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1           **A Network Approach to Affect Regulation Dynamics and Personality Trait-Induced Variations:**  
2 **Extraversion and Neuroticism Moderate Reciprocal Influences Between Affect and Affect**  
3 **Regulation Strategies**

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## 1. Introduction

Affect regulation is involved in many important areas of individuals' lives, including health, wellbeing, and career success (Mikolajczak & Desseilles, 2012). There have therefore been frequent attempts to understand it. These attempts have often emphasized the dynamic nature of its processes. Specifically, for many decades, the prevailing models of affect regulation have highlighted the way regulatory processes, especially affect regulation strategies (i.e., the strategies individuals can use to modify their affect), influence both current and subsequent affective experiences (Gross, 1998; Lazarus & Folkman, 1984). By contrast, these same models have long overlooked the regulatory role played by affective experiences, thus neglecting the reciprocal influences that experiencing affect and implementing affect regulation strategies can exert on each other. Yet, an integrative perspective considering the possible interplay between affect and affect regulation strategies might more fully explain the dynamics of affect regulation than an approach focusing solely on the dependence of affect on affect regulation strategies (Philippot, 2011). Furthermore, the new network approaches (Schmittmann et al., 2013) that are starting to emerge in the psychology literature provide the methodological tools needed to test the hypothesis that the dynamics of broad psychological phenomena (e.g., affect regulation) rely on reciprocal influences between more specific variables (e.g., affect and affect regulation strategies).

Affect regulation dynamics may also be understood more deeply by examining how they differ from one person to another. The stable disposition to feel certain affects or use certain affect regulation strategies is known to vary according to interindividual differences in personality traits (Carver & Connor-Smith, 2010). However, the impact of these interindividual differences on affect regulation dynamics has rarely been examined, even though their contribution to dynamic psychological processes has been recognized for at least two decades (Mischel & Shoda, 1995).

The present study was designed to improve current knowledge of affect regulation dynamics. To this end, we attempted to address the neglected issues of interindividual differences in these dynamics and the influence of affective experiences on the use of affect regulation strategies. Specifically, we adopted a network approach to test a conceptualization of affect regulation dynamics whereby affective experience

1 and affect regulation strategy use constantly influence each other. An experience sampling method enabled  
2 us to capture these relationships as they occur in everyday life. We not only revealed the structure of the  
3 network made up of these relationships at the sample level, but also determined whether it varies according  
4 to interindividual differences in two basic personality traits (extraversion and neuroticism).

### 5 **1.1. A Network Approach to Affect Regulation Dynamics**

6 For at least three decades, the main models of affect regulation adopted in psychology research have  
7 emphasized the effect of certain regulatory mechanisms on affective feelings<sup>1</sup> (e.g., Gross, 1998; Lazarus &  
8 Folkman, 1984). For instance, the model of affect regulation proposed by Gross (1998) highlights the  
9 different influences exerted on affective experience by five categories of cognitive or behavioral strategies  
10 used by individuals to modify their affect (i.e., situation selection, situation modification, attentional  
11 deployment, cognitive change, and response modulation). A number of affect regulation strategies have  
12 been identified on the basis of these models, and their effects on concurrent and subsequent affective  
13 feelings have been widely studied (Mikolajczak, 2009, Quoidbach, 2009).

14 The most popular models of affect regulation in psychology research today place more emphasis on the  
15 influence that affective experiences exert in turn on the implementation of affect regulation strategies  
16 (Gross, 2015; Kuppens, Oravecz, & Tuerlinckx, 2010). In this context, affective feelings are no longer  
17 simply phenomena that need to be regulated. Their regulatory role is also considered. One example is the  
18 extended process model of emotion regulation (Gross, 2015). This theory states that changes in affective  
19 experiences, just like changes in all other components of the external or internal environment, are evaluated  
20 by individuals as “indifferent, good for me, or bad for me” (Gross, 2015, p. 10). This evaluation is thought  
21 to consist of a comparison individuals make between the affect they are actually feeling and the one they  
22 would like to feel. When a difference emerges between these actual and desired affective experiences,  
23 individuals are assumed to be motivated to implement affect regulation strategies to reduce this gap. When  
24 the gap is sufficiently closed, they are thought to stop using affect regulation strategies. The resulting  
25 conceptualization of affect regulation dynamics consists mainly of negative feedback loops between affect

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<sup>1</sup> In this paper, we use the terms *affective experience* and *affective feeling* to refer to the same phenomenon: an affective state present within an individual who may or may not be aware of this state.

