Fighting Your Sadness: Does Desiring Emotional Control Affect Emotional Inertia and Rumination?

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Abstract

Existing emotion literature highlighted the existence and implications of maladaptive emotion dynamics such as emotional inertia and rumination. Identifying individual differences associated with such cognitive, behavioral and emotional patterns could shed light onto potential prevention strategies and protective factors. The current study assessed whether differences in control beliefs correlate with emotional inertia and rumination. We hypothesized that individuals who desire heightened emotional control, while also being unsatisfied with their perceived control levels, would experience (1a) the most emotional inertia of sad affect from one moment to the next, (1b) the most inertia of negative affect over one day, as well as (2) the most emotion-related rumination out of all participant groups. One hundred thirteen participants answered self-report questionnaire items concerning the variables of interest. In the case of moment-level emotional inertia, a significant interaction effect between desired emotional control and control discrepancies was found. The relationship direction contradicted our predictions, with participants low on desired control, but high on discrepancy, experiencing the most moment-level inertia. Predictions that desired emotional control would influence rumination or day-level emotional inertia were not supported, due to nonsignificance. However, heightened control discrepancies were consistently linked to increased moment- and day-level inertia. Further research could investigate the role of control beliefs in inertia and rumination by better distinguishing between balanced and maladaptive manifestations of these emotion dynamics.

Keywords: desired control, emotional inertia, rumination, control discrepancy, emotion dynamics

Fighting Your Sadness: Does Desiring Emotional Control Affect Emotional Inertia and Rumination?

Emotion might be one of the most complex aspects to describe human experience. Since the beginning of time, numerous efforts have been made to explain emotion, with varying degrees of success. While it is often discussed how emotions are universal, each individual's emotional experience might look drastically different from that of another. In an effort to appropriately describe affect, principles of emotion dynamics were established. The field of emotion dynamics provides a multi-faceted quantification of emotions, while taking into account its time-dependency. Thus, one's 'emotional fingerprint' is no longer defined by the mere presence or absence of emotions, but is multifactorial (Kuppens & Verduyn, 2017), allowing for more complex investigations into emotions' associated outcomes.

Emotions' contingency to one's environment is reflected by their hypothesized purpose: helping individuals detect environmental changes and, if necessary, motivate appropriate action (Houben et al., 2015; Kuppens & Verduyn, 2017). As such, determining the adaptive or maladaptive nature of emotional patterns must take context into account. For instance, certain coping strategies or emotional experiences that are adaptive on the short run might be maladaptive over larger timescales (Brose et al., 2015, Houben et al., 2015) reflecting the importance of temporal contingency in the study of emotion.

Upon investigating various emotion dynamic outcomes over different timescales, specific patterns of affect have correlated with better or worse results for the concerned individual. A

prominent example of maladaptive emotion dynamics is heightened emotional inertia, a dimension which reflects the extent to which people's emotions are resistant to change and tend to linger from one moment to the next (Koval et al., 2012; Kuppens et al., 2010; Kuppens et al., 2012). It has been associated with lower emotional and psychological wellbeing – particularly for inertia of negative emotions (Houben et al., 2015) – and the severity of depressive symptoms on timescales from moments (Koval et al., 2012) to days (Brose et al., 2015). Emotional inertia has been found to be heightened in depressed individuals, evaluated through both self-report (Koval & Kuppens, 2012) and observed emotionally-suggestive behaviors (Kuppens et al., 2010). Furthermore, heightened inertia has been deemed a clinical depression risk factor for non-depressed adolescents (Kuppens et al., 2012), an indicator of poor emotion-regulation capabilities (Brose et al., 2015; Bylsma & Rottenberg, 2011), and reflection of affective inflexibility (Koval et al., 2012).

Concurrently, such patterns of affective inflexibility are also associated with forms of cognitive inflexibility, such as rumination (Koval et al., 2012). Rumination generally refers to recurring thoughts surrounding an issue, in the absence of external stimuli that would require these cognitions (Martin & Tesser, 1996). In the context of mood, some have narrowed it down to repetitively analyzing one's psychological distress, its causes, consequences and manifestations (Nolen-Hoeksema et al., 2008, p. 400). Research has found that individuals who ruminate experience heightened inertia of negative affect, sadness and anger (Brose et al., 2015; Koval et al., 2012). Individuals with more inert negative emotions also have stronger associations between affect and ruminative thinking (Brose et al., 2015). Moreover, inertia and

rumination play a role in the development and maintenance of negative affect and depressive symptoms, with both independent and joint contributions (Brose et al., 2015; Koval et al., 2012). Similar to inertia, the consequences of rumination also extend to a wide array of negative factors, such as higher levels of negative affect (Koval et al., 2012; Moberly & Watkins, 2008; Takano & Tanno, 2011), the onset, maintenance and severity of depression (Koval et al., 2012) and anxiety (Blagden & Craske, 1996).

Identifying key individual differences and predictors for both heightened emotional inertia and rumination could shed light on the functioning of cognitive-emotional processes and even pinpoint potential risk factors for maladaptive patterns. This could allow for the development of early, targeted interventions for maladaptive dynamics in clinical settings, and preventive strategies in healthy populations.

Literature on the links between one's desired (emotional) control, emotional inertia and rumination is scarce. The majority of control-focused research primarily investigates the effects of one's sense of control, rather than their need for it (Uziel & Baumeister, 2017). In existing literature, desired control is often conceptualized as the extent to which an individual is motivated to make appropriate changes in their life, being correlated with beneficial outcomes such as motivation, decisiveness and proactivity (Burger, 1984; Burger & Cooper, 1979).

On the other hand, Moulding and Kyrios (2006) suggest that an excessive need for control might lead to feelings of distress, due to the impossibility of meeting unrealistic control needs. Research has consistently indicated that having personal awareness of a gap between

perceived and desired levels of control is related to depression, distress, and anxiety (Evans et al., 1993; Moulding & Kyrios, 2006). Furthermore, fear of loss of control has also been investigated in relation to mood, specifically the phenomenon of relaxation-induced anxiety. Participants who paradoxically experience increased anxiety following relaxation treatments are believed to experience uncontrollable, strong negative affect (Braith et al., 1988). Parallel to this, fears of strong affect have also been linked to a heightened desire for control (Sookman et al., 2001). Thus, findings seem to indicate that, although wanting control can reflect a positive motivation to adapt to life's demands, excessive levels might have a detrimental impact.

A high desire for control is also linked to obsessive-compulsive disorder (OCD), in which ruminative cognitions are also highly dominant. Specifically, two types of rumination can be distinguished: OCD-specific ruminative thoughts (such as mental compulsions and repetitive cognitions), as well as rumination about one's symptoms (Heinzel et al., 2020), further exacerbating symptoms and depressed mood (Wahl et al., 2021). Concurrently, the belief that controlling one's thoughts is important is also considered a key factor in OCD maintenance (Clark, 2004; Mouldig & Kyrios, 2006; Purdon & Clark, 1999; Wells, 1997). Those diagnosed with OCD generally exhibit a significantly higher desire for control compared to healthy individuals or other clinical groups, as well as a low sense of control (Freeston & Ladouceur, 1997; McLaren & Crowe, 2003; Sassaroli, 2015; Sookman et al., 2001), and thus a larger discrepancy between perceived and wanted control. In turn, their excessive need for control further exacerbates symptom severity (Sassaroli, 2015). Although these findings do not bring

definite conclusions about the impact of desired control on rumination, their mutual connections with obsessive-compulsive symptomatology could highlight a relationship worth investigating.

While literature on control beliefs highlights the negative consequences of a perceived-desired control discrepancy, research on rumination investigates the potential role of general goal discrepancies. Studies based on control theory (Watkins, 2008) suggest that noticing discrepancies between one's goals and one's current achievements might lead to rumination. For instance, experimental findings indicated that participants who were cued an unresolved goal engaged in more rumination than those reminded of a solved goal, indicating a causational link between perceived goal discrepancies and rumination (Roberts et al., 2013). The aforementioned relationship is strongest when the goal is deemed important or the progress insufficient (Watkins, 2008). If such goal-discrepancy findings are applicable to the emotional facet, they could suggest a link between perceived emotional control discrepancies and rumination.

