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Emotional inertia and psychological maladjustment

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Abstract

This paper examines the concept of emotional inertia to capture a fundamental property of the emotion dynamics that may characterize psychological maladjustment. Emotional inertia simply refers to the degree to which emotional states are resistant to change. As psychological maladjustment has been associated with both emotional underreactivity and ineffective emotion regulation skills, we hypothesized that its overall emotion dynamics would be characterized by high levels of inertia. Using different methods, we provide evidence from two naturalistic studies that the emotional fluctuations of individuals suffering from low self-esteem (Study 1) and depression (Study 2) are indeed characterized by higher levels of emotional inertia in both positive and negative emotions than those of their counterparts. We discuss the usefulness of the concept of emotional inertia as a hallmark feature of maladaptive emotion dynamics.

Keywords

emotion; psychological adjustment; emotional inertia; emotional variability

Feelings change. Our emotional lives are characterized by ups and downs, changes and fluctuations following the ebb and flow of daily life. Studying the patterns and characteristics of these changes gives researchers insight into the dynamics of emotions and how people regulate their emotions, for better or for worse. In this paper we examine the concept of "emotional inertia" as a fundamental feature of the dynamics of emotional experience, and study its relationship to psychological maladjustment.

Emotional variability and adjustment

One of the most pervasive findings in the study of emotion dynamics is that high levels of emotional variability are associated with maladaptive psychological functioning. Individuals who display large emotional variability over time (expressed as for instance the standard deviation of repeated emotion assessments across time) are characterized by higher levels of depression, neuroticism, and lower self-esteem, among others (e.g., Eid & Diener, 1999; Kuppens, Van Mechelen, Nezlek, Dossche, & Timmermans, 2008).

This line of research could be interpreted as showing that psychological maladjustment is characterized by greater emotional reactivity (Kuppens, et al., 2008). Yet, emotions are generally considered to be adaptive responses that aid and motivate an organism to cope

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with the demands and threats in the environment (Frijda, 2007; Izard, 2009). Anger motivates antagonism and the removal of the object of frustration, fear motivates avoiding or fleeing a threatening environment, happiness signals that things are going well and promotes further approach. In sum, the adaptive value of emotions lies in their capacity to be mobilized in response to (internal or external) events. It therefore seems contradictory that emotional reactivity *per se* would be maladaptive. Experiencing changing emotions should be generally functional and adaptive (depending on how attuned these emotional changes are to environmental contingencies), and lack of emotional responsiveness may be a sign that emotional responses have become decoupled from environmental or psychological demands, and thus, may be indicative of maladjustment.

Emotional inertia and adjustment

Upon closer inspection, emotional variability as it has been measured in studies reporting an association with psychological maladjustment, may not reflect emotional reactivityas much as the range and extremity with which emotions are experienced (Larsen & Diener, 1987). Extremely intense emotions are indeed very disruptive and characteristic of many emotional disorders (e.g., anxiety disorder, mania, depression). Experiencing a broad range of intense emotions is not, however, the same thing as being emotionally reactive. In fact, maladjustment may be characterized by *reduced* reactivity. A recent meta-analysis (Bylsma, Morris, & Rottenberg, 2008) has provided evidence that depressive disorder is characterized by what Rottenberg (2005) has labeled Emotion Context Insensitivity (ECI), or reduced emotional reactivity to the environment, with regard to both positive and negative emotions. This lower responsivity, moreover, may typify not just the onset, but also the maintenance of emotions. In general, psychological maladjustment is related to impaired emotion regulation skills (Gross, 2007). Specifically, research has shown that indicators of low psychological well-being, such as neuroticism and low self-esteem are related to impairments in affect repair (e.g., Heimpel, Wood, Marschall, & Brown, 2002; Hemenover, 2003) and evidence suggests that depression, for instance, is characterized by longer duration of negative moods and emotional states once initiated (Peeters, Nicolson, Berkhof, Delespaul & deVries, 2003; Sheeber, Allen, Davis, & Sorensen, 2000; Silk, Morris, & Steinberg, 2003).