1 and affect regulation strategies (i.e., an increased experience of negative affect triggers the use of various  
2 affect regulation strategies which, in turn, reduces the initial negative affect).

3 The idea that affective feelings can influence the implementation of affect regulation strategies is also  
4 supported by some theories pertaining to the broad impact of affective experience on cognition and behavior  
5 (Bowers, 1991; Fredrickson, 1998, 2001), and has been confirmed by empirical studies (Burns et al., 2008;  
6 Fredrickson & Joiner, 2002; Moberly & Watkins, 2008; Pavani, Le Vigouroux, Kop, Congard, & Dauvier,  
7 2015). Contrary to what recent models of affect regulation state (Gross, 2015; Kuppens, Oravecz, et al.,  
8 2010), these theories and findings suggest that there are at least as many positive feedback loops between  
9 affect and affect regulation strategies as there are negative ones. Despite this disagreement, which we  
10 discuss below, recent theories of affect regulation (i.e., Gross, 2015; Kuppens, Oravecz, et al., 2010),  
11 theories on the broad impact of affective experiences on cognition and behavior (i.e., Bowers, 1991;  
12 Fredrickson, 1998, 2001), and several initial studies (Burns et al., 2008; Fredrickson & Joiner, 2002;  
13 Moberly & Watkins, 2008; Pavani et al., 2015), all agree that reciprocal influences can exist between affect  
14 and affect regulation strategies. Given that these influences operate over time (affective experiences  
15 determine the subsequent implementation of affect regulation strategies which, in turn, determines fresh  
16 affective feelings), they presumably constitute the dynamics of affect regulation.

17 This emerging perspective on affect regulation dynamics is in line with recent network approaches  
18 (Schmittmann et al., 2013). When applied to dynamic processes, including affective dynamics (Bringmann  
19 et al., 2013; Bringmann, Lemmens, Huibers, Borsboom, & Tuerlinckx, 2015; Bringmann et al., 2016; Pe et  
20 al., 2015), network approaches conceptualize broad psychological phenomena (e.g., depression) as  
21 networks made up of more specific components that are temporally related to one another (e.g., tiredness  
22 and sadness). The relationships between these variables over time are thought to constitute the dynamics of  
23 the psychological network to which they belong. For example, many depressive symptoms reinforce each  
24 other over time, thus constituting the dynamics of depression (Bringmann et al., 2015). Similarly, as  
25 mentioned above, affect regulation dynamics can be conceptualized as a network composed of affect and  
26 affect regulation strategies that exert reciprocal influences on each other over time. Below, we identify the

1 components of affect regulation we chose to focus on, as they represent the types of affect and affect  
2 regulation strategies that are most likely to influence each other.

### 3 **1.1.1. Affective components: positive and negative affect**

4 Few studies have focused on the possible influence of affective experiences on the subsequent  
5 implementation of affect regulation strategies (Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Burns et al.,  
6 2008; Fredrickson & Joiner, 2002; Moberly & Watkins, 2008; Pavani et al., 2015). Nevertheless, their  
7 findings all stress the importance of considering affective valence (i.e., positive or negative affect). The  
8 broaden-and-build theory (Fredrickson, 1998, 2001) and the affect priming theory (Bowers, 1991) outline  
9 different mechanisms explaining how affective valence can influence the use of affect regulation strategies.