While the aforementioned studies considered rumination to be a consequence of perceived goal discrepancies (Roberts et al., 2013, Watkins, 2008), others have also identified it as a conscious response to (perceived) problems. In that sense, some researchers hypothesized that depressed individuals (mis)use ineffective emotion regulation strategies like rumination out of increased motivation to better their emotional state (Nolen-Hoeksema, 2013). Existing research has consistently indicated that rumination is ineffective and counterproductive for problem-solving purposes (Fresco et al., 2002; Lyubomirsky et al., 1999). In spite of this, some suggest that depressed individuals might engage in rumination specifically for problem-solving

or emotion regulation purposes (Nolen-Hoeksema, 2013). In interviews conducted by Papageorgiou and Wells (2001) investigating metacognitive beliefs surrounding rumination, all participants reported not only negative, but also positive beliefs regarding rumination outcomes. Some of the perceived benefits included identifying causes, triggers, and key components of one's depression, as well as alternative courses of action and prevention strategies. There is also experimental evidence that sad-affect participants purposefully prompted to ruminate reported an enhanced understanding of the problem and of oneself as a result of the task (Lyubomirsky & Nolen-Hoeksma, 1993). Thus, there seems to be a false sense of efficacy surrounding rumination among those who consciously practice it. It is, therefore, possible that individuals less skilled in emotion regulation, but who intensely desire emotional control, would turn to rumination as an intended solution.

Similarly. findings on self-control imply counterintuitive consequences. Namely, research suggests that one's desire for self-control, including emotional control, ironically reduces their ability to achieve it during demanding tasks (Uziel & Baumeister, 2017). Applying these findings strictly on the emotional facet would imply that wanting high emotional control could in fact impede achieving this control, if the task of emotion-regulation is perceived as demanding. If one does not satisfy their personal (excessively-high) standards of emotional control, it could be argued they would perceive emotion regulation as demanding.

The present study aims to determine whether a heightened desire for control is positively associated with emotional inertia and rumination. In doing so, participants were given

self-report questionnaire items investigating the effects of desired emotional control of sad affect on emotional inertia and rumination, as part of a larger survey. To distinguish between adaptively-high and excessive levels of desired emotional control, an additional variable was considered: one's control discrepancy, defined as the gap between one's perceived and desired levels of control. In that sense, a high desire for emotional control paired with low control discrepancies could reflect healthy control beliefs. Conversely, a high desire for emotional control, accompanied by high control discrepancies, could indicate unrealistic control beliefs and/or poor emotion-regulation capabilities, both of which are maladaptive. Based on the association between excessive desired control and impaired control capabilities (Uziel & Baumeister, 2017), we expect individuals scoring high on desired emotional control, as well as on control discrepancies, to experience the most emotional inertia of sad affect from one moment to the next (Hypothesis 1a).

Furthermore, taking into account emotions' time-dependency, an additional inertia timescale was introduced: day-level emotional inertia. Considering the similar outcomes between different inertia timescales within the literature (Brose, et al., 2015, Koval et al., 2012) we predict the same association to hold true for emotional inertia of negative affect throughout the course of one day (Hypothesis 1b: "We expect that individuals with who score highly for desired emotional control and control discrepancies to experience the most emotional inertia of negative affect over the course of one day".).

Additionally, based on the potential applicability of control theory (linking goal discrepancies with rumination; Watkins, 2008) to situations involving desired emotional control, as well as the mutual links of rumination (Heinzel et al., 2020; Wahl et al., 2021) and desired control (Freeston & Ladouceur, 1997; McLaren & Crowe, 2003; Mouldig & Kyrios, 2006; Sassaroli, 2015; Sookman et al., 2001) to psychopathology, we hypothesize that an increased desire for emotional control is positively associated with rumination, when control discrepancies are also high (Hypothesis 2).

Method

Participants

The sample consisted of 130 participants with ages between 18 and 68 (M = 25.85, SD = 10.19), specifically 91 females from 18 to 68 years (M = 25.21, SD = 9.65), 37 males of ages from 19 to 58 years old (M = 27.59, SD = 11.58) and one 'Non-binary/Third gender' with an age of 25 years. Finally, one participant that preferred to withhold gender-related information had the age of 20 years. All participants were citizens of the European Union. An a priori power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2007) to determine the minimum sample size to test the study hypotheses. The analysis was based on a correlational test, as it seemed to be the most suitable test for conducting a between-subject comparison within our sample. Results indicated that a sample of 64 participants was required to achieve a power of .80 for detecting a small effect size (d =.30) at a significance criterion of α = .05.

Research Design and Procedure

The study was approved by Ethical Committee Psychology (ECP) of the University of Groningen. It was prefaced by an informed consent form and consisted of a cross-sectional questionnaire used during one online study. It was allowed for respondents to quit the study at any given time for no specified reason. Participants were also informed of the anonymity of their responses, with no personally identifiable information, such as IP addresses, being collected.

The recruitment procedure was carried out by the students from the Individual Differences in Emotion Dynamics bachelor thesis group at the University of Groningen, who distributed the study announcement in WhatsApp groups, on Instagram and on Facebook. No compensation was offered in exchange for participating. Prior to data collection, participants were provided information about the study, after which they could either choose to give consent or discontinue the study. The other requirements for the participation and data collection were being older than 16 years old, and being a citizen of the European Union. Finally, participants were informed about potentially sensitive topics, for example risky behavior and parenting styles, before taking part in the study.

Stimuli, Materials and Apparatus

The data for our current study was collected by means of a Qualtrics questionnaire (https://rug.eu.qualtrics.com/jfe/form/SV_86BEHlu4oVXa43I), consisting of 32 items taking five to 10 minutes to complete, developed by the authors (Appendix A). As the items currently lack professional peer review, their reliability and validity are addressed in the following sections of this paper.

In general, the main themes addressed in the questionnaire were parenting styles, coping behavior, emotion regulation, risky behavior, personality assessment, negative affect and emotion augmentation. Most questions used a slider-scale format from zero to 100, with labels added at the middle-point, as well as endpoints of the scale. This format was adopted to facilitate intuitive and comprehensive answering from participants, as well as for analysis purposes. An attention check was included, and the questionnaire items were spread and grouped over multiple pages to help maintain participant attention.

Emotional inertia, rumination and control beliefs

The concepts of interest pertaining to control beliefs consisted of one's desired emotional control (*DEC*) of sad affect and their emotional control discrepancy (*discrepancy*). The question scores were measured continuously in a slider format from zero ("strongly disagree") to 100 ("strongly agree"), unless specified otherwise. DEC levels were measured using scores on item Q20 ("When I am sad, I want to resolve this feeling as soon as possible"), while discrepancy levels were assessed using the reverse-coded scores on item Q18 ("I can manage my emotions as well as I would like to").

The relevant concepts relating to emotion dynamics consisted of rumination over sad affect (*rumination*), measured by item Q19 ("When I am sad, I extensively analyze my emotions' causes, manifestations or consequences"), as well as two different conceptualizations of emotional inertia. In that sense, emotional inertia was split into two dimensions reflecting different timescales and emotion specificity, namely *moment-level emotional inertia* of sad affect

and *day-level emotional inertia* of negative affect. As a natural consequence of their different conceptualizations, the two inertia measures had a Cronbach's alpha of 0.624, below the recommended 0.7 value. Considering this, as well as our interest in assessing inertia on different timescales, the two concepts were assessed separately throughout the entire study. Moment-level emotional inertia focused on short-term persistence of sad affect, and was determined by the reverse-coded scores of item Q16 ("If I am sad, this feeling passes quickly and I do not feel sad anymore"). Meanwhile, day-level emotional inertia inquired into the broader concept of negative affect, over the course of an entire day. This was determined by scores on item Q13 ("Once faced with an anxious, depressive otherwise negative emotion: How much does it affect your mood throughout the day?"), measured from zero ("little") to 100 ("considerably"). The focus of day-level emotional inertia was broadened from inertia of sad affect to that of negative effect for more efficient data collection of multiple Bachelor's thesis group members.

Data analysis

The data was analyzed by means of three two-way analyses of variance (ANOVA), targeting rumination, day-level and moment-level emotional inertia of sad affect as the three dependent variables of interest. The model predictors consisted of the desired emotional control (*DEC*) of sad affect and the emotional control discrepancy (*discrepancy*) variables. Based on the two aforementioned predictors, with two levels each (low- and high-scoring), participants were split into four groups: "low-DEC/low-discrepancy" (N= 10), "low-DEC/high-discrepancy" (N = 15), "high-DEC/low-discrepancy" (N = 38), "high-DEC/high-discrepancy" (N = 50). Scores

between zero and 49 constituted the low-scoring levels of each variable, while scores 51 to 100 defined the high-scoring ones. A neutral response was defined as a score of 50 on either of the independent variables and, subsequently, deemed irrelevant in the context of this study. Therefore, 16 participants whose responses were neutral were excluded from the analyses involving day-level emotional inertia and rumination, as well as one who did not answer the DEC item, resulting in 113 participants. Our moment-level emotional inertia analysis involved 109 participants, as four of the respondents did not answer the corresponding questionnaire item. Thus, the latter analysis had 9 low-DEC/low-discrepancy participants, 14 low-DEC/high-discrepancy participants, 38 high-DEC/low-discrepancy participants and 48 high-DEC/high-discrepancy participants.

