants were in a romantic relationship (50.3%). The EMA observations totaled 5322, with an average of 42/70 observations per participant.

2.2. *Measures*

2.2.1. *Attachment orientation*

In both samples, attachment orientation was measured using the *Experiences in Close Relationships–Revised Questionnaire* (Fraley et al., 2000). The participants reported their attachment anxiety (18 items; e.g., "I worry a lot about my relationships") and avoidance (18 items; e.g., "I am nervous when partners get too close to me") using a 7-point Likert

[1] For preregistration, see https://osf.io/unh8m. All analysis scripts of both samples and the data of Sample I and its codebook can be found at https://osf.io/v6495. The data of Sample II is not shared to protect the privacy of the participants in the ongoing longitudinal study.

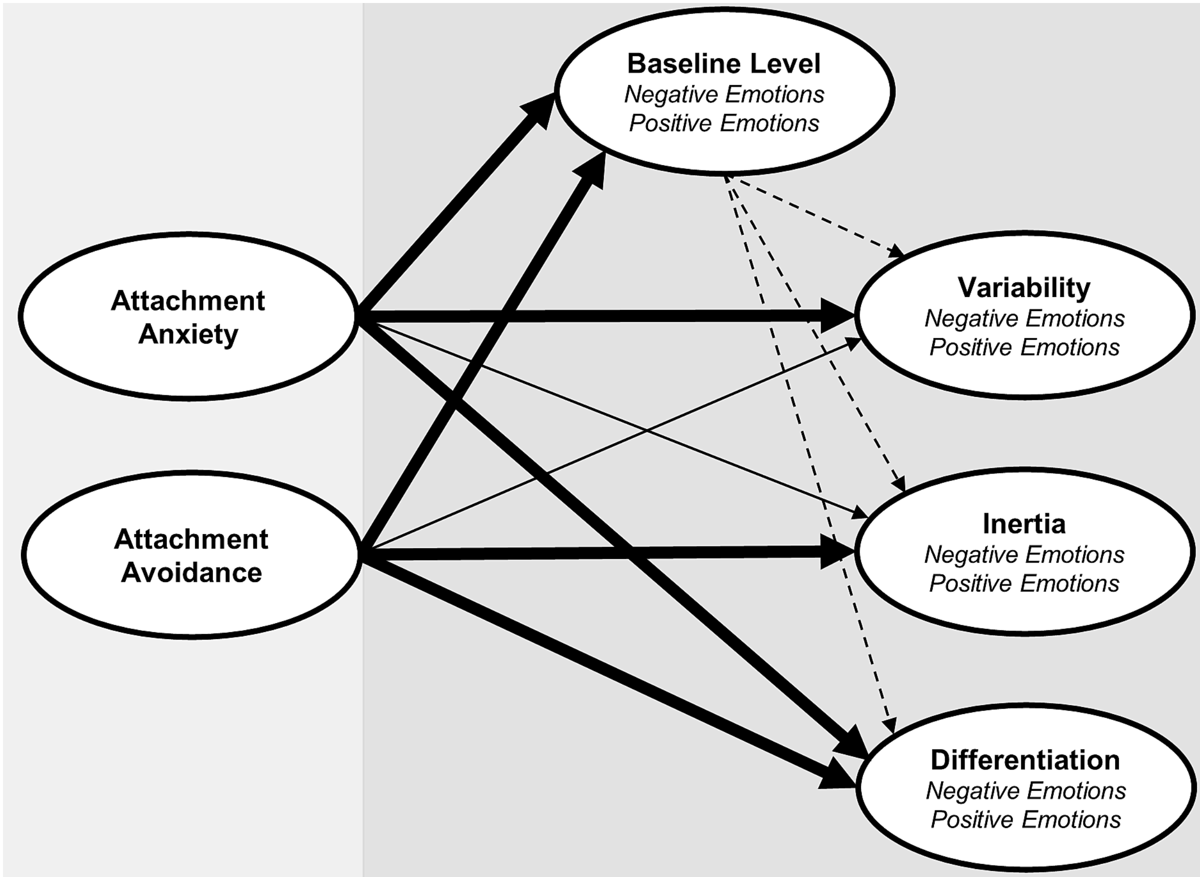

Fig. 1. Conceptual Model Regarding Associations of Attachment Orientation with Emotion Dynamic Features
Notes. The bolded unbroken arrows refer to our hypotheses. The hypothesis regarding the association of attachment anxiety with differentiation concerned only negative emotions. Moreover, the hypothesis regarding the association of attachment avoidance with baseline level concerned only positive emotions. The non-bolded unbroken arrows refer to associations that were tested without specifying hypotheses. The dashed arrows refer to the associations of baseline level with variability, inertia, and differentiation that were considered as more parsimonious explanations when testing the associations of attachment orientation with more complex emotion dynamic features.

scale (1 = *strongly disagree* to 7 = *strongly agree*). In Sample I and Sample II, Cronbach's alphas were 0.92 and 0.93 for attachment anxiety and 0.91 and 0.91 for attachment avoidance, respectively.

2.2.2. Daily emotions

In each EMA of both samples, the participants were asked to report how strongly they experienced four negative (i.e., anger, anxiety, shame, and sadness) and four positive (i.e., joy, pride, satisfaction, and excitement) emotions at the present moment. In Sample I (seven times a day for a week), participants reported their emotions using a 5-point Likert scale (1 = *not at all* to 5 = *very much*). In Sample II (ten times a day for a week), participants reported their emotions using a continuous slider scale (0 = *not at all* to 100 = *very much*).