10 The broaden-and-build theory (Fredrickson, 1998, 2001) states that the experience of a positive affect  
11 momentarily triggers a cognitive and behavioral broadening mechanism. Such a broadening process is  
12 manifested by a temporary widening of the attentional scope and thought-action repertoire of the person  
13 who has felt this affect. This mechanism is supposed to encourage individuals to explore their environment  
14 when they encounter a healthy situation. Several studies confirm this hypothesis, notably revealing that a  
15 positive affect experience is followed by an increases in creativity and cognitive flexibility (Davis, 2009;  
16 Tsai, Lin, Chen, & Lin, 2014). Interestingly, creativity and flexibility are particularly important in the  
17 implementation of so-called broadminded affect regulation strategies (Fredrickson & Joiner, 2002). These  
18 strategies are characterized by a broad perspective on the causes of one's affective feelings (e.g., discovering  
19 new ways of interpreting an unpleasant situation, identifying ways of altering it through concrete actions,  
20 directing attention away from it). If the experience of positive affect enhances creativity and cognitive  
21 flexibility, and if enhanced creativity and cognitive flexibility facilitate the implementation of broadminded  
22 affect regulation strategies, then it is not surprising to observe that positive affect feelings primarily  
23 influence the use of this type of strategy (Burns et al., 2008; Fredrickson & Joiner, 2002; Pavani et al., 2015;  
24 but for an exception, see Brans et al., 2013).

25 The broaden-and-build theory (Fredrickson, 1998, 2001) also acknowledges that the experience of a  
26 negative affect momentarily engenders a cognitive and behavioral narrowing mechanism. Such a process is

1 associated with an attentional fixation on the threats present in the environment, and a reduction in the  
2 repertoire of available thoughts and actions, in favor of ones that promote fight, flight, or freeze. This  
3 cognitive and behavioral narrowing following a momentary experience of negative affect has been  
4 demonstrated in numerous studies (e.g., Gasper & Clore, 2002; Hamilton, 1989; Matthews & Wells, 2000).  
5 Once again, the implementation of certain affect regulation strategies may be particularly sensitive to this  
6 process. These strategies can be labeled “narrow-minded” strategies, because they are characterized by the  
7 fixation of thoughts and attention on certain stimuli, or by the inhibition of some behaviors. For instance,  
8 within a few hours of experiencing more negative affect, individuals are more inclined to ruminate (Brans et  
9 al., 2013; Moberly & Watkins, 2008; Pavani et al., 2015).

10 The mechanisms outlined in the affect priming theory (Bowers, 1991) are based on the specific  
11 organization of information in memory. According to this framework, each affect is represented in memory  
12 by a concept, and each affective concept in memory is related to the words, propositions and images that  
13 accompanied the previous feelings of this affect. Thus, the experience of an affect activates the  
14 corresponding affective concept in memory, as well as all the information to which it is related. In other  
15 words, feeling a positive affect activates positive information, whereas feeling a negative affect activates  
16 negative information. In turn, this information is thought to momentarily shape information processing. For  
17 example, several studies have shown that eliciting a particular affect results in the retrieval of memories,  
18 biases in attention deployment, and the interpretation of ambiguous situations that are all congruent with the  
19 valence of the initial induced affect (Bowers, 1991; Forgas, 1995). These affective priming effects may  
20 explain the influence exerted by affective experiences on subsequent engagement in particular affect  
21 regulation strategies, most of which involve the display of positive or negative thoughts and interpretations,  
22 or the direction of attention toward pleasant or unpleasant stimuli (Gross, 1998).