Individual A Priori Power Calculations

In addition to the general, team-level power analysis, an a priori power analysis targeting the statistical model of interest to the current paper was also conducted using G*Power version 3.1.9.7 (Faul et al., 2007). To test for differences between the four groups on rumination, moment-level and day-level emotional inertia at $\alpha = .05$, an estimated 128 participants would be needed to achieve 0.80 power of detecting a medium effect size ($f = .25$).

Results

Upon conducting the two-way ANOVAs, four statistical assumptions were considered: homoscedasticity and normality of observations within groups, lack of outliers and no multicollinearity between predictors. The former three assumptions are individually addressed

below, for each computed model. The relationship between the two predictors, considered in their categorical format, was nonsignificant, with a correlation coefficient of r = – .027 (p = .779), suggesting no concern of multicollinearity. All our calculations were done at a significance level of $\alpha = .05$.

Moment-level emotional inertia of sad affect

Assumption checks

A nonsignificant Levene's test for equality of error variances (p = .098), indicated sufficient homoscedasticity of residuals for the current analysis. The normality assumption was met by part of the groups, as determined by the nonsignificant Shapiro-Wilks tests for the low-DEC/low-discrepancy (p = .673) and the low-DEC/high-discrepancy (p = .087) groups. The same assumption did not stand for the remaining groups, with significant Shapiro-Wilks tests for the high-DEC/low-discrepancy (p = .003) and high-DEC/high-discrepancy (p < .001) conditions. However, the QQ-plots of the observations, displayed in Figures B4 and B5 indicated that normality violations were not severe. Due to two-way ANOVA's robustness against violations of normality, such mild deviations of normality can be tolerated, without increasing the risk of a type I error. No outliers were identified in any of the groups, according to the 1.5 IQR rule.

Two-way ANOVA results

A two-way ANOVA inquired into the effects of DEC and discrepancy on moment-level emotional inertia, testing the predictions of Hypothesis 1a ("We expect individuals scoring high on desired emotional control, as well as on control discrepancies, to experience the more

emotional inertia of sad affect from one moment to the next"). The results revealed a nonsignificant main effect for DEC, $F(1,105) = .29$, $p = .591$, $\eta_p^2 = .00$. However, the main effect for discrepancy was significant, with a large effect size [$F(1, 105) = 41.93$, $p < .001$, $\eta_p^2 = .29$], as well as the interaction effect between DEC and discrepancy, with an almost moderate-to-small effect size [$F(1, 105) = 4.16$, $p = .044$, $\eta_p^2 = .04$].

While the results support the existence of an interaction effect, the direction of the relationships (Figure 1) and the mean inertia values of each group (Table 1) contradict our predictions. Figure 1 shows that DEC level might have opposite effects on moment-level emotional inertia, depending on one's discrepancy level. In that sense, participants high on discrepancy experienced less inertia if they had a high DEC, whereas participants low on discrepancy experienced more inertia if their DEC was high. Our hypothesis suggested that participants high on both DEC and discrepancy scores (M = 59.06, SD = 23.50) would experience the most emotional inertia in the sample. However, the highest moment-level emotional inertia score was instead obtained by the low-DEC/high-discrepancy group (M = 73.57, SD = 14.77). Thus, Hypothesis 1a was not supported by the data.

Figure 1

Estimated marginal means of moment-level emotional inertia

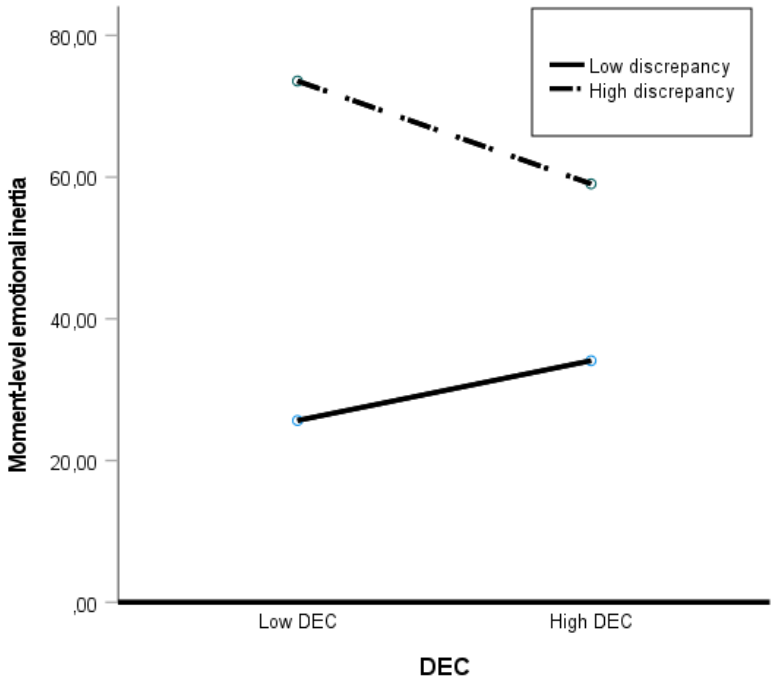


Table 1

Moment-level emotional inertia means, standard deviations and participant counts per group

DEC	Discrepancy	Mean	SD	N
Low DEC	Low discrepancy	25.67	21.38	9
	High discrepancy	73.57	14.77	14
High DEC	Low discrepancy	34.10	26.21	38
	High discrepancy	59.06	23.50	48

Day-level emotional inertia of negative affect

Assumption checks

The assumption of homoscedasticity was supported by a nonsignificant Levene's test, at $p = .247$. Nonsignificant Shapiro-Wilks tests for the low-DEC/low-discrepancy ($p = .268$), low-DEC/high- discrepancy ($p = .810$) and high-DEC/low-discrepancy ($p = .090$) groups suggested sufficiently-normal distributions within those three groups. For the high-DEC/high-discrepancy group, the Shapiro-Wilks test yielded significant results, at $p < .001$. However, considering two-way ANOVA's general robustness against normality violations, mild deviations from normality would not increase the risk of a type I error. The QQ-plot of the aforementioned group, included in Figure B6, indicated only a slight normality violation, allowing the analysis to be carried out normally. Based on the 1.5 IQR rule, no outliers were identified in any of the two low-discrepancy groups. However, one outlier was present in the low-DEC/high-discrepancy group, and three others in the high-DEC/high-discrepancy, as depicted in Figures B7 and B8. To determine the impact of this assumption violation, an identical analysis excluding the outliers was conducted (Appendix C). No additional significant effects were detected.

Two-way ANOVA results

The impact of DEC and discrepancy on day-level emotional inertia was assessed using a two-way ANOVA, testing the predictions posed in Hypothesis 1b ("We expect individuals scoring high on desired emotional control, as well as on control discrepancies, to experience the more emotional inertia of negative affect over the course of one day"). The analysis revealed a

significant and relatively large main effect of discrepancy on day-level emotional inertia, $F(1, 109) = 24.38$, $p < .001$, $\eta_p^2 = .18$. Conversely, the main effect for DEC [$F(1, 109) = 1.40$, $p = .240$, $\eta_p^2 = .01$] and the interaction effect between the two factors [$F(1, 109) = .94$, $p = .334$, $\eta_p^2 = .01$] were small and nonsignificant.

Table 2 contains an overview of the obtained results divided by group. Out of the four conditions, the highest day-level emotional inertia mean score was obtained by high-DEC/high-discrepancy participants (M = 69.86, SD = 19.11), in line with our predictions. While the interaction effect of the predictors was nonsignificant, Figure 2 provided further insights into the relationship directions within our sample. Some differences were indeed visible between the low-discrepancy groups, with those high on DEC experiencing more inertia. However, the same could not be said for high-discrepancy participants. The relatively flat slope of the high-discrepancy line suggested that those high on DEC only had negligibly heightened inertia compared to their low-DEC counterparts (M = 68.87, SD = 16.96), further reflecting the nonsignificance of the findings. Thus, no definite support for Hypothesis 1b can be drawn.