Before our main analyses, we assessed the psychometric structure of emotions using multilevel confirmatory factor analyses with random intercepts in both samples (for a detailed description and discussion, see Supplemental Material 1). In Sample I, the measurement model with two factors of negative and positive emotions at both within- and between-person levels showed good fit, χ^2 [38, $N_{participants}$ = 122, $N_{observations}$ = 4628] = 235.67 $p < .001$, CFI = 0.973, RMSEA = 0.041, $SRMR_{within/between}$ = 0.029/0.077. Similarly, in Sample II, the same measurement model showed good fit, χ^2 [38, $N_{participants}$ = 127, $N_{observations}$ = 5322] = 209.75, $p < .001$, CFI = 0.977, RMSEA = 0.038, $SRMR_{within/between}$ = 0.031/0.070. In Sample I, the omega reliabilities at the within- and between-person levels were 0.65 and 0.83 for negative emotions and 0.83 and 0.89 for positive emotions, respectively. In Sample II, the omega reliabilities at the within- and between-person levels were 0.67 and 0.90 for negative emotions and 0.83 and 0.95 for positive emotions, respectively. In our main analyses, we modeled baseline level, variability, and inertia using the average scores of both negative and positive emotions to guarantee comparability of our results across our samples and to most previous EMA research (e.g., Dejonckheere et al., 2019).

Regarding differentiation, we used the *emodiff R* package to compute differentiation scores for negative and positive emotions (https://github.com/seanchrismurphy/emodiff). First, we calculated each participant's intraclass correlation coefficients (ICC) for (a) the negative emotion indicators and (b) the positive emotion indicators. These ICCs assess average consistency between the same-valenced emotion ratings, a classic index of emotional (non)differentiation (Erbas et al., 2022). Then, the ICCs were Z-transformed, and the negative values were handled as missing data (Erbas et al., 2022). Finally, as the lower ICC reflects the higher differentiation (i.e., lower covariations) of the emotions, we reversed the Z-transformed ICCs so that high values indicate higher differentiation (Erbas et al., 2022).

2.2.3. Covariates

We considered covarying the proportion of participants' EMAs in which they reported being alone, financial strain (Sample I), education level (Sample II), age, gender, and being conceived with assisted reproduction treatments (Sample II). To minimize unnecessary complexity in our statistical models, we preregistered a decision only to include covariates that correlated with at least one of the attachment dimensions ($p < .050$) in either of the samples. The proportion of participants' EMAs in which they reported being alone was the only covariate that met our criterion and was thus included in the analyses of both samples. This allowed us to exclude the possibility that general social activity would solely explain the associations of attachment orientation with emotion dynamic features (Mikulincer & Shaver, 2016). In Sample I, the time spent alone was measured in each EMA using one item asking whether the participant was alone at the present moment ("Who are you with right now?"; 0 = *with someone*, 1 = *alone*). In Sample II, the time spent alone was measured using one item asking whether the participant had interacted with others since the previous EMA or during the last one and a half hours when the questionnaire was the first of the day ("Have you interacted with others?"; 0 = *yes, in live or virtually*, 1 = *no*).

2.3. Analytic strategy

To answer our research questions, we analyzed our data with dynamic structural equation models (DSEM; Asparouhov et al., 2018) conducted in Mplus 8.7–8.8 (Muthén and Muthén, 1998–2023). Before these analyses, the stationarity of emotions was assessed by Kwiatkowski-Phillips-Schmidt-Shin tests for a mean and trend, and Tsay's and Keenan's tests for nonlinearity in R. Descriptive statistics were also computed in R.