### 23 **1.1.2. Affect regulation strategy components: broadminded and narrow-minded strategies**

24 Not only is engagement in broad- or narrow-minded affect regulation strategies likely to depend on  
25 prior experiences of positive or negative affect, but it is also thought to influence subsequent feelings of  
26 positive or negative affect. For instance, the ability to flexibly change one’s point of view, behavior or focus



1 of attention forms the basis of the main psychological interventions designed to promote affect regulation  
2 (Beck, 2011; Seligman, Rashid, & Parks, 2006). We chose to focus on three broadminded strategies (i.e.,  
3 appreciation, positive reappraisal, and distraction) and two narrow-minded strategies (i.e., expressive  
4 suppression and rumination). There were three reasons for this choice. First, each of these five strategies can  
5 be described as either broad- or narrow-minded. Second, their implementation, be it habitual or momentary,  
6 has been shown to exert a significant influence on affective valence (see below). Third, these five strategies  
7 have been widely studied, and are thus familiar to people interested in affect regulation research.

8       Appreciation refers to the initiative to notice and enjoy those aspects of life that individuals usually rush  
9 through (Seligman et al., 2006). This strategy can be seen as a broad-minded strategy, as its implementation  
10 rests on a change in one's cognitive habits. First, implementing appreciation involves directing attention to  
11 the present moment. Second, using this strategy entails a modification in the initial appraisal of a seemingly  
12 neutral situation that becomes pleasant once all its small positive aspects have been recognized.  
13 Appreciation has been shown to promote mainly positive affect experiences (Erisman & Roemer, 2010;  
14 Fagley, 2012).

15       Positive reappraisal consists in perceiving negative events as beneficial (Folkman, 1997). This strategy  
16 involves changing one's initial interpretation of a negative event by considering the positive features of this  
17 event. The contributions of creativity and cognitive flexibility to this process has already been  
18 acknowledged (e.g., Weber, de Assunção, Martin, Westmeyer, & Geisler, 2014). Positive reappraisal has  
19 been shown to influence affective experiences mostly by increasing positive affect feelings (Rood, Roelofs,  
20 Bögels, & Arntz, 2012; Shiota & Levenson, 2012). By contrast, the effect of this strategy on affective inertia  
21 (i.e., resistance of an affective experience to change from one moment to another; Kuppens, Allen, &  
22 Sheeber, 2010), an important aspect of affective dynamics possibly captured by network approaches, was  
23 found to be negligible in one recent study (Koval, Butler, Hollenstein, Lanteigne, & Kuppens, 2015).

24       Distraction is a strategy whereby an individual's attention is diverted from a negative situation or the  
25 unpleasant feelings it elicits (Van Dillen & Koole, 2007). This strategy can be used by directing attention to  
26 the most neutral or positive aspects of a critical situation, or even by changing the situation (e.g.,

1 engagement in an alternative activity). In the short term, distraction can enhance feelings of positive affect  
2 (Brans et al., 2013) and reduce feelings of negative affect (Nolen-Hoeksema & Morrow, 1993), but its  
3 chronic use can have the opposite effect.

4 Expressive suppression consists in inhibiting the behavioral tendencies associated with the elicitation of  
5 an affect (John & Gross, 2004). This strategy entails suppressing one's facial expressions or gestures, to  
6 hide one's feelings from others. Expressive suppression can be regarded as a narrow-minded strategy,  
7 because it constitutes a form of behavioral inhibition, which is supposed to be encouraged by a narrowing  
8 mechanism triggered by experiences of negative affect. This strategy influences affective valence mainly by  
9 increasing subsequent experiences of negative affect (Brans et al., 2013; John & Gross, 2004). Furthermore,  
10 like positive reappraisal, it appears to have a less important effect on the inertia of affective experiences  
11 (Koval et al., 2015).

12 Rumination refers to the passive and repetitive generation of thoughts about negative events or affects  
13 (Nolen-Hoeksema, 2000). This strategy can be viewed as a prototypical narrow-minded strategy, as it is  
14 defined by the fixation of thoughts and attention on a single stimulus. Rumination mainly influences  
15 affective experience through its impact on feelings of negative affect, either in the short term or the longer  
16 term (Nolen-Hoeksema, 2000). Furthermore, its habitual use has been shown to increase the inertia of  
17 negative affect feelings (Koval, Kuppens, Allen, & Sheeber, 2012).