Figure 2

Estimated marginal means of day-level emotional inertia

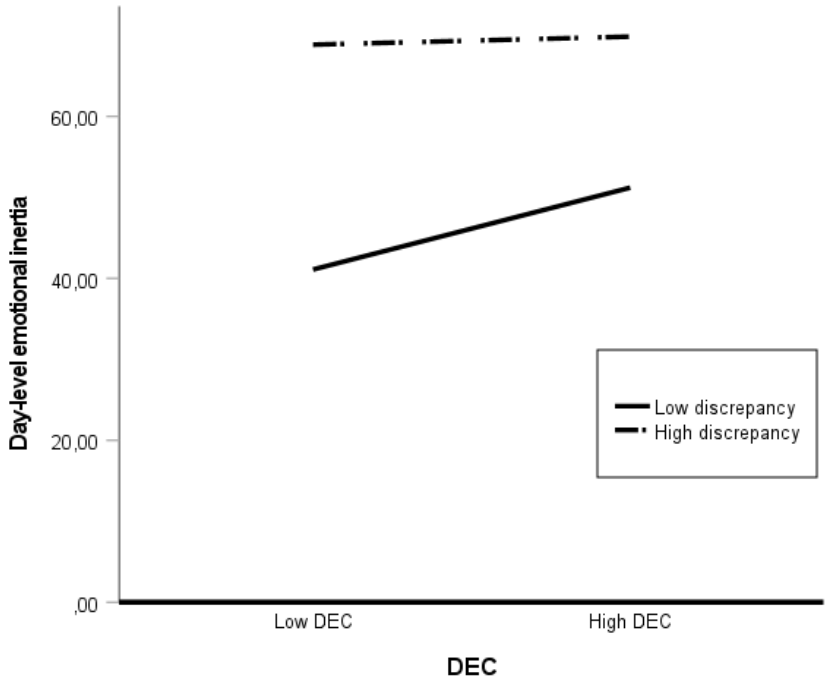


Table 2

Day-level emotional inertia means, standard deviations and participant counts per group

DEC	Discrepancy	Mean	SD	N
Low DEC	Low discrepancy	41.10	22.91	10
	High discrepancy	68.87	16.96	15
High DEC	Low discrepancy	51.21	22.41	38
	High discrepancy	69.86	19.11	50

Rumination

Assumption checks

Levene's test indicated homogeneity of variances, being nonsignificant at $p = .928$. The Shapiro-Wilks test was also nonsignificant for the low-DEC/low-discrepancy ($p = .164$) and low-DEC/high-discrepancy ($p = .109$) groups, but showed normality violations for high-DEC/low-discrepancy ($p = .032$) and high-DEC/high-discrepancy ($p = .007$) groups. The QQ-plots of the latter two groups' observations, included in Figures B9 and B10, indicate violations of normality that are not severe. Thus, considering two-way ANOVA's general robustness against mild normality violations the analysis can be carried out without increasing type I error risk. Based on the 1.5 IQR rule, no outliers were identified within the groups, except for the high-DEC/high-discrepancy condition. The group's two outliers are depicted in Figure B11. Outlier impact was not significant, as no additional significant effects were identified upon conducting an outlier-free ANOVA (Appendix C).

Two- way ANOVA results

A two-way ANOVA investigating the effects of DEC and discrepancy on rumination tested the predictions of Hypothesis 2 ("We hypothesize that more desired emotional control is positively associated with rumination, when control discrepancies are also high"). The analysis revealed nonsignificant results for the main effects of DEC [$F(1, 109) = .386$, $p = .536$, $\eta_p^2 = .00$], discrepancy [$F(1, 109) = .00$, $p = .993$, $\eta_p^2 = .00$] and for the interaction effect of the two factors [$F(1, 109) = .47$, $p = .495$, $\eta_p^2 = .00$]. Contrary to our hypothesis, the high-DEC/high-discrepancy participants ($M = 68.27$, $SD = 23.27$), did not display the highest levels of rumination of all

groups, as displayed in Table 3. Instead, the highest rumination scores corresponded to participants from the high-DEC/low-discrepancy condition (M = 68.27, SD = 23.27).

Table 3

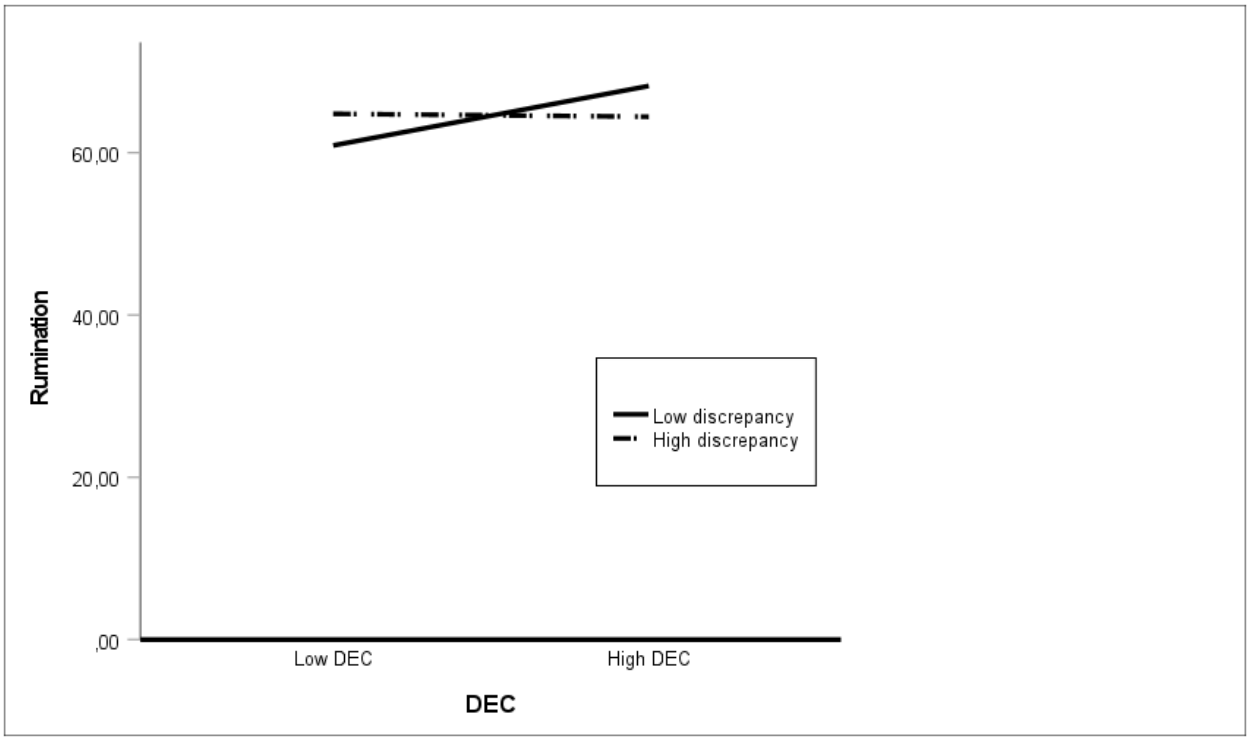
Rumination means, standard deviations and participant counts per group

DEC	Discrepancy	Mean	SD	N
Low DEC	Low discrepancy	60.900000	28.660658	10
	High discrepancy	64.8000	21.47490	15
High DEC	Low discrepancy	68.236842	23.272109	38
	High discrepancy	64.4400	25.03725	50

Figure 3 provides further insights into the observed relationship directions. While a difference in rumination levels can be noticed between the two groups of low-discrepancy participants, participants high on discrepancy have scored very similarly, regardless of their DEC level. The slope for high discrepancy participants appears almost flat, suggesting a negligibly heightened inertia for the high-DEC respondents, compared to their low-DEC counterparts. Thus, Hypothesis 2 was not supported by current data.

Figure 3

Estimated marginal means of rumination



Post hoc power analyses

Using G*Power (Faul et al., 2007), post hoc power analyses were carried out for each of the three two-way ANOVAs. In the case of moment-level emotional inertia, the study carried a power of .083 to detect the effect of DEC (η_p^2 = .003), 1.00 for the effect of discrepancy (η_p^2 = .285) and .524 for the interaction effect of the two predictors (η_p^2 = .038). For day-level emotional inertia, the analysis' power to detect the effect of DEC (η_p^2 = .013) was .216, while being .998 for the effect of discrepancy (η_p^2 = .183) and .161 for the interaction effect (η_p^2 = 009). Rumination post hoc analyses revealed a .094 power for the effect of DEC (η_p^2 = .004),

.050 power for the effect of discrepancy (η_p^2 = .000), and .104 power for their interaction (η_p^2 = .004).