Taken together, these findings seem to suggest that the emotion dynamics observed in psychological maladjustment might be characterized by what has been labeled emotional inertia (Suls, Green, and Hillis, 1998). Emotional inertia can be defined as resistance to change, formalized as the degree to which a person's current emotional state can be predicted by the person's emotional state at a previous moment (with high predictability reflecting high inertia). Defined in such terms, high emotional inertia means that a person's emotional state is likely to persist from one moment to the other, suggesting it may be relatively more impervious to external (e.g., events) or internal (e.g., regulation efforts) influences. High inertia may thus signal a slowing down of emotional experiences, reflecting a decoupling of emotions from their adaptive function. In turn, low emotional inertia means that one's emotional state is more susceptible to change, suggesting that it is more likely to be influenced by environmental or psychological demands and more responsive to regulatory control. It is important to underscore that emotional inertia should be viewed as conceptually distinct from emotional variability (see, e.g., Jahng, Wood, & Trull, 2008). A person can display high levels of both emotional inertia and variability (for instance in the case of large but slow mood shifts), high inertia but low variability (small and slow mood shifts), low inertia and high variability (with frequent and sudden shifts), and both low inertia and low variability (frequent small shifts).

The concept of emotional inertia has implications for understanding of both emotion generation and emotion control (c.f., Koole, 2009). It captures both the decreased reactivity

that is central to the ECI account as well as the decreased ability to change moods and emotions that reflects deficient emotion regulation skills. Emotional inertia may therefore prove to be a hallmark feature of the dynamical unfolding of emotions that is tied to psychological maladjustment.

Before research explores the boundary conditions and underlying processes of emotional inertia, it is crucial to establish that increased emotional inertia indeed characterizes the emotional dynamics of individuals who show signs of psychological maladjustment (see Rozin, 2009). So far, the concept of emotional inertia has largely escaped empirical attention. A notable exception is the study by Suls, et al. (1998) that introduced the concept of affective inertia, and indeed demonstrated that neuroticism increased the likelihood of a negative mood at one moment being carried over to the next moment. Yet, additional evidence is needed to establish the potential role of emotional inertia as a feature of maladaptive emotional dynamics. Also, it is important to examine whether maladjustment is associated with inertia solely of negative affective states, or whether it is a more general dynamical characteristic that is relevant to both positive and negative affects.

The aim of the present study is to establish the usefulness of the concept of emotional inertia by examining its relationship with indicators of psychological adjustment. We chose to focus on two central and important indicators of psychological adjustment: Self-esteem, which is widely considered to be central to psychological functioning and well-being (Kernis, 2006), and major depression, a mood disorder that afflicts close to one sixth of the general population and is projected to become the number one mental health threat in the coming decades (Kessler, 2002). We examined the hypothesis that low self-esteem and depression (which are themselves highly related; Neiss, Stevenson, Legrand, Iacono, & Sedikides, 2009) are associated with higher emotional inertia in two studies that relied on different methodologies and that each focused on one of these two indicators of psychological adjustment. In Study 1, we examined the relationship between self-esteem and inertia of people's naturally occurring emotional experiences throughout their daily life. In Study 2, we examined the relationship between major depression and inertia in emotional behavior during emotionally evocative family interactions.

Study 1

An Experience Sampling study (Csikszentmihalyi & Larsen, 1987) was conducted to collect data on the natural emotional changes and fluctuations that occur during daily life. Because Experience Sampling techniques capture life "as it is lived" (Bolger, Davis, & Rafaeli, 2003), they benefit from high ecological validity and are less subject to recall biases than other self-report methodologies. Participants recorded their momentary emotional experiences over the course of two weeks. Multilevel analyses examined the hypothesis that low self-esteem, as an indicator of psychological maladjustment, is related to elevated levels of emotional inertia.

Method

Participants—Eighty university students took part in the study. One participant ended the study after one day of sampling, resulting in a final sample of 79 participants (50 female, 29 male; Mean age = 24 years). Participants were paid 40€ for their participation.