### 18 **1.1.3. Reciprocal influences between affect and affect regulation strategies**

19 To summarize the numerous findings described above, positive feedback loops could be observed  
20 between positive affect and broadminded affect regulation strategies such as appreciation, positive  
21 reappraisal and distraction. Individuals who feel positive affect at a particular time appear to temporarily  
22 display increased creativity, cognitive flexibility, and easier access to positive information. This state may  
23 facilitate their inclination to see negative or neutral situations in a favorable light, and direct their attention to  
24 more positive stimuli, thus encouraging fresh feelings of positive affect. The experience of negative affect  
25 and engagement in narrow-minded affect regulation strategies, including rumination and expressive  
26 suppression, could also reinforce each other. Individuals who feel negative affect at a particular time appear

1 to momentarily tend to focus their attention on negative stimuli, and restrict their behaviors to those required  
2 to cope with them. In such a state, there would be a notable increase in the inclination to brood on previous  
3 or future problems, as well as to overestimate, then avoid, the risk associated with expressing affect to  
4 others. These mechanisms may foster fresh experiences of negative affect.

5       Importantly, these hypotheses on the interplay between affect and affect regulation strategies, which are  
6 based on theories pertaining to the broad impact of affective experiences on cognition and behavior  
7 (Bowers, 1991; Fredrickson, 1998, 2001), differ from hypotheses based entirely on recent models of affect  
8 regulation (Gross, 2015; Kuppens, Oravecz, et al., 2010). For instance, as set out above, the extended  
9 process model of emotion regulation (Gross, 2015) claims that affect only influences affect regulation  
10 strategies when affective experiences are negatively evaluated, triggering the urge to use strategies to  
11 produce experiential changes. As the most negatively evaluated affective experiences appear to be high in  
12 negative affect and/or low in positive affect (Riediger, Schmiedek, Wagner, & Lindenberger, 2009), Gross  
13 (2015)'s model mainly predicts that a momentary increase in a negative affect experience promotes the use  
14 of various affect regulation strategies which, in turn, decreases the initial feeling of negative affect.  
15 Conversely, an increase in a positive affect experience reduces the use of affect regulation strategies,  
16 resulting in a subsequent decrease in the initial feeling of positive affect. Thus, the extended process model  
17 of emotion regulation (Gross, 2015) mainly predicts negative rather than positive feedback loops between  
18 affect and affect regulation strategies.

19       We acknowledge that these negative feedback loops form part of affect regulation dynamics. For  
20 instance, although their implementation is likely to depend on prior positive affect experiences as mentioned  
21 above, the use of distraction and positive reappraisal is primarily thought to arise in a context where a  
22 negative affect is felt (Folkman, 2000; Van Dillen & Koole, 2007). Moreover, implementing these strategies  
23 can sometimes reduce this initial negative feeling (e.g., Nolen-Hoeksema & Morrow, 1993). Nevertheless,  
24 our main hypotheses suggest that greater attention should be paid to possible positive feedback loops  
25 between affect and affect regulation strategies.

1 Note that the positive feedback loops between positive affect and broadminded strategies are  
2 sometimes referred to hereafter as virtuous cycles, and those between negative affect and narrow-minded  
3 strategies as vicious cycles. Despite their tempting simplicity, these terms must be used with caution, as  
4 individuals are not always motivated by feeling more positive affect and less negative affect (Riediger et al.,  
5 2009).

## 6 **1.2. Personality and Affect Regulation Dynamics**

7 The contribution of stable inter-individual differences in personality to the dispositions to feel particular  
8 types of affect, or use particular affect regulation strategies, is well documented (see Carver & Connor-  
9 Smith, 2010, for a review). By contrast, few researches have examined how differences in personality  
10 impact dynamic temporal relationships between affective experience and affect regulation strategy  
11 implementation. Yet, Mischel and Shoda (1995)'s cognitive-affective personality system highlights the  
12 possible close relationship between stable traits and dynamic processes. According to this theoretical  
13 framework combining dispositional and dynamic approaches to psychological functioning, all the levels at  
14 which interindividual variations occur should be considered. Below, we provide information suggesting that  
15 variations in affect regulation dynamics as we conceptualize them arise partly from differences in  
16 individuals' levels of extraversion and neuroticism. We chose to focus on these two traits because they are  
17 the two basic personality traits that are most strongly related to affect and affect regulation strategies (Carver  
18 & Connor-Smith, 2010; Watson & Clark, 1992).