Discussion

The current paper assessed the roles of desired emotional control of sad affect and of control discrepancies over emotional inertia and rumination. Specifically, Hypothesis 1a ("We expect individuals scoring high on desired emotional control, as well as on control discrepancies, to experience the more emotional inertia of sad affect from one moment to the next") investigated the effect of control beliefs on moment-level emotional inertia of sad affect, while Hypothesis 1b ("We expect individuals scoring high on desired emotional control, as well as on control discrepancies, to experience the more emotional inertia of negative affect over the course of one day") targeted the day-level emotional inertia of negative affect. Our results concerning one's desire for control contradicted our hypotheses on the moment-level: those with a high control discrepancy, but low desire for emotional control, experienced more persistent sad affect. However, the hypothesis was partially supported by our control discrepancy findings, and complemented by a similar pattern of discrepancy results for Hypothesis 1b. Higher control discrepancies consistently corresponded with higher levels of emotional inertia throughout our analyses, assessed on both moment- and day-level timescales.

Our results not only strengthen the link between control discrepancies and psychologically detrimental outcomes, but do so dynamically. In that sense, our findings link

high control discrepancies to not only the existence, but also the persistence of sad affect, as well as of anxious, depressive or generally negative states, on two different timescales.

However, while results coincided for our two inertia measures in relation to discrepancy, the same pattern of results did not hold true for desired emotional control. On the day-level, one's desire for emotional control did not have any significant impact on inertia levels, contradicting Hypothesis 1b. Additionally, the link between our measured control beliefs and rumination (Hypothesis 2: "We hypothesize that more desired emotional control is positively associated with rumination, when control discrepancies are also high") was also not supported. Our results indicated no significant differences on rumination levels, based on one's desire to control their emotions and control discrepancies.

Our findings on moment-level emotional inertia suggest a positive impact of desiring emotional control on high-discrepancy participants, contradicting our initial conclusions about the literature. Such results could imply that a high desire for control does indeed reflect motivation to make appropriate, adaptive changes to one's emotional state, as suggested by Burger and Cooper (1979). A supplementary, yet surprising, finding was that inertia levels increased with one's desire for emotional control in low-discrepancy participants, which were assumed to be emotionally well-adjusted. While counterintuitive, this pattern could also be attributed to beneficial effects of desiring emotional control. In that sense, research suggests that very low levels of emotional inertia could also be associated with impaired emotion regulation,

resulting in sudden emotional fluctuations (Koval & Kuppens, 2012). Thus, an increase in inertia for low-discrepancy participants might also be reflecting regulated affect.

However, the influence of desired emotional control on emotional inertia was nonsignificant on a day-level. In spite of documented outcome similarities of inertia measures for various timespans (Brose et al., 2015, Koval et al., 2012), our findings for different inertia timescales diverged in pattern direction and, most importantly, significance. One possible explanation might be that attempts at emotional control are only successful on the short term, while larger-timescale inertia levels rather depend on one's emotion regulation capabilities, reflected by discrepancy levels. Those with poor emotion regulation (and thus, high control discrepancies) might be falling back into using ineffective coping strategies over longer timescales, regardless of their efforts to exert control. However, another key reason could lie in the different variable conceptualizations regarding the emotions targeted. In that sense, our moment-level inertia measure specifically targeted sad affect, while its day-level counterpart targeted "anxious, sad, or otherwise negative" affect. Previous studies suggested that inertia levels of various negative emotions are associated with different factors, outcomes or causes (Koval et al., 2012; Houben et al., 2015). Thus, the difference in results could be owed, at least partially, to the broader range of emotions targeted by our day-level measure.

On the one hand, the (partial) nonsignificance of our results could suggest that one's desire for emotional control is simply unrelated to one's day-level inertia or rumination levels. On the other hand, results should be interpreted in the context of their limitations. Firstly,

conducting the study as part of a Bachelor's thesis project imposed limitations on the number of included questionnaire items, due to shared data collection. Considering the complexity of emotion dynamics' dimensions, using single-item assessments for our constructs might have failed to capture all of their intricacies. For instance, research distinguished two types of rumination: brooding (negative and abstract self-focused thinking, associated with maladjustment), and its more neutral counterpart called reflection, which was observed to have neutral or less detrimental outcomes (Koval et al., 2012). Our single-item construct measurements did not include such distinctions, making it unclear whether some groups engaged in more one type of rumination than the other. Similarly, keeping in mind the maladaptive nature of both heightened (Brose et al., 2015) and lowered emotional inertia (Koval & Kuppens, 2012) one-item measurements could not fully capture the extent to which certain inertia scores would imply detrimental consequences. In addition, measuring control beliefs through self-report means could have been less accurate than an experimental approach, as such concepts might lie beyond participant awareness.

Statistical and methodological considerations were also at play. Our sample size being lower than the a priori recommendations might have led to the very low power reported by post hoc analyses, and even to unrepresentatively low effect sizes. Furthermore, a priori recommendations assumed equal sample sizes between groups, but our resulted groups differed even five times in size, in some cases. The conversion of initially continuous predictors to a categorical, dichotomous format might have also led to loss of information. In that sense, the high range of scores included in each high- and low-scoring level of the predictors could have

concealed or changed the true patter of results. Our sample size limitations prevented us from using more than two levels on the control-belief variables. Including a third, middle-ground category of participants for the two predictors could minimize such loss of information in future studies.

Due to the purely correlational nature of our study, our analyses could also not determine any potential causation or directionality of the relationship between emotional inertia and control discrepancies. This relationship could be a natural consequence of experiencing poor inertia-induced outcomes, and subsequently dissatisfaction with one's perceived level of emotional control. On the other hand, our correlational results might provide grounds for future research to investigate whether reducing one's control discrepancies diminishes the persistence of such emotional states.

Overall, the current study results could contribute in various ways to the literature on individual differences in emotion dynamics. One the one hand, our findings could suggest that one's desire for emotional control plays no role in concepts such as rumination or emotional inertia on timescales longer than one moment to the next. On the other hand, they could suggest a positive influence of desiring emotional control on emotion dynamics outcomes, for people who are satisfied with their emotion regulation capabilities. Simultaneously, our results highlight an important connection between one's satisfaction with their emotional control and the persistence of their negative emotions.

Current results showcase the need for additional research on the topic of control beliefs and emotion dynamics, using more nuanced approaches. In that sense, distinguishing between neutral and maladaptive forms of rumination, as well as between extreme and balanced inertia levels, could unravel different patterns. Furthermore, our reported association between control discrepancies and emotional inertia could highlight the importance of investigating whether interventions that reduce one's control discrepancy might also reduce the persistence of negative emotional states. Gaining an extensive understanding on emotion dynamics could pave the path for a happier, healthier and emotionally-educated society.

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Appendix A

Questionnaire Survey Emotion Dynamics

Participant demographics

Age	
Gender	Male/Female/Non-binary/Prefer not to say
Nationality	EU citizen/ non EU citizen
Parenting style Parent 1	Male/Female/ Non-binary
Parenting style Parent 2	Male/Female/ Non-binary

Think about **your childhood** and how you grew up over the years…	
How did you perceive your parents combined parenting style to be ?	0 = Very neglectful; 50 = Balanced; 100 = Very overprotective
How did you perceive the parenting style of **Parent 1** to be?	0 = Very neglectful; 50 = Balanced; 100 = Very overprotective
How did you perceive the parenting style of **Parent 2** to be?	0 = Very neglectful; 50 = Balanced; 100 = Very overprotective

How well did you deal with negative emotions when you were younger ? (age 12-18)	0 = Not well at all; 50 = Average 100 = Exceptionally well
How well did you deal with negative emotions from age 19 to today?	0 = Not well at all; 50 = Average 100 = Exceptionally well

Once faced with an anxious, depressive otherwise negative emotion: How much does it affect your mood throughout the day ?	0 = Little; 50 = Average; 100 = Considerably
Think about a situation in which emotions might have augmented each other (e.g. anxiousness making you more irritated and irritation contributing to anger). How much did the intensity of your emotional experience increase?	0 = Little; 50 = Average; 100 = Considerably

Think about your mood/lifestyle **in the last month**. Determine whether you agree or disagree with the following statement.	
If I am sad, the feeling passes quickly and I do not feel sad anymore.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
When I'm sad, I believe there is nothing I can do to make me feel better.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
I can manage my emotions as well as I would like to.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
When I am sad, I extensively analyze my emotions' causes, manifestations or consequences.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
When I am sad I want to resolve the feeling as soon as possible.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
When I am sad I know exactly what to do to resolve this feeling.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
I am someone who gets easily nervous.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree

When confronted with a task I tend to do it immediately and thoroughly.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree
I see myself as outgoing and sociable.	0 = Strongly disagree; 50 = Neither agree nor disagree; 100 = Strongly agree

Think about your mood/lifestyle **in the past month**. This section will be concerned with the *frequency* of your experiences.	
How often did you experience negative emotions, e.g. sadness?	0 = Never, 50 = About half the time; 100 = Always
How often did you experience Melancholia (defined as a state of deep or deliberating sadness)?	0 = Never, 50 = About half the time; 100 = Always
How often do you pay attention? If you're paying attention now, answer with 60.	0 = Never, 50 = About half the time; 100 = Always