Materials and Procedure—In a first session, each participant received a palmtop computer along with instructions for its use. Each palmtop was programmed to beep 10 times a day for 14 consecutive days during the participant's waking hours. The beeps were programmed according to a stratified random interval scheme: Participants' waking hours were divided into 10 equal intervals and one beep was randomly programmed within each

interval. At each beep, the palmtop was programmed to ask participants to rate (in randomized order) how happy, excited, relaxed, satisfied, angry, anxious, depressed, and sad they felt at the moment of the beep, using a continuous slider scale that ranged from 0 (not at all) to 100 (very much). The selection of emotion terms was based on their representation of all quadrants of the affective circumplex (Russell, 2003). For the next two weeks, participants carried the palmtop during their normal daily activities and responded to the questions when signaled. Compliance was good: Overall, participants responded to 82% of the programmed beeps (ranging between 55% and 99% for individual participants). After two weeks, participants attended a second session and were paid for participation. In addition, each participant filled-out the Rosenberg (1989) Self-esteem scale (either before or after the sampling procedure, based on random assignment).

Results

Following a process approach to examine time as a facet of data (Larsen, Augustine, & Prizmic, in press), we examined within-person emotion autocorrelations and their between-person association with self-esteem in a multilevel framework. An autocorrelation (i.e., the correlation of a variable with itself at a time-lagged interval; Box & Jenkins, 1970) expresses the extent to which a current observed variable can be predicted based on the value of that variable at a previous timepoint, and can therefore be considered to be a direct operationalization of the concept of emotional inertia. We used multilevel techniques to take into account the nested data structure and resulting dependencies (e.g., Bryk & Raudenbush, 1992) and to examine the moderating role of self-esteem in individual differences in the emotions' autocorrelations. Specifically, at Level 1 of the model, we predicted each emotion at time *t* by that same emotion at the previous assessment (*t*-1). At Level 2, the intercept and slope values of each emotion were allowed to vary across participants, and were predicted by the level of participants' self-esteem.

Table 1 summarizes the findings. At Level 1, the significant intercept values indicate that participants experienced higher than zero levels on average for all emotions. The intercept values also reveal that people experienced more positive than negative emotions on average, in line with previous findings (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004;Zelenski & Larsen, 2000). All slope values were significant at Level 1, meaning that on average, all emotions displayed positive significant autocorrelations (i.e., that participants' emotion states at time *t* were significantly predicted by their state at *t*-1). This suggests that some degree of emotional inertia is normative. At Level 2, self-esteem was a significant positive predictor of individual differences in intercept values for happy, excited, relaxed, and satisfied, and a negative predictor for intercept values for anxious and depressed (and marginally significant for anger), indicating that participants with higher self-esteem on average felt more positive emotions, and also less anxious, depressed, and angry emotions compared with participants with lower self-esteem, again replicating previous findings (Diener & Diener, 1995). Finally, and central to our research question, the slopes at Level 2 reflect how self-esteem is associated with individual differences in autocorrelation/inertia for the different emotions. The results show that self-esteem was significantly related to the autocorrelation slopes for the majority of the studied emotions. As predicted, lower levels of self-esteem were associated with higher inertia for the experience of happy, excited, angry, anxious, and depressed emotions. Self-esteem was not significantly related to inertia for relaxed, satisfied, or sad emotions, although the direction of the associations for each of these emotions was in the predicted direction.

Consistent with our hypothesis, Study 1 provided evidence that low self-esteem is related to higher emotional inertia across a variety of emotions in daily life. This means that relative to those of individuals with higher self-esteem, the emotional states of individuals with low self-esteem are more resistant to change. Interestingly, our findings showed that the

association between self-esteem and inertia held for both positive and negative emotions, indicating that emotional inertia extends across hedonic boundaries.

Study 2

Contemporary research on depression suggests that the emotional life of depressed individuals is not characterized by increased emotional reactivity, but rather by emotional insensitivity (Rottenberg, 2005). In addition, depression is associated with impaired emotion regulation skills (Gross & Muñoz, 1995) and ruminative thought (Watkins, 2008), suggesting a decreased capacityto change one's emotions and thoughts. Together, these observations may suggest that the emotional changes depressed individuals exhibit may be more inert compared to non-depressed individuals. In Study 2, we examined this hypothesis based on data on the emotional behavior of depressed and non-depressed adolescents during lab-based interactions with their parents. Because interpersonal relationships are strong elicitors of emotional states and family relations are arguably the most salient interpersonal predictor of depressive symptomatology in adolescents (Sheeber, Hops, & Davis, 2001), family interactions provide an especially appropriate context for observing affective behavior. In addition, this study enabled us to examine emotional inertia on a much shorter time-scale than Study 1. Whereas the former study concerned inertia across relatively large time periods (hours), the current study allowed to examine emotional inertia at the level of seconds. As before, multilevel analyses were used to examine the hypothesis that psychological maladjustment (here operationalized by the presence of depressive disorder), is related to elevated levels of emotional inertia.