### 19 **1.2.1. Extraversion and affect regulation dynamics**

20 To the best of our knowledge, there are no available findings on the impact of extraversion on  
21 reciprocal relationships between affect and affect regulation strategies. Nevertheless, some information  
22 leads us to hypothesize that a higher level of extraversion is associated with more intensely positive  
23 feedback loops between positive affect and broadminded strategies. First, a pleasant stimulation of the same  
24 magnitude triggers a more intense experience of positive affect among extraverted individuals than among  
25 introverted ones (Larsen & Ketelaar, 1991). As the use of a broadminded affect regulation strategy can be  
26 perceived of as a pleasant internal stimulation, the enhanced positive affect reactivity displayed by

1 extraverted individuals may lead them to feel more intense positive affect than their introverted  
2 counterparts, for the same intensity of strategy use. Second, a higher level of extraversion is associated with  
3 greater motivation to seek pleasure and rewards (Smits & Boeck, 2006). Thus, the cognitive and behavioral  
4 broadening mechanisms that follow the experience of an initial positive affect may particularly increase the  
5 implementation of affect regulation strategies that promote feelings of positive affect among the most  
6 extraverted individuals. Initial findings support this hypothesis, suggesting that a higher level of extraversion  
7 is accompanied by a greater inclination to continue to seek pleasure after positive affect induction (Hirsh,  
8 Guindon, Morisano, & Peterson, 2010).

### 9 **1.2.2. Neuroticism and affect regulation dynamics**

10 Although the relationship between neuroticism and the dynamics of affective feelings starts to be  
11 understood (Bringmann et al., 2016, Suls, Green, & Hillis, 1998), the impact of this trait on the interplay  
12 between affect and affect regulation strategies has rarely been analyzed. We can nevertheless hypothesize  
13 that the positive feedback loops between the experience of negative affect and the use of narrow-minded  
14 affect regulation strategies are most intensely displayed by the most neurotic individuals, compared to the  
15 less neurotic ones. As the use of a narrow-minded strategy can be perceived of as an unpleasant internal  
16 stimulation, and as neurotic individuals react more intensely to negative stimuli than their less neurotic  
17 counterparts (Larsen & Ketelaar, 1991), the former may feel more intense negative affect than the latter for  
18 the same intensity of strategy use. Furthermore, the stronger inclination to focus on negative stimuli  
19 exhibited by neurotic individuals compared with less neurotic ones (Smits & Boeck, 2006) may mean that a  
20 higher level of neuroticism is accompanied by a more intense use of narrow-minded strategies in reaction to  
21 an initial experience of negative affect. Finally, given the deterioration in affect regulation skills associated  
22 with increased neuroticism (Yoon, Maltby, & Joormann, 2013), we can also predict that components of the  
23 virtuous cycles studied here have less of an inhibitory effect on vicious cycle components among neurotic  
24 individuals than among less neurotic ones.

### 25 **1.3. The Present Study**

1 In this study, we tested a new conceptualization of affect regulation dynamics, based on the reciprocal  
2 influences over time between affect and affect regulation strategies. We did so in the light of the network  
3 approach (Schmittmann et al., 2013), which recommends the use of experience sampling methods (Hektner,  
4 Schmidt, & Csikszentmihalyi, 2006) to capture dynamic mechanisms (Bringmann et al., 2013). We  
5 therefore used this method to collect data on affective experience and affect regulation strategy  
6 implementation via five daily assessments over a 2-week period. These short time intervals between two  
7 assessments enabled us to analyze short-term dynamics.