How often did you engage in risky driving behavior (e.g. speeding, drink-drive, unfastening of a seat belt, driving while feeling sleepy, and highway code violations) when feeling sad?	0 = Never, 50 = About half the time; 100 = Always
How often did you engage in risky driving behavior to reduce feelings of sadness?	0 = Never, 50 = About half the time; 100 = Always
How often did you engage in aggressive behavior (e.g. acts of physical violence. shouting, swearing, and harsh language) when feeling sad?	0 = Never, 50 = About half the time; 100 = Always
How often did you engage in aggressive behavior to reduce feelings of sadness?	0 = Never, 50 = About half the time; 100 = Always
How often do you engage in substance use (alcohol, drugs) when feeling sad?	0 = Never, 50 = About half the time; 100 = Always
How often do you engage in substance use to reduce feelings of sadness?	0 = Never, 50 = About half the time; 100 = Always

How often do you engage in sexual risky behaviour (unprotected sex, multiple sex partners) when feeling sad?	0 = Never, 50 = About half the time; 100 = Always
How often do you engage in sexual risky behaviour to reduce feelings of sadness?	0 = Never, 50 = About half the time; 100 = Always

Appendix B

Assumption Checks

Moment-level emotional inertia

Figure 4

Normal Q-Q plot of moment-level emotional inertia within the high-DEC/high-discrepancy group

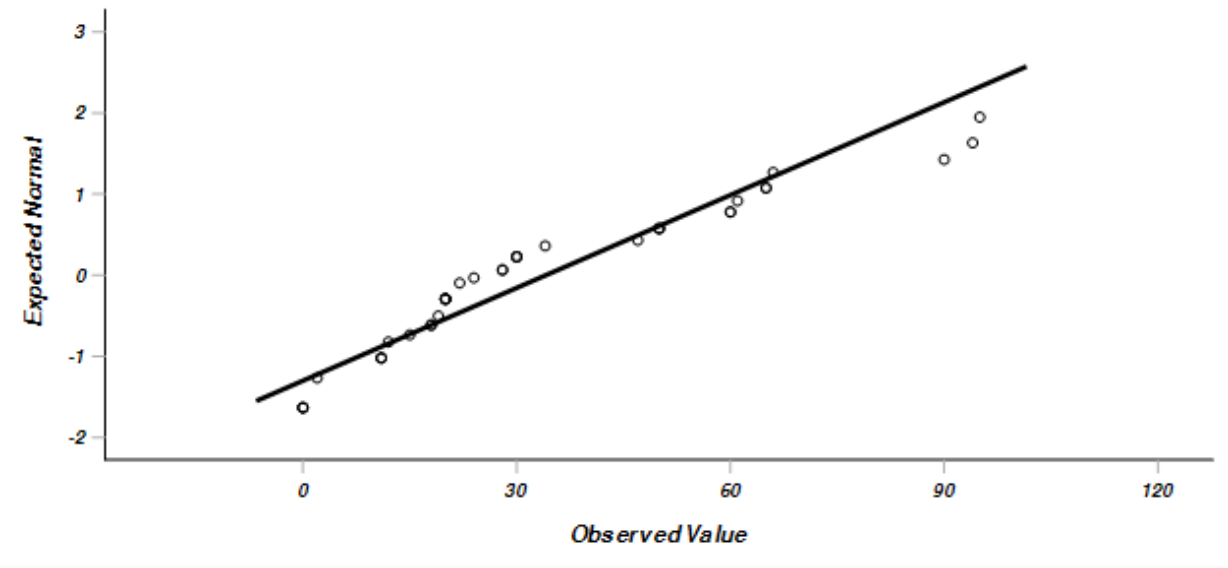
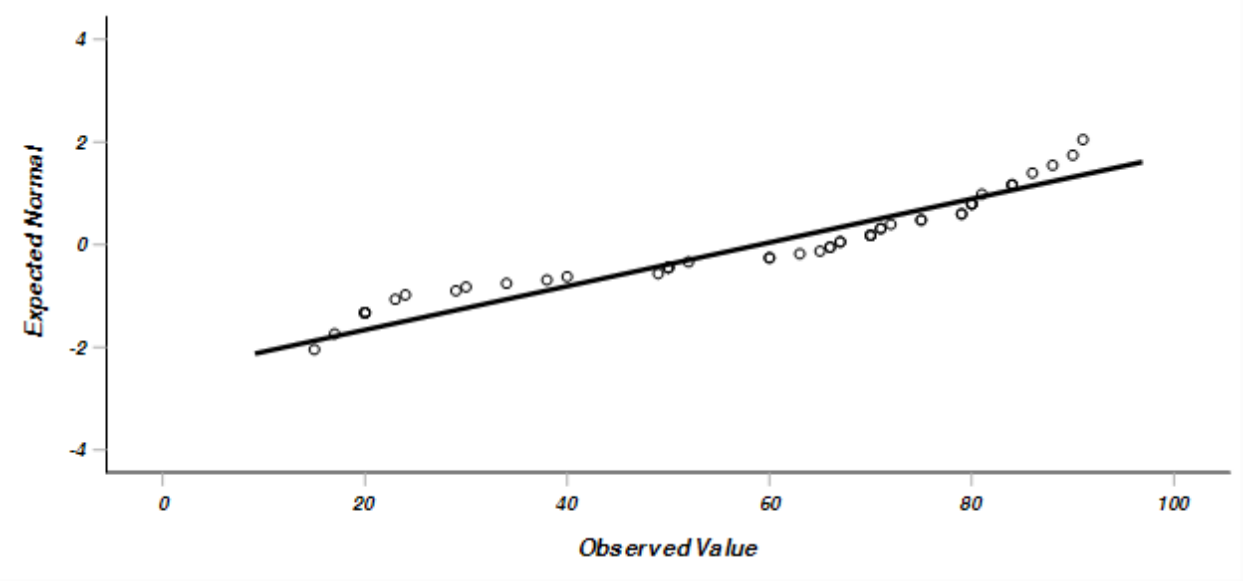


Figure 5

Normal Q-Q plot of moment-level emotional inertia within the high-DEC/high-discrepancy group



Day-level emotional inertia

Figure 6

Normal Q-Q plot of day-level emotional inertia within the high-DEC/high-discrepancy group

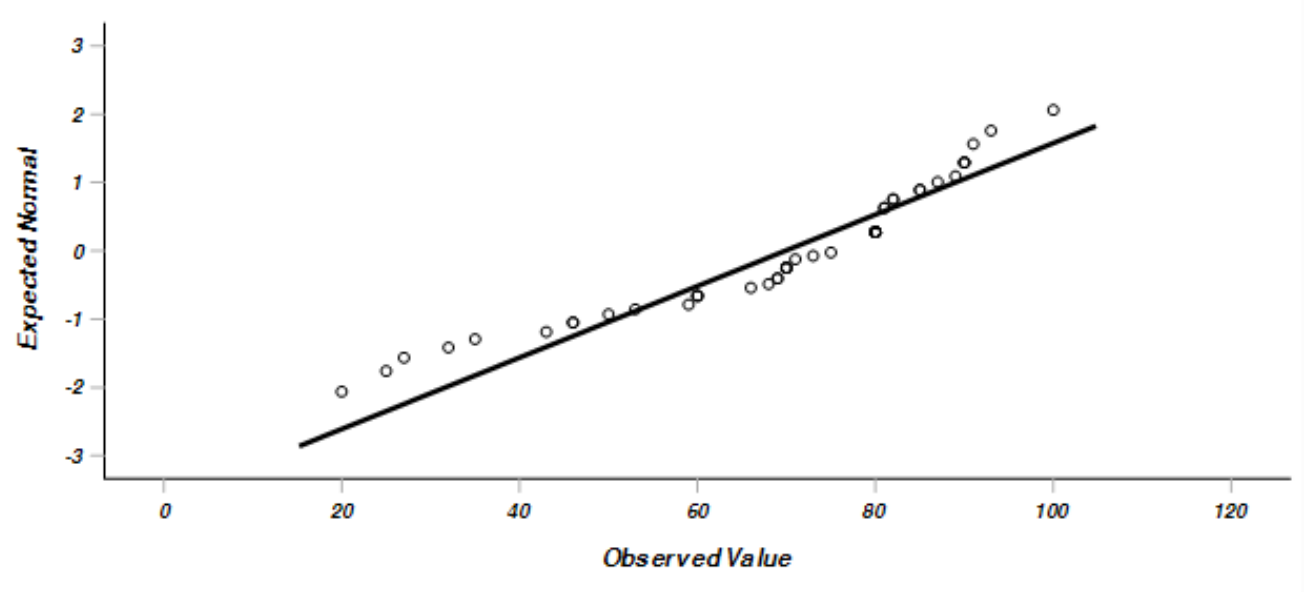


Figure 7

Distribution of day-level emotional inertia within the low-DEC/high-discrepancy group, with outliers