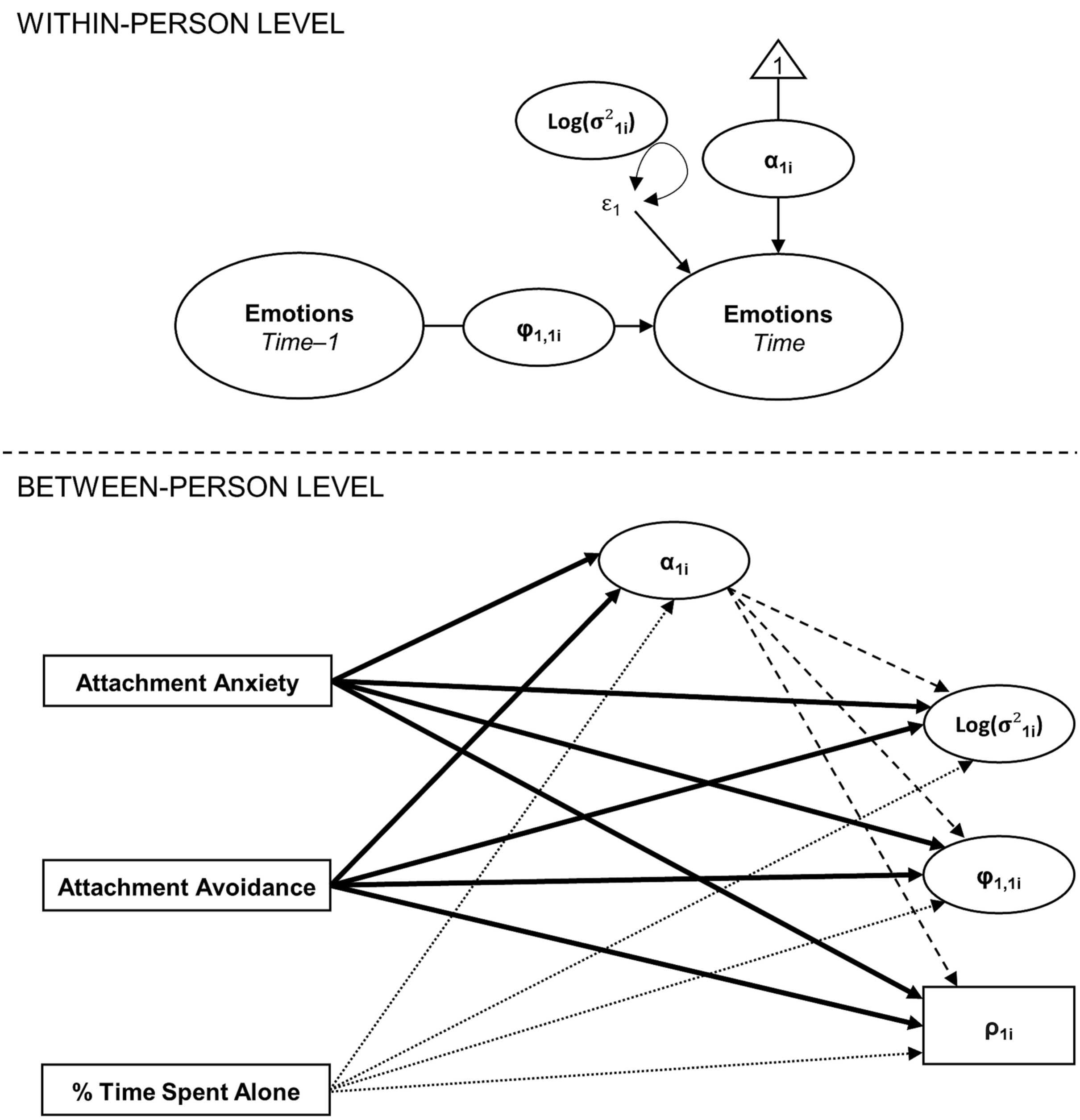

Fig. 2. Associations of Attachment Orientation with Emotion Dynamic Features: Dynamic Structural Equation Model
Notes. This strategy was applied to negative and positive emotions. At the between-person level, the unbroken bolded arrows refer to the predictive associations of attachment orientation with baseline level (α_{1i}), variability ($\log(\sigma^2_{1i})$), inertia ($\varphi_{1,1i}$), and differentiation (ρ_{1i}) of emotions included in the first and other models. The round dotted arrows refer to the predictive associations of time spent alone that were controlled in the second and final model. The dashed arrows refer to the predictive associations of baseline level that were controlled in the final model. The estimated between-level correlations of the emotion dynamic features are not shown. Variability was estimated using the log transformation to guarantee all individual variances to be positive, which is a standard approach in dynamic structural modeling (Asparouhov et al., 2018). At the within-person level, ε1 and the related circle with bidirectional arrows indicate the fixed effect of innovation variance (with the random effect, $\log(\sigma^2)$).

Table 1
Correlations Between Variables at Within-Person and Between-Person Levels in Sample I and Sample II.

Within-Person Level	1	2	3	4	5
1. Negative Emotions	–	−0.43***	0.39***	−0.21***	−0.01
2. Positive Emotions	−0.47***	–	−0.19***	0.43***	−0.05***
3. Negative Emotions $_{t-1}$	0.36***	−0.21***	–	−0.43***	−0.02
4. Positive Emotions $_{t-1}$	−0.21***	0.37***	−0.47***	–	−0.05***
5. Time	−0.01	−0.02	−0.01	−0.02	–

Between-Person Level	1	2	3	4	5	6	7	8	9	10	11
1. Attachment Anxiety	–	0.28**	0.39***	−0.28**	−0.12	0.04	−0.09	0.11	−0.09	0.11	0.01
2. Attachment Avoidance	0.44***	–	0.10	−0.31***	0.05	−0.02	0.02	−0.04	0.00	0.30***	0.03
3. Negative Emotions	0.45***	0.11	–	−0.17	−0.33***	0.05	−0.15	0.07	−0.21*	−0.02	0.00
4. Positive Emotions	−0.15	−0.32***	−0.20*	–	0.11	−0.05	0.12	0.05	−0.05	−0.28**	0.02
5. Differentiation of Negative Emotions	−0.09	−0.07	−0.28***	−0.11	–	0.21*	−0.07	−0.06	0.21*	0.04	-0.05
6. Differentiation of Positive Emotions	−0.08	0.11	−0.18*	−0.07	0.10	–	−0.13	0.04	0.23**	0.15	−0.10
7. Financial Strain / Education Status[a]	−0.15	0.01	−0.19*	0.14	−0.07	0.12	–	−0.08	−0.02	−0.06	−0.01
8. Age in years	−0.09	−0.03	−0.01	0.06	0.03	−0.12	−0.09	–	−0.09	−0.05	−0.31***
9. Sex[b]	−0.02	−0.09	−0.02	−0.09	0.04	0.16	0.17	−0.07	–	0.28**	−0.13
10. % Time Spent Alone	0.25**	0.14	0.16	−0.06	0.04	0.13	0.02	−0.19*	0.05	–	−0.15
11. Assisted Reproduction Treatment [c]	–	–	–	–	–	–	–	–	–	–	–

Notes. The values below the diagonal represent correlations in Sample I ($N_{participants} = 122$, $N_{observations} = 4628$) and values above the diagonal represent correlations in Sample II ($N_{participants} = 127$, $N_{observations} = 5322$). The correlations between emotions at the within-person level are for the group-mean-centered data. At the between-person level, the aggregated average scores of negative and positive emotions were used. The rounding is based on the IEC 60559 standard. [a]Financial strain was assessed in Sample I, and education status (1 = *comprehensive school* to 4 = *undergraduate degree*) in Sample II. Financial strain was an average of 4- and 5-point Likert scale items ("Do you or your family have difficulties in regularly paying coming bills?" and "How much money do you and your family have just before the next payday?"). The items were transformed to the 0–1 scale, with higher scores indicating lower strain. [b] 0 = *female*, 1 = *male*; [c] 0 = *no*, 1 = *yes*. * $p < .05$; ** $p < .01$; *** $p < .001$.

DSEM is a novel analytical integration of time-series, multilevel, and structural equation modeling (Asparouhov et al., 2018). We decided to use DSEM as it allowed us to simultaneously model all associations of the attachment dimensions with baseline level, variability, inertia, and differentiation of emotions (negative or positive) within the same model. Fig. 2 presents the overview of our modeling strategy consisting of six DSEMs (i.e., three for negative and three for positive emotions) conducted for both samples. All variables were grand-mean centered, and negative and positive emotions were yet latent-mean centered. In each DSEM, baseline level was modeled by estimating the random intercept/mean of emotions, variability by the random innovation of emotions, and inertia by the random first-order autoregressive effect of the emotions. The differentiation variable was further added to the models as the between-person level outcome variable. At the between-person level, all emotion dynamic features were specified to correlate with each other.