Method

Participants—Participants were 141 adolescents (94 females, 47 males; Mean age = 16 years) recruited using a two-gate procedure consisting of a school-based screening of depressive symptoms (CES-D; Radloff, 1977) followed by diagnostic interviews with selected youth (K-SADS; Orvaschel & Puig-Antich, 1994). Depressed adolescents (n = 72) evidenced elevated scores on the CES-D (>31 for males and >38 for females) during the screening and subsequently met DSM-IV (APA, 1994) diagnostic criteria for current major depressive disorder. Non-depressed adolescents (n = 69) scored below an adolescent-appropriate cut-off on the CES-D (<21 for males and <24 for females) and did not meet criteria for depressive or other disorders at subsequent interview.

Materials and procedure—Families of the selected adolescents participated in three family interaction tasks in the lab. Each task consisted of two discussions that lasted 9 minutes each. In the first task, families were first instructed to plan a vacation and then to talk about a fun time they had experienced together (positive tasks). The second task consisted of two problem-solving interactions in which families were asked to discuss and resolve areas of conflict (conflict tasks). In the last task, families were asked to discuss two areas of family life; one focused on identifying and describing the best and most difficult years the adolescent had experienced, the other on the most challenging and most rewarding aspects of parenting the adolescent (reminiscence tasks). We have found these tasks to elicit differential levels of happy, angry, and dysphoric affect. During the interactions, family members were videorecorded for subsequent behavioral coding. The Living in Family Environments coding system (LIFE; Hops, Biglan, Tolman, Arthur, & Longoria, 1995) was used to code adolescent behavior during the family interactions. The validity of the LIFE system has been established in numerous studies of adolescent depression (e.g., Katz & Hunter, 2007; Sheeber et al., 2007). Observers, blind to diagnostic status and hypotheses, coded the adolescents' nonverbal affect and verbal content in real time. Three constructs indicating angry, dysphoric, and happy behavior were derived from the individual affect and

content codes. Angry behavior included aggressive or contemptuous nonverbal behavior and cruel or provoking statements. Dysphoric behavior was defined by sad nonverbal behavior or statements. Happy behavior reflected happy nonverbal behavior or statements. This procedure yielded second-by-second time-series information on the emotional (happy, angry, dysphoric) behavior of both depressed and non-depressed adolescents during several different interaction tasks with their parents.

Results

The data consist of binary behavioral codes (e.g., happy/not happy) nested within interaction tasks, nested in persons, and were accordingly analyzed using three-level logistic autocorrelation regression models. In a first series of analyses, adolescent behavior (e.g., happy behavior) at time *t* was predicted by the adolescent's behavior at time *t*-5s at Level 1 of the model, nested in interaction task at Level 2, and the person-specific intercept and slope values were predicted by the presence or absence of depression at Level 3. The results can be found in Table 2. At Level 1, participants displayed significant degrees of happy, angry, and dysphoric behavior, and each of these behaviors demonstrated a significant degree of autocorrelation (inertia). At Level 3, examination of the intercepts shows that depressed participants displayed significantly more angry (but not dysphoric or happy) behavior than non-depressed participants. In relation to our central research question, the results showed that depressed participants overall differed significantly in their autocorrelation or inertia from non-depressed adolescents. Consistent with our hypotheses, the depressed participants displayed greater inertia for happy, angry, and dysphoric emotional behavior.