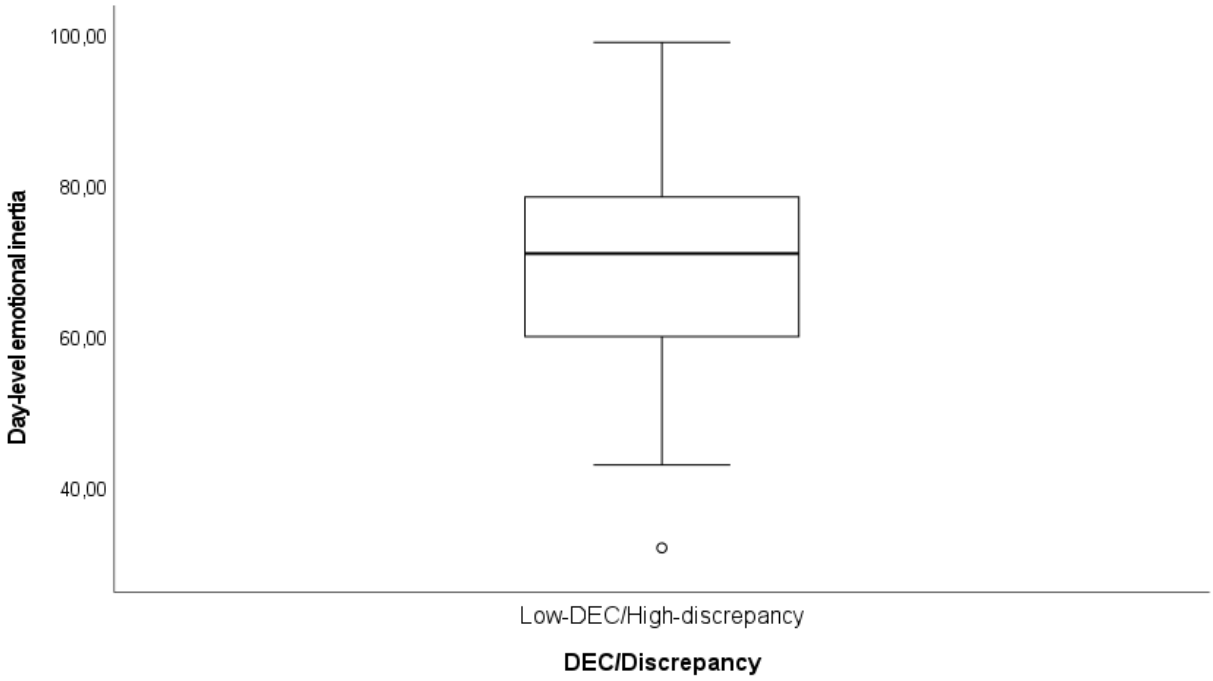


Figure 8

Distribution of day-level emotional inertia within the high-DEC/high-discrepancy group, with outliers

Rumination

Figure 9

Normal Q-Q plot of rumination within the high-DEC/low-discrepancy group

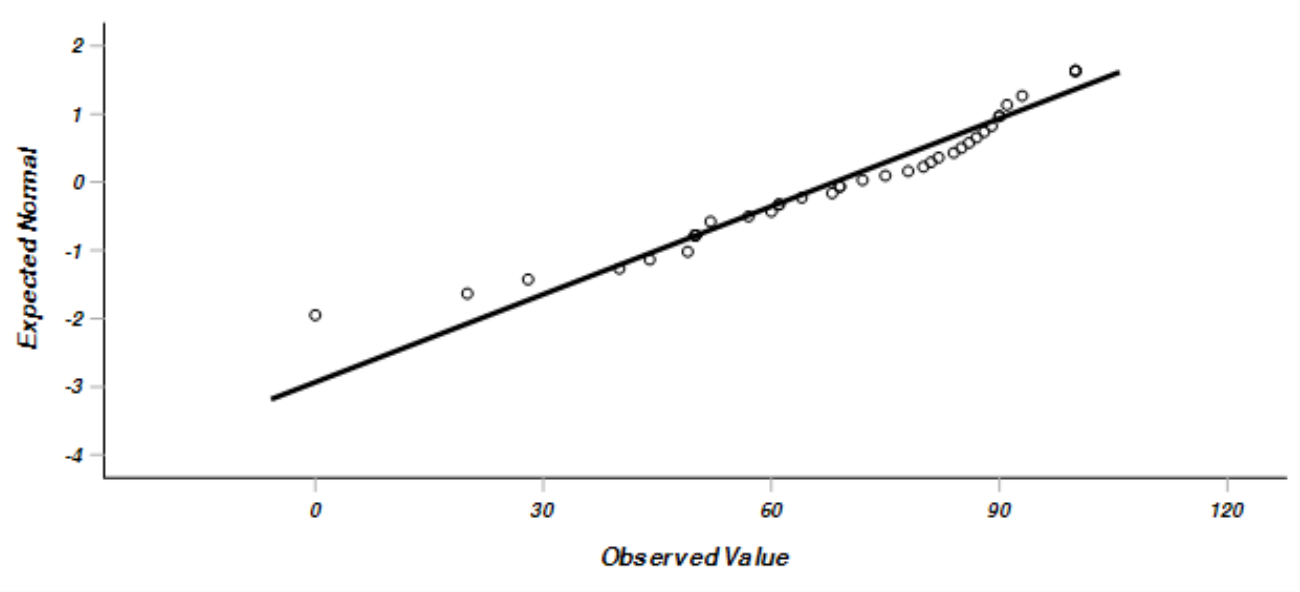


Figure 10

Normal Q-Q plot of rumination within the high-DEC/high-discrepancy group

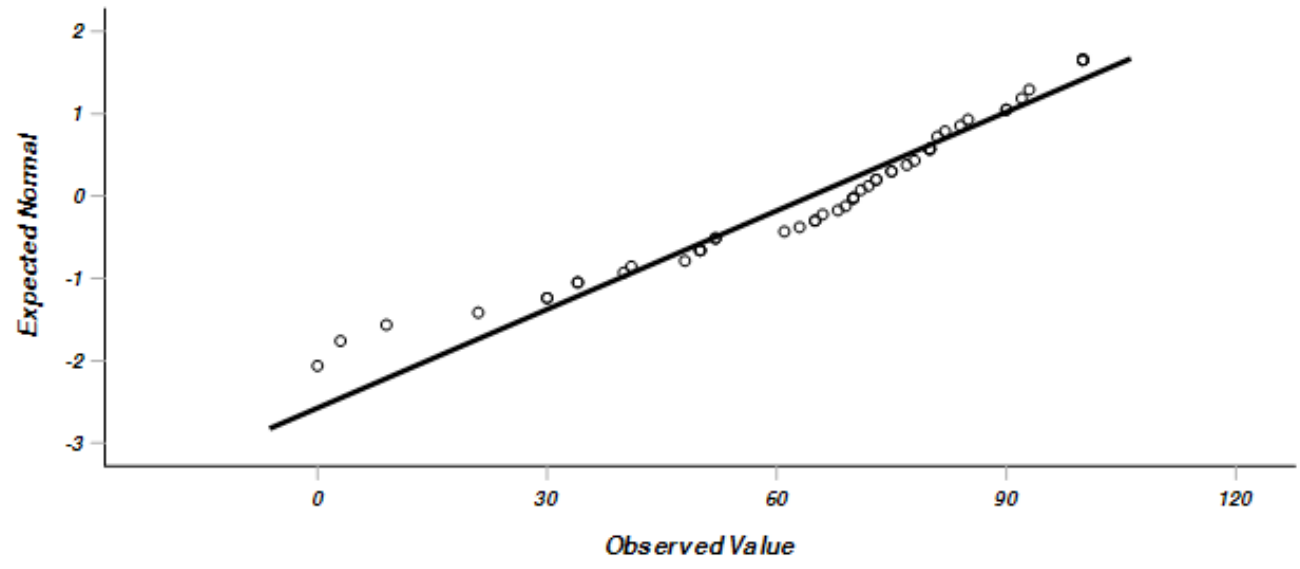
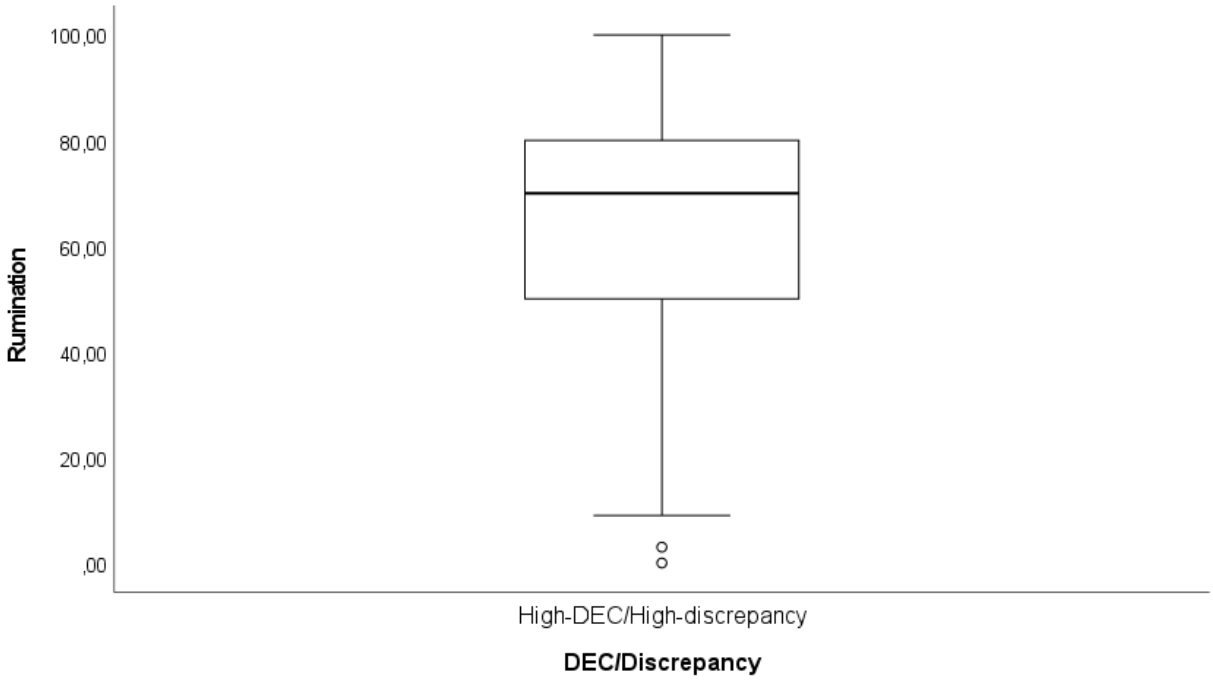