In the first two models (i.e., one for negative and one for positive emotions), attachment anxiety and avoidance were specified to predict individual differences in the baseline level, variability, inertia, and differentiation of emotions. In the following two models, the proportion of time spent alone was added to predict all emotion dynamic features. This enabled us to test whether the attachment dimensions showed unique predictive associations with the emotion dynamic features beyond time spent alone. Importantly, in the last two models, the baseline level was additionally specified to predict variability, inertia, and differentiation. This enabled us to test whether the attachment dimensions showed unique predictive associations with the other emotion dynamic features beyond the baseline level.

In addition to our main analyses using the average scores of emotions, we conducted the same DSEMs using the corresponding factor scores (see Supplemental Material 1). These preregistered supplemental analyses allowed us to check whether the way of forming the emotion scores produced any differences in the results.

In all DSEMs, Bayesian Markov chain Monte Carlo estimation was used with the uninformative priors of Mplus. Two unthinned chains with 50,000 iterations (first 25,000 burn-in iterations) were used in the estimation. Convergence was checked via the Gelman-Rubin Proportional Scale Reduction (PSR) and trace plots. The criteria for convergence were PSR < 1.05 and no trends or irregularities in trace plots. The median was used as a point estimate to sum up posterior distributions. Missing data were handled with the Kalman filter approach. In both samples, the TINTERVAL command of Mplus was used to add missing data in line with the intervals of each EMA block (e.g., due to nighttime). Thus, the emotions at the previous EMA were handled as the lagged observation of emotions at the current EMA.

Our Monte Carlo simulations[2] for both samples suggested that when using 95% credible intervals (CrIs), the power ranged 0.83–0.94 to detect the |0.27|–|0.34| standardized effects of attachment anxiety on baseline level (-0.27), variability (0.34), and differentiation (-0.27). The power ranged 0.82–0.86 to detect the −0.27 standardized effects of attachment avoidance on baseline level and differentiation. Finally, when we specified the standardized effect of avoidance on inertia to 0.43 (Sample I) and 0.42 (Sample II), the power was 0.81 and 0.80, respectively. In specifying effect sizes for baseline level, variability, and inertia, we used the only prior EMA study using DSEM (Somers et al., 2020). As no EMA studies existed on differentiation, in this effect size, we used a cross-sectional study on attachment orientation and alexithymia with a comparable Finnish sample (Kajanoja et al., 2021). Based on our simulations, an effect was considered as detected if the 95% CrI excluded zero. We also reported standardized effects and the two-tailed Bayesian *p*-values of the detected effects.

3. Results

3.1. Preliminary analyses

Supplemental Material 2 summarizes the stationarity tests for emotions with low rejection rates (0.0%–14.3%). Supplemental Material 3 presents the descriptive statistics (Table S3) as well as the distributions of the dynamic features of negative (Figure S3A) and positive emotions (Figure S3B) for both samples. Notably, compared to Sample I ($M_{age} = 26.43$), Sample II ($M_{age} = 20.98$) was younger, $t(121.69) = 7.21$, $p < .001$, $d = 0.93$, and had more males, $\chi^2(1) = 16.65$, $p < .001$. Yet, the samples did not differ in their average attachment anxiety, $t(247) = 0.45$, $p = .651$, $d = 0.06$, or avoidance, $t(244.59) = -1.861$, $p = .064$, d

[2] for details, see preregistration: https://osf.io/unh8m

Table 2
Associations of Attachment Orientation with Emotion Dynamic Features of Negative Emotions: Unstandardized Effects.

	Baseline Level of Negative Emotions		Variability of Negative Emotions		Inertia of Negative Emotions		Differentiation of Negative Emotions	
	Sample I	Sample II	Sample I	Sample II	Sample I	Sample II	Sample I	Sample II
Predictor	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]
Model 1: Attachment Dimensions Only								
Attachment Anxiety	**0.11 [0.07, 0.15]**	**3.53 [1.64, 5.40]**	**0.29 [0.14, 0.44]**	**0.31 [0.08, 0.54]**	−0.01 [−0.05, 0.04]	0.01 [−0.03, 0.05]	−0.07 [−0.14, 0.00]	−0.05 [−0.11, 0.00]
Attachment Avoidance	−0.03 [−0.08, 0.02]	−0.05 [−2.19, 2.07]	−0.06 [−0.25, 0.13]	0.04 [−0.23, 0.31]	−0.01 [−0.06, 0.05]	0.03 [−0.02, 0.08]	0.00 [−0.09, 0.10]	0.01 [−0.06, 0.08]
R^2	0.17	0.07	0.09	0.04	0.01	0.02	0.02	0.02
Model 2: Covarying % Time Spent Alone								
Attachment Anxiety	**0.11 [0.07, 0.15]**	**3.55 [1.66, 5.46]**	**0.32 [0.17, 0.47]**	**0.31 [0.08, 0.54]**	−0.02 [−0.06, 0.03]	0.01 [−0.03, 0.05]	**−0.08 [−0.16, −0.01]**	−0.05 [−0.11, 0.00]
Attachment Avoidance	−0.03 [−0.08, 0.02]	0.25 [−1.97, 2.48]	−0.05 [−0.24, 0.14]	0.07 [−0.21, 0.35]	−0.01 [−0.07, 0.05]	0.03 [−0.02, 0.08]	0.00 [−0.09, 0.10]	0.00 [−0.07, 0.08]
% Time Spent Alone	0.04 [−0.20, 0.29]	−7.91 [−24.38, 8.70]	−0.88 [−1.79, 0.03]	−0.77 [−2.88, 1.33]	0.26 [−0.01, 0.54]	−0.10 [−0.48, 0.28]	0.36 [−0.10, 0.81]	0.07 [−0.46, 0.59]
R^2	0.17	0.08	0.12	0.04	0.05	0.03	0.04	0.02
Model 3: Covarying Associations with Baseline Level of Negative Emotions								
Attachment Anxiety	**0.11 [0.07, 0.14]**	**3.51 [1.66, 5.36]**	0.05 [−0.09, 0.19]	0.11 [−0.11, 0.32]	−0.04 [−0.09, 0.01]	0.00 [−0.05, 0.04]	−0.02 [−0.10, 0.06]	−0.02 [−0.08, 0.04]
Attachment Avoidance	−0.03 [−0.08, 0.02]	0.28 [−1.88, 2.42]	0.03 [−0.13, 0.19]	0.05 [−0.20, 0.31]	0.00 [−0.06, 0.06]	0.03 [−0.02, 0.08]	−0.02 [−0.10, 0.07]	0.01 [−0.06, 0.08]
% Time Spent Alone	0.04 [−0.20, 0.28]	−7.83 [−23.88, 8.08]	**−0.99 [−1.75, −0.24]**	−0.31 [−2.22, 1.60]	0.25 [−0.03, 0.52]	−0.07 [−0.44, 0.31]	0.38 [−0.06, 0.82]	−0.01 [−0.51, 0.50]
Baseline Level of Negative Emotions			**2.56 [1.86, 3.34]**	**0.06 [0.04, 0.08]**	0.23 [−0.03, 0.50]	0.00 [0.00, 0.01]	**−0.57 [−0.99, −0.17]**	**−0.01 [−0.02, 0.00]**
R^2	0.18	0.08	0.49	0.24	0.12	0.08	0.13	0.11