8 Moreover, working on the assumption that a deeper understanding of dynamic processes can be  
9 acquired by considering how they vary between individuals, we looked at whether interindividual  
10 differences in extraversion and neuroticism were associated with variations in affect regulation dynamics.  
11 Extraversion and neuroticism were assessed with questionnaires.

12 The hypotheses formulated in the present study concerned the structure of the network of affect  
13 regulation dynamics. We assumed that, at the sample level, this network is characterized by positive  
14 feedback loops between the experience of positive affect and the implementation of broadminded affect  
15 regulation strategies (virtuous cycles), and between the experience of negative affect and engagement in  
16 narrow-minded affect regulation strategies (vicious cycles). We also hypothesized that this network varies  
17 according to the degree of extraversion and neuroticism. Interindividual differences in extraversion would  
18 mainly be reflected in the virtuous cycles, which would intensify as the level of extraversion increased.  
19 Similarly, the vicious cycles would intensify as the level of neuroticism increased. Furthermore, a higher  
20 level of neuroticism would be accompanied by reduced inhibitory influences of positive affect experiences  
21 and broadminded strategy implementation on feelings of negative affect and narrow-minded strategy use.

## 22 **2. Method**

### 23 **2.1. Participants**

24 The sample consisted of 78 non-clinical individuals (62% female) aged 13-80 years ( $M = 44.55$ ,  $SD =$   
25  $18.01$ ). The main determinant of such a sample size choice was that it was sufficient for the examination of  
26 the significance of the effects hypothesized in the present study, that included cross level interaction effects.

1 Participants were recruited from the experimenters' social network, and came from different regions of  
2 France. Participants were excluded if they exhibited alexithymia, as measured by the French version of the  
3 Toronto Alexithymia Scale (TAS; Bagby, Parker, & Taylor, 1994), validated in French by Loas, Otmani,  
4 Verrier, Fremaux, and Marchand (1996), because this characteristic reflects an inability to identify and label  
5 affective experiences.

## 6 **2.2. Procedure**

7 Each participant was initially interviewed by the experimenter, either face to face or over the telephone,  
8 depending on the participant's preference. During this interview, after obtaining the participant's informed  
9 consent (or the consent of a parent for adolescents), the experimenter worked with the latter to fix the times  
10 at which the daily assessments would take place throughout the experience sampling period. The  
11 experimenter initially proposed five daily assessments 3 hours apart (i.e., 9 am, noon, 3 pm, 6 pm, and 9  
12 pm). However, depending on the participant's preference, these scheduled times could be changed by up to  
13 15 minutes (e.g., between 8.45 am and 9.15 am for the first assessment of the day). Finally, during this  
14 interview, the wording of the affect and affect regulation strategies on which the participant would be  
15 assessed was determined. To "filter" the interindividual differences that exist in labeling affective  
16 experience, the experimenter implemented a strategy based on the work of Nesselrode, Gerstorf, Hardy,  
17 and Ram (2007). More precisely, for each affect we studied, the experimenter read out a set of statements  
18 describing this affect to the participant, then asked him or her to provide the adjective that best seemed to  
19 summarize them (e.g., happy, anxious, sad). A similar technique was implemented for the affect regulation  
20 strategies of interest, except that the participant was asked to provide a whole sentence, as one adjective is  
21 not sufficient to describe the use of such strategies<sup>2</sup>. The last step consisted in asking the participant to  
22 express the meaning he or she assigned to each of the items (i.e., adjectives and sentences) that had been  
23 provided, to avoid any misunderstanding. Each participant's items were written on a card that he or she kept  
24 throughout the experience sampling phase, in order to respond to the assessments.

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<sup>2</sup> The statements describing affect and affect regulation strategies to participants, which they then had to summarize in a single adjective or sentence, were jointly created by four experts in affect regulation. These experts were four of the five coauthors of the present article (Congard, A., Dauvier, B., Kop, J.-L., and Le Vigouroux, S.). Examples of the statement for each variable of interest can be found in an openly accessible file available from <https://osf.io/project/s3chz/files/osfstorage/58920befb83f6901f40f7ec4/>.