Figure 11

Distribution of rumination within the high-DEC/high-discrepancy group, with outliers



Appendix C

Tables 4 and 5 show the group means and standard deviations for day-level emotional inertia and rumination, upon outlier removal. Tables 6 and 7 contain the results of the outlier-free two-way ANOVAs for day-level emotional inertia and rumination, while Figures 12 and 13 display the relationship trends of these analyses. As previously mentioned, results did not differ drastically or significantly as a result of outlier removal.

Table 4

Day-level emotional inertia means, standard deviations and participant counts per group upon outlier removal

DEC	Discrepancy	Mean	SD	N
Low DEC	Low discrepancy	41.10	22.91	10
	High discrepancy	71.50	14.06	14
High DEC	Low discrepancy	51.21	22.41	38
	High discrepancy	72.79	15.57	47

Table 5

Rumination means, standard deviations and participant counts per group upon outlier removal

DEC	Discrepancy	Mean	SD	N

Low DEC	Low discrepancy	60.90	28.66	10
	High discrepancy	64.80	21.47	15
High DEC	Low discrepancy	68.24	23.27	38
	High discrepancy	67.06	21.86	48

Table 6

Two-way Analysis of Variance (ANOVA) of day-level emotional inertia upon outlier removal

Predictor	F	df_1	df_2	*p*	η_p^2
DEC	1,68	1	105	,198	0,016
Discrepancy	34,970	1	105	<.001	.250
DEC * discrepancy	1,007706	1	105	.318	,010

Table 7

Two-way Analysis of Variance (ANOVA) of rumination upon outlier removal

Predictor	F	df_1	df_2	*p*	η_p^2
DEC	,818	1	107	,368	,008
Discrepancy	,066	1	107	,798	,001
DEC * discrepancy	,229	1	107	,633	,002

Figure 12

Estimated marginal means of day-level emotional inertia upon outlier removal

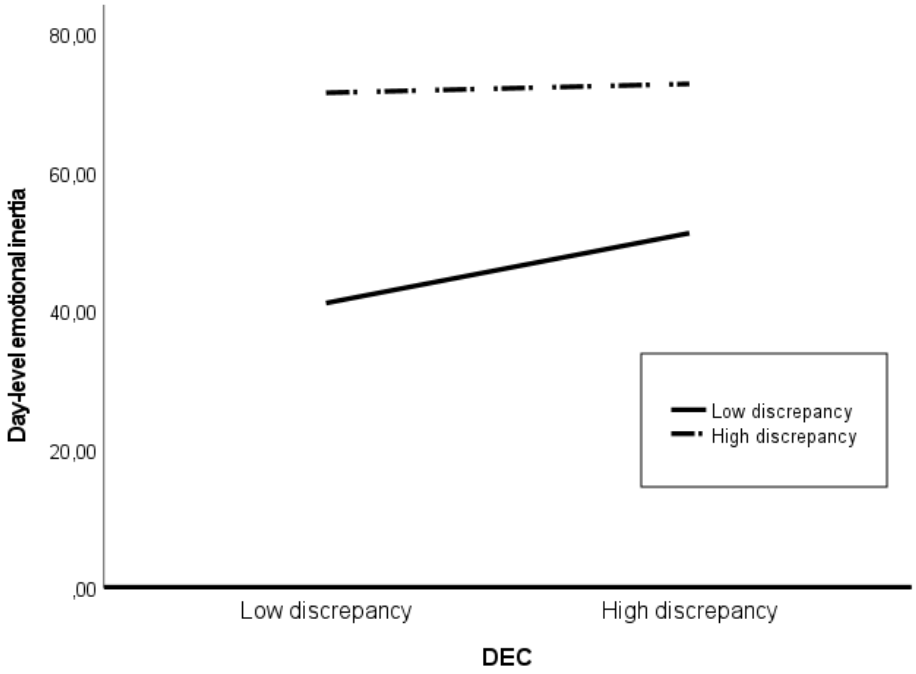
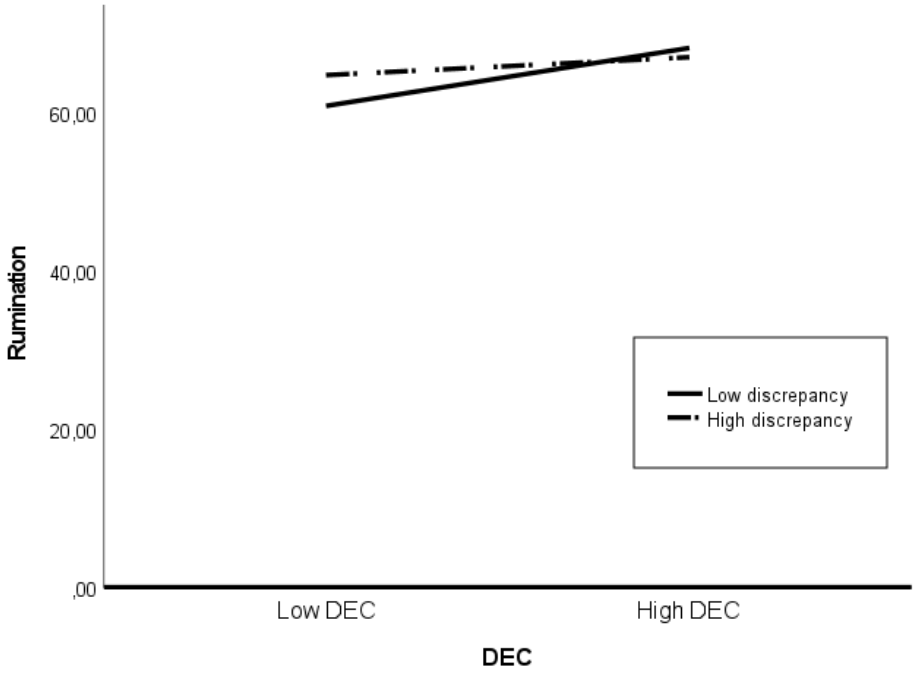


Figure 13

Estimated marginal means of rumination upon outlier removal


60,00
40,00
20,00
,00
Rumination
Low discrepancy
High discrepancy
Low DEC
High DEC
DEC