Notes. In Sample I, $N_{participants} = 122$, $N_{observations} = 4628$. In Sample II, $N_{participants} = 127$, $N_{observations} = 5322$. In bolded values, the 95% credible interval (95% CrI) does not contain zero. The results were summarized in R using the MplusAutomation package (Hallquist & Wiley 2018). The rounding is based on the IEC 60559 standard.

= 0.24.

Table 1 shows the within- (group-mean centered scores) and between-person (aggregated scores) level correlations of the study variables in both samples. Attachment anxiety and avoidance correlated positively in both samples. However, this correlation was somewhat higher in older Sample I than in younger Sample II. These correlations align with meta-analytical research showing the positive correlation between attachment dimensions that tend to be larger in older than younger adults (Cameron et al., 2012).

3.2. Associations of attachment orientation with dynamics of negative emotions

Table 2 presents the associations of attachment orientation with the dynamic features of negative emotions (for all standardized results, β*s, see Supplemental Material 4). In line with our hypothesis, high attachment anxiety predicted a higher baseline level of negative emotions in Sample I, $\beta^* = 0.40$, $p < .001$, and Sample II, $\beta^* = 0.25$, $p < .001$. Similarly, in line with our hypothesis, high attachment anxiety predicted higher variability of negative emotions in Sample I, $\beta^* = 0.28$, $p < .001$, and Sample II, $\beta^* = 0.17$, $p = .010$. These associations with baseline level and variability were robust for controlling the proportion of time spent alone. However, after controlling for the baseline level, the associations of attachment anxiety with the variability were no longer detected in either sample.

To better understand this shrinkage, we conducted non-preregistered analyses in which we switched the places of the variability and baseline level so that the variability was specified to predict the baseline level and other dynamic features (see all results in Supplemental Material 5). After controlling for the variability, the association of attachment anxiety with the baseline level remained in Sample I, $\beta^* = 0.19$, $p = .004$, and Sample II, $\beta^* = 0.17$, $p = .008$. The Deviance Information Criterion (DIC) was also consistently lower in the models where the baseline level was the predictor (DICs = 12882 and 102127) compared to the models where the variability was the predictor (DICs = 12893 and 102139). This implied better model fit for the former than the latter models with an equal number of parameters, although caution is required to interpret DIC due to its instability (Asparouhov et al., 2018). These further explorations supported the interpretation that the baseline level explained the association of attachment anxiety with the variability over the alternative interpretation that the variability explained the association of attachment anxiety with the baseline level.

Contrary to our hypothesis, attachment anxiety showed no associations with the differentiation of negative emotions, with one exception. In Sample I, high attachment anxiety predicted lower differentiation when controlling for the proportion of time spent alone, $\beta^* = -0.16$, $p = .028$. However, also this association diminished and disappeared in the model that controlled for the baseline level. Thus, no robust evidence was detected for the associations of attachment anxiety with the differentiation of negative emotions.

Finally, against our hypotheses, attachment avoidance did not predict any dynamic features of negative emotions. This provided no support for our hypotheses linking high avoidance to higher inertia and lower differentiation of negative emotions.

3.3. Associations of attachment orientation with dynamics of positive emotions

Table 3 presents the associations of attachment orientation with the dynamic features of positive emotions (for all standardized results, see Supplemental Material 4). In line with our hypothesis, high attachment anxiety predicted a lower baseline level of positive emotions in Sample II, $\beta^* = -0.16$, $p = .014$. This association was robust across modeling conditions but was not detected in Sample I, emphasizing cautiousness in the interpretation. Attachment anxiety did not predict any other dynamic features of positive emotions. This provided no support for our hypothesis linking anxiety to higher variability of positive emotions.

In line with our hypothesis, high attachment avoidance predicted a lower baseline level of positive emotions in Sample I, $\beta^* = -0.22$, $p = .002$, and Sample II, $\beta^* = -0.19$, $p = .004$. These associations were robust across the modeling conditions. Yet, no associations of avoidance were found with the other dynamic features. This provided no support for our hypotheses linking avoidance to higher inertia and lower differentiation of positive emotions.

3.4. Sensitivity analyses using factor scores of emotions

Finally, we reran the same DSEMs on negative and positive emotions using their estimated factor scores (see results in Supplemental Material 6). Compared to our main DSEMs, the absolute differences were marginal, and the interpretations remained the same.