In a second series of analyses, we explored how the observed difference in emotional inertia varied as a function of the interaction task. As emotional demands may be higher in tasks that require focus on areas of disagreement (conflict tasks) or challenge (reminiscence tasks), as opposed to pleasurable events (positive tasks), it is plausible that differences in inertia may be particularly salient in the former tasks. We therefore examined whether the difference between depressed and non-depressed participants in emotional inertia was larger in the conflict and reminiscence tasks. We estimated multilevel models in which emotional behavior at time *t* was predicted by emotional behavior at time *t*-5s at Level 1, allowing for different intercept and slope values for the three types of interaction at Level 2, which were then predicted by depression at Level 3.[1] For parsimony, we limit ourselves here to reporting the results relevant to differences in inertia between depressed and non-depressed participants as a function of interaction type. Regarding happy behavior, the findings showed that depressed adolescents evidenced significantly higher autocorrelations in the conflict (B = .40, SE = .12, p = .002) and reminiscence (B = .33, SE = .11, p = .005), but not in the positive tasks (B = −.03, SE = .08, p = .745). The results were similar for dysphoric behavior: Depressed participants displayed higher autocorrelations in both the conflict (B = .26, SE = .13, p = .048) and reminiscence (B = .30, SE = .12, p = .014), but not in the positive tasks (B = .16, SE = .14 p = .256). Although the results trended in the same direction for angry behavior, the differences were not significant (conflict: B = .28, SE = .17, p = .111; reminiscence: B = .27, SE = .16, p = .085; positive: B = .13, SE = .17 p = .438). Taken together, these results suggest that depressed participants displayed greater emotional inertia particularly during tasks that were more conflictual or challenging.

Study 2 differed in several notable respects from Study 1. Study 1 examined self-esteem, whereas Study 2 focused on major depression as an indicator of psychological adjustment.

[1]To this end, dummy variables indicating the three type of interaction tasks were added at Level 2 of the models, while omitting the intercept term at this level.

Study 1 examined self-reported emotions throughout daily life as compared to observed emotional behavior. Finally, Study 1 examined emotional inertia over the course of hours, whereas Study 2 across seconds. Despite these differences, the two studies both supported the conclusion that individuals evidencing poorer psychological adjustment manifest markedly higher levels of emotional inertia in both positive and negative emotions. Moreover, Study 2 provided additional evidence that this is particularly the case in contexts that are stressful or involve negative interactions with significant others.

Discussion

We explored emotional inertia as a potentially fundamental feature of emotional dynamics associated with psychological maladjustment. We hypothesized that the emotional fluctuations of individuals experiencing psychological maladjustment would be more resistant to change and thus display higher inertia. Findings from two studies supported this hypothesis by showing that the emotions experienced by individuals with low self-esteem display higher autocorrelations throughout daily life as compared to those of high self-esteem individuals (Study 1), and that the emotional behavior of depressed adolescents displays higher autocorrelations during emotionally evocative interactions with their parents relative to the emotional behavior of nondepressed adolescents (Study 2). The higher levels of inertia may therefore reveal a fundamental feature of the emotion dynamics characteristic of low self-esteem and depression, as indicators of psychological maladjustment: Changes are less sudden, states are more pervasive, responsivity is diminished or slowed. In other words, emotional inertia reflects a "flattening of the emotional landscape" (Rottenberg, 2005).

Of note is the finding from Study 2 indicating that differences in emotional inertia were evident particularly during emotionally taxing circumstances. This finding is interesting because it suggests that emotional inertia may not be a persistent trait-like disposition, but instead, that it might be especially evident in particular circumstances. Further attention to the nature of situations in which emotional inertia is displayed, as well as the impact of inertia on individuals' ability to successfully navigate those situations are important directions for future research.

A striking finding in the two studies was that low self-esteem and depression were associated with higher inertia for both positive and negative emotions. Whereas it is intuitively acceptable that psychological maladjustment is indeed characterized by lower positive reactivity, it seems less straightforward that it is also associated with more pervasive positive emotions and mood. Yet, our findings seem to suggest that the resistance to change indeed applies to both positive and negative emotions. To be sure, individuals characterized by low psychological adjustment experience fewer positive emotions. Yet, once they experience positive emotions, these states may be slow to change. Emotional inertia therefore seems to have a profound impact on the dynamics of emotions, affecting emotions irrespective of their hedonic value.