4. Discussion

Research suggests that attachment orientation is associated with people's tendency to experience different emotions (Park et al., 2022; Zhang et al., 2022). However, despite the pivotal role of attachment orientation in processes modifying emotions (e.g., emotion regulation; Mikulincer & Shaver, 2019), its associations with the dynamic features describing the temporal flow of emotions have remained unclear. In this preregistered study, we addressed this gap by testing the associations of attachment anxiety and avoidance with baseline level, variability, inertia, and differentiation of daily negative and positive emotions using two independent adult EMA samples.

In line with our hypotheses, high attachment anxiety predicted a higher baseline level and variability of negative emotions in both samples. However, after controlling for the baseline level, the associations with variability disappeared in both samples. Partially in line with our hypothesis, high attachment anxiety also predicted a lower baseline level of positive emotions in Sample II but not in Sample I. Further, high attachment avoidance predicted a lower baseline level of positive emotions in both samples, aligning with our hypothesis. However, contrary to our hypotheses, we found no associations of high attachment anxiety with higher variability of positive emotions or lower differentiation of negative emotions. Similarly, high attachment avoidance was not associated with higher inertia or lower differentiation of negative and positive emotions. Overall, our findings suggest that people's attachment orientation is primarily associated with their baseline levels of negative and positive emotions rather than other more complex emotion dynamic features.

4.1. Attachment orientation and baseline levels of negative and positive emotions

Ample research using experimental and traditional correlative designs suggests that attachment anxiety and avoidance reflect distinct forms of insecurities with unique regulatory styles (Mikulincer & Shaver, 2016). Our EMA study expands this research by showing the unique pattern of associations for each attachment dimension with the baseline levels of daily negative and positive emotions. People with high attachment anxiety had a heightened baseline level of negative emotions in both samples, corroborating prior EMA studies (Dugan et al., 2022; Kerr et al., 2019). This high baseline level of negative emotions in people with high attachment anxiety can reflect their general vigilance for threats and negative information (Long et al., 2020; Mikulincer & Shaver, 2019). It can also reflect the use of prototypical hyperactivating emotion regulation strategies, such as rumination and catastrophizing, that intensify and exaggerate one's negative emotions (Mikulincer & Shaver, 2019; Tammilehto et al., 2022). Finally, it is also possible that intense negative emotions play a reciprocal role in maintaining high attachment anxiety. While others may sometimes show desired supportive behaviors to anxiously attached people's intense negative

Table 3
Associations of Attachment Orientation with Emotion Dynamic Features of Positive Emotions: Unstandardized Effects.

	Baseline Level of Positive Emotions		Variability of Positive Emotions		Inertia of Positive Emotions		Differentiation of Positive Emotions	
	Sample I	Sample II	Sample I	Sample II	Sample I	Sample II	Sample I	Sample II
Predictor	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]	Posterior *Mdn* β [95% CrI]
Model 1: Attachment Dimensions Only								
Attachment Anxiety	−0.01 [−0.09, 0.08]	**−3.07 [−5.53, −0.61]**	0.06 [−0.03, 0.16]	0.05 [−0.07, 0.17]	−0.02 [−0.06, 0.01]	−0.01 [−0.05, 0.02]	−0.04 [−0.09, 0.01]	0.01 [−0.04, 0.06]
Attachment Avoidance	**−0.17 [−0.28, −0.06]**	**−4.31 [−7.23, −1.39]**	−0.09 [−0.21, 0.04]	0.02 [−0.13, 0.16]	−0.02 [−0.07, 0.03]	−0.01 [−0.05, 0.04]	0.06 [0.00, 0.12]	−0.01 [−0.07, 0.05]
R^2	0.05	0.07	0.03	0.01	0.05	0.01	0.03	0.01
Model 2: Covarying % Time Spent Alone								
Attachment Anxiety	−0.01 [−0.10, 0.08]	**−3.01 [−5.40, −0.59]**	0.08 [−0.01, 0.18]	0.05 [−0.07, 0.17]	−0.03 [−0.06, 0.01]	−0.01 [−0.05, 0.02]	−0.05 [−0.10, 0.00]	0.01 [−0.04, 0.06]
Attachment Avoidance	**−0.17 [−0.28, −0.06]**	**−3.37 [−6.35, −0.36]**	−0.08 [−0.21, 0.04]	0.03 [−0.13, 0.18]	−0.02 [−0.07, 0.02]	0.00 [−0.04, 0.04]	0.06 [−0.01, 0.12]	−0.03 [−0.09, 0.03]
% Time Spent Alone	−0.05 [−0.58, 0.48]	**−23.78 [−46.15, −1.50]**	−0.48 [−1.08, 0.11]	−0.23 [−1.37, 0.89]	0.09 [−0.14, 0.31]	−0.19 [−0.50, 0.12]	0.25 [−0.05, 0.56]	0.41 [−0.04, 0.84]
R^2	0.06	0.08	0.05	0.01	0.07	0.03	0.05	0.03
Model 3: Covarying Associations with Baseline Level of Positive Emotions								
Attachment Anxiety	−0.01 [−0.09, 0.08]	**−3.01 [−5.36, −0.65]**	0.08 [−0.01, 0.18]	0.02 [−0.10, 0.15]	−0.03 [−0.06, 0.01]	−0.01 [−0.05, 0.02]	−0.05 [−0.10, 0.00]	0.01 [−0.04, 0.06]
Attachment Avoidance	**−0.17 [−0.28, −0.06]**	**−3.38 [−6.27, −0.43]**	−0.04 [−0.16, 0.09]	−0.01 [−0.16, 0.15]	−0.03 [−0.08, 0.02]	0.00 [−0.05, 0.04]	0.05 [−0.01, 0.12]	−0.03 [−0.09, 0.03]
% Time Spent Alone	−0.05 [−0.57, 0.47]	**−23.90 [−45.35, −2.08]**	−0.47 [−1.04, 0.10]	−0.47 [−1.59, 0.66]	0.08 [−0.15, 0.31]	−0.21 [−0.52, 0.11]	0.25 [−0.05, 0.55]	0.40 [−0.05, 0.85]
Baseline Level of Positive Emotions			**0.27 [0.04, 0.50]**	−0.01 [−0.02, 0.00]	−0.02 [−0.11, 0.07]	0.00 [0.00, 0.00]	−0.02 [−0.14, 0.10]	0.00 [0.00, 0.00]
R^2	0.06	0.08	0.12	0.05	0.10	0.05	0.06	0.04