Our study did not speak to the mechanisms that underlie emotional inertia. We offer the hypothesis that emotional inertia results from reductions in responsivity to internal and external stimuli as well as from failures of emotion regulatory processes aimed at altering emotional states. Emotions are thought to be adaptive largely because of their ability to prepare and motivate an organism to respond to personally relevant threats and challenges. Emotion regulation, in turn, serves to alter the experience or expression of these emotions as a function of the constraints placed by the individual or society on hedonistic or instrumental motives (Tamir, 2009). Increased emotional inertia may reflect what happens when the adaptive processes of emotion responding and control are dampened. In addition, it is likely

that inertia is affected by interpersonal processes as well, stemming from possible maladaptive ways of eliciting and reciprocating social information with others. Moreover, the fact that emotional inertia was observed across different time-scales does not necessarily imply that similar mechanisms are at work in emotional inertia observed across seconds or across minutes/hours. Clarifying the meaning of different inertia time scales and the underlying intrapsychic and interpersonal processes will be an important task for future research.

In conclusion, emotional inertia appears to be a useful, but understudied, unifying concept that captures a fundamental feature of how emotions unfold over time and is characteristic of the emotion dynamics tied to psychological maladjustment. Further research is needed, however, to pinpoint the underlying processes and determinants of inertia, to examine the occurrence of emotional inertia in other manifestations of psychological maladjustment (e.g., emotional inertia may feature as the emotional numbing characteristic of PTSD symptoms), and its impact on subsequent functioning and social interactions.

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Table 1

Multilevel autocorrelation analyses for each emotion, predicted by level of self-esteem

Emotion		Level 1			Level 2 (self-esteem)		
		B	SE	p	B	SE	p
Happy	Intercept	58.58	1.48	.000	7.45	2.52	.005
	Slope	0.30	0.02	.000	−0.07	0.03	.032
Excited	Intercept	55.53	1.58	.000	8.54	2.52	.001
	Slope	0.33	0.02	.000	−0.08	0.03	.025
Relaxed	Intercept	61.53	1.42	.000	8.12	2.43	.002
	Slope	0.27	0.02	.000	−0.04	0.04	.304
Satisfied	Intercept	59.96	1.30	.000	9.29	2.38	.000
	Slope	0.29	0.02	.000	−0.06	0.04	.123
Angry	Intercept	6.63	0.70	.000	−2.57	1.46	.082
	Slope	0.20	0.03	.000	−.09	0.05	.051
Anxious	Intercept	7.38	1.11	.000	−8.84	2.80	.003
	Slope	0.22	0.02	.000	−0.14	0.04	.002
Depressed	Intercept	6.70	0.75	.000	−7.11	1.79	.000
	Slope	0.22	0.03	.000	−0.11	0.05	.025
Sad	Intercept	8.58	0.87	.000	−5.20	1.80	.005
	Slope	0.27	0.03	.000	−0.06	0.05	.297

Note. In each analysis, the lagged predictor was group-mean centered at Level 1. To remove previous day effects, the first measurement of each day for the lagged variables was replaced with a missing value. At Level 1, the intercept reflects the average emotion rating and the slope reflects the average autocorrelation/inertia. At Level 2, self-esteem was grand centered. Here, the intercept reflects the association between self-esteem and the average emotion level across participants, and the slope reflects the association between self-esteem and the autocorrelation/inertia across participants.

Table 2

Logistic multilevel autocorrelation analyses for each emotional behavior, predicted by presence or absence of depression

Behavior		Level 1			Level 3 (depression)		
		B	SE	p	B	SE	p
Happy	Intercept	−1.60	0.09	.000	−0.16	0.15	.279
	Slope	1.63	0.05	.000	0.21	0.07	.005
Angry	Intercept	−3.89	0.16	.000	0.83	0.21	.000
	Slope	1.79	0.09	.000	0.26	2.28	.024
Dysphoric	Intercept	−2.37	0.10	.000	0.16	0.14	.387
	Slope	1.84	0.06	.000	0.24	0.09	.010

Note. At Level 1, the intercept reflects the (log-odds ratio of the) average probability to display emotional behavior for non-depressed participants and the slope reflects the average autocorrelation/inertia for non-depressed participants. At Level 3, the intercept reflects the deviation from these average intercept and slope values for depressed participants. To aid interpretation and comparability to the results reported in Study 1, we report regression coefficients and SE's instead of Odds-ratios and confidence intervals.