Notes. In Sample I, $N_{participants} = 122$, $N_{observations} = 4628$. In Sample II, $N_{participants} = 127$, $N_{observations} = 5322$. In bolded values, the 95% credible interval (95% CrI) does not contain zero. The results were summarized in R using the MplusAutomation package (Hallquist & Wiley 2018). The rounding is based on the IEC 60559 standard.

emotions, they may also often feel that these emotions are too much to handle (Arriaga et al., 2018). Such inconsistent emotional support may reinforce anxious beliefs and expectations, giving rise to bidirectional effects between high attachment anxiety and the high baseline level of negative emotions. These self-sustaining effects need testing in multi-wave longitudinal EMA studies.

We also found partial support that, in people with high attachment anxiety, escalated negative emotions may take over and dominate their positive emotions. In Sample II, people with high attachment anxiety had a lowered baseline level of positive emotions, aligning with the prior EMA studies (Dugan et al., 2022; Somers et al., 2020). On the one hand, this finding may reflect that people with high attachment anxiety dampen their positive emotions to emphasize their negative emotions even further in line with their hyperactivation goals (Verhees et al., 2021). On the other hand, anxiously attached people's vigilance for negative information may deteriorate their capacity to wholeheartedly experience positive emotions without ambivalence that pleasant moments may eventually lead to pain and sorrow (Shaver & Mikulincer, 2008). However, this association was not replicated in Sample I. While exact reasons for the non-replicability are challenging to locate, it may be due to the differences in our samples. In line with meta-analytical research (Cameron et al., 2012), the attachment dimensions showed more unique variances (i.e., a smaller correlation) in younger Sample II compared to older Sample I. Although speculative, the specific processes of attachment anxiety might be better captured in younger adults due to their higher sensitivity to rejection cues and social evaluation compared to older adults (Andrews et al., 2021). Yet, the non-replicability may also reflect several other differences in the samples, involving education status, gender distributions, and chosen response scales for emotions. Finally, it may also be just due to random sampling error.

Regarding attachment avoidance, people with high attachment avoidance had a lower baseline level of positive emotions in both samples, corroborating prior EMA studies (Dančík et al., 2021; Dugan et al., 2022). This robust finding is consistent with the classic defensive exclusion hypothesis, according to which avoidantly attached people strive to keep all information out of awareness that might activate their attachment system (Bowlby, 1980). More specifically, the low baseline level of positive emotions may reflect avoidantly attached people's tendency to minimize positive emotions as positive emotions promote interpersonal intimacy, which they find threatening (Gentzler et al., 2010; Verhees et al., 2021). Alternatively, it can also reflect their general insensitivity to processing positive social signals (Long et al., 2020). Finally, it is also possible that blunted positive emotions play a reciprocal role in maintaining attachment avoidance by reducing the opportunities for joyful moments with others (Arriaga et al., 2018). Such reduced opportunities for corrective emotional experiences can reinforce avoidant beliefs and expectations, giving rise to bidirectional effects between high attachment avoidance and the low baseline level of positive emotions. These self-sustaining effects require testing in future multi-wave longitudinal EMA studies.

4.2. No robust associations of attachment with complex emotion dynamic features

The evidence supporting the associations of attachment orientation with the more complex emotion dynamic features was minor. People with high attachment anxiety showed higher variability of negative emotions in both samples. However, after controlling for the baseline level, the associations disappeared. These findings extend the one existing EMA study linking attachment anxiety to higher variability of negative emotions without taking into account the baseline level (Sheinbaum et al., 2015). Importantly, our further explorations showed that while the association of attachment anxiety with the variability was explained by the baseline level, the association with the baseline level remained robust even for controlling for the variability. This strengthens the interpretation that the high intensity of negative emotions rather than variability is the core emotional feature of people with high attachment anxiety.

Contrary to our hypotheses, attachment anxiety also showed no associations with the variability of positive emotions. Moreover, we found no support for our hypothesis that the rigid and vulnerable deactivating strategies in people with high attachment avoidance would manifest in their higher inertia of negative and positive emotions. These null findings deviate from another EMA study that found associations between attachment anxiety and higher variability of positive emotions and between avoidance and higher inertia of positive emotions (Somers et al., 2020). One explanation for these discrepancies concerns the difference in sampling, as Somers et al. (2020) focused on mothers of toddlers. Compared to our samples of university students and young adults, mothers with small children may face more situations in which the attachment-related emotion dynamics become clearly manifested (e.g., with a child or partner). Yet, our findings on the diminished links of attachment anxiety with the variability of negative emotions after controlling for the baseline level suggest caution in interpreting the findings on mothers (Somers et al., 2020). This is because the baseline level of positive emotions was not considered as a more parsimonious explanation.

Finally, contrary to our hypotheses, neither attachment avoidance nor anxiety showed robust associations with the differentiation of negative or positive emotions. These null findings do not align with research suggesting that people with high attachment avoidance struggle to differentiate their emotions, whereas people with high attachment anxiety are prone to experience undifferentiated negative emotions (Kajanoja et al., 2021; Mikulincer & Shaver, 2016). However, previous research was based on single-occasion global self-reports (e.g., alexithymic traits; Kajanoja et al., 2021; Mikulincer & Shaver, 2016). Our novel findings based on EMA data suggest that insecurely attached people's difficulties identifying and making subtle distinctions in their emotions may not be visible in most daily contexts. Nevertheless, it is still possible that these problems emerge in more specific situations that involve threats of rejection and/or being dependent on unavailable others (Arriaga et al., 2018). In future studies, one intriguing question is to expand the design to examine how attachment orientation is associated with the momentary differentiation of emotions in insecurity-triggering situations. In answering this question, researchers may find it useful to utilize the momentary differentiation index that has been recently developed to inspect within-person fluctuations in the differentiation of emotions (Erbas et al., 2022).

4.3. General discussion

Overall, our findings contribute to the prevailing attachment models, helping to understand how attachment processes manifest in daily emotional experiences (Arriaga et al., 2018; Del Giudice, 2022; Kobak & Bosmans, 2019; Mikulincer & Shaver, 2016). Specifically, our findings suggest that, in daily life, the core emotional feature of people with high attachment anxiety is their intense negative emotions, which may also take over their positive emotions. In turn, the core emotional feature of people with high attachment avoidance is their blunted positive emotions.

Moreover, our findings showing minor associations of attachment orientation with the more complex emotion dynamic features, especially after controlling for baseline level, emphasize cautiousness in interpreting some previous findings (Sheinbaum et al., 2015; Somers et al., 2020). Specifically, our findings suggest that the association of attachment anxiety with the variability of negative emotions is largely a redundant by-product of its association with the baseline level. Our study also positions itself as a part of the ongoing debate in the field of affect dynamics concerning the lack of incremental validity in the more complex emotion dynamic features (Dejonckheere et al., 2019; Kalokerinos et al., 2020; Mader et al., 2023; Wendt et al., 2020). Currently, the exact nature of the shrinkage in the associations when controlling for baseline level remains unclear. Research of complex systems has identified "order parameters" referring to single variables that capture the global and collective organization of the system (Richardson et al., 2014). It is possible that the baseline level is the primary dynamic feature to reflect the functioning and macroscopic behaviors of the emotion system as a whole. In contrast, the more complex emotion dynamic features might reflect the more surface phenomena and secondary properties of the emotion system. Yet, the shrinkage may also reflect methodological artifacts due to a weak signal-to-noise ratio in current EMA practices (Dejonckheere & Mestdagh, 2021). Studies that focus on increasing the temporal resolution of EMA or adjusting the timing of the measurements to relevant contexts can enlighten this open issue. However, until able to show the incremental association of attachment with the more complex emotion dynamic features, researchers should emphasize the most parsimonious explanation regarding the baseline level.

Finally, research has shown that the high baseline level of negative emotions and low baseline level of positive emotions are robust predictors of various forms of psychological maladjustment (Dejonckheere et al., 2019). Thus, our findings have tentative implications for attachment-informed psychotherapies (Slade & Holmes, 2019). For people with high attachment anxiety, developing alternative emotion regulation strategies for rumination and catastrophizing and fostering self-worthiness might decrease their baseline level of negative emotions (Arriaga et al., 2018; Mikulincer & Shaver, 2019). For people with high attachment avoidance, developing alternative emotion regulation strategies to replace minimization and exclusion and transforming negative attitudes toward interpersonal intimacy might increase their baseline level of positive emotions (Arriaga et al., 2018; Mikulincer & Shaver, 2019).

4.4. Strengths and limitations

Our study had several strengths compared to the previous research on attachment orientation and emotion dynamic features. These included preregistering the study, controlling for baseline level, and using state-of-the-art statistical techniques to model emotion dynamic features. As a result, our study offers a meaningful contribution to the field. However, our study also has several limitations. First, our power simulations suggested that our design could only detect moderate-to-large effects. This may partly explain some of our null findings, especially concerning inertia. Second, the generalizability of our findings remains especially unclear for males, as our participants were mostly females, and for non-Western populations, where attachment and emotion processes can manifest differently (Thompson et al., 2022). Third, it is unclear how our findings based on the standard self-report measure of attachment (Fraley et al., 2000) apply to the interview-based assessment with the Adult Attachment Interview (AAI; George et al., 1996). Similarly, our EMA measurement of emotions was solely based on self-reports, which increases the risk of common method biases in our findings. Thus, future studies using AAI and psychophysiological EMA measures may reveal different insights. Finally, we examined only the associations of attachment orientation with the emotion dynamic features within the same-valenced emotions. Future EMA studies focusing on the dynamics between negative and positive emotions, such as emotion cross-lags (i.e., effects of negative on positive emotions and vice versa; Kuppens & Verduyn, 2015), can increase our understanding of the associations of attachment orientation with emotion dynamic features.

4.5 Conclusions

As demonstrated by the titles of Bowlby's *Separation: Anxiety and Anger* (1973) and *Loss: Sadness and Depression* (1980), emotions have been a core scientific interest for attachment researchers since the beginning. Our EMA findings suggest that people's attachment orientation is primarily associated with their baseline levels of negative and positive emotions rather than other more complex emotion dynamic features of variability, inertia, and differentiation. We hope our findings encourage researchers to identify potential intra- and interpersonal mechanisms that can explain our robustly detected associations of attachment anxiety with the higher baseline level of negative emotions and attachment avoidance with the lower baseline level of positive emotions. Such studies can further increase the dialogue between the frameworks of attachment theory and affect dynamics.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

All analysis scripts of both samples and the data of Sample I can be found at https://osf.io/v6495. The data of Sample II is not shared to protect the participants' privacy in the ongoing longitudinal study.

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Appendix A. Supplemental Materials

Supplemental Materials 1–6 can be found online at https://doi.org/10.1016/j.jrp.2023.104398.

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[3] The first author developed the research idea and hypotheses. The first author formulated the initial draft of the preregistration and revised it in collaboration with the last, second, third, fourth, fifth, and sixth authors. The first author formulated the initial draft of the manuscript and revised it in collaboration with the last, second, third, fourth, fifth, and sixth authors. The first author conducted all statistical analyses. The last, second, third, fourth, fifth, and sixth authors provided numerous salient comments, suggestions, and criticisms at the different stages of the study. The last and first authors contributed to the data collection. The last author is a principal investigator of both research projects the study was part of.

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