1 Tailoring a construct to each individual, all the while leading all the individuals to assign the same core  
2 meaning to this construct, as described above, represents an innovative strategy. We used it because of its  
3 usefulness in analyzing interindividual differences. As Nesselroade et al. (2007) and Nesselroade and  
4 Molenaar (2016) argue, this strategy serves to filter *nonrelevant* interindividual differences, allowing for a  
5 more precise examination of *relevant* interindividual differences. In our study, we focused on how  
6 individuals differ in their affect regulation dynamics, not how they differ in the way they label their affective  
7 experiences or their use of affect regulation strategies. To give but one example, as explained below, one of  
8 the types of affective experience we sought to assess was highly deactivated negative affect. Some  
9 individuals habitually use the word *tired* to describe this type of experience, whereas others use the word  
10 *apathetic*. Most importantly, for the latter, *tired* may refer to a deactivated affect that is not negatively  
11 valenced. Thus, despite the rarity of this strategy in the literature, we chose to use it because we assumed  
12 that its ability to filter out idiosyncratic meanings would enhance the validity of our measures. Using this  
13 strategy was particularly useful for defining our affect-related items, as the model on which we based our  
14 affective measures (see below) distinguishes between several types of affect that have subtle differences  
15 from one another (e.g., highly activated positive affect and activated positive affect).

16 The week before the beginning of the experience sampling period, participants were invited to fill in  
17 several questionnaires on the Internet, including one that measured their levels of extraversion and  
18 neuroticism. The experience sampling phase lasted for 2 consecutive weeks. During this phase, five times a  
19 day, at the times agreed on with the experimenter, participants received a text message on their mobile  
20 phones. These text messages were sent by a web server. They were all identical, prompting the participant  
21 to respond. More specifically, participants were asked to respond within 30 minutes, so that the assessments  
22 were neither too close together nor too far apart. On each occasion, participants were assessed on their  
23 current affective experience (through the set of adjectives printed on their card), and the way they had  
24 regulated their affect since the last assessment (through the set of sentences printed on their card).  
25 Specifically, participants responded by texting a list of numbers in response to the alert messages. Each  
26 number corresponded to the participant's rating of the intensity with which he or she currently felt (for



1 affective items), or had used (for affect regulation strategy items), each item printed on the card (for a more  
2 precise description of the Likert scales used and the number of items, see below). The numbers texted by  
3 each participant had to follow the order in which the items were printed on the card. Each participant was  
4 trained to respond in this manner at the very end of the initial interview, to avoid any possible mistakes.  
5 Importantly, for the first assessment of each day, and for assessments that followed ones to which they had  
6 not responded, participants were asked to indicate the way they had regulated their affect for the previous  
7 three hours only. On average, participants responded to 87% of the 70 text messages that were sent during  
8 the experience sampling phase.

## 9 **2.3. Material**

### 10 **2.3.1. Affect**

11 We assessed participants' affective experience with the 12 kinds of affect described by the 12-point  
12 affect circumplex model (Yik, Russell, & Steiger, 2011). This model identifies five kinds of positive affect  
13 and five kinds of negative affect according to their arousal level (highly activated, activated, neither  
14 activated nor deactivated, deactivated and highly deactivated positive and negative affect). This model also  
15 contains two neutrally valenced affects: one that is activated, and one that is deactivated. Examples of the  
16 statements that participants had to summarize for each type of affect are set out in an openly accessible file  
17 available from <https://osf.io/project/s3chz/files/osfstorage/58920befb83f6901f40f7ec4/>. At each  
18 assessment occasion, participants were asked to indicate the intensity with which they currently experienced  
19 these 12 kinds of affect, on a Likert scale ranging from 1 (*not at all*) to 5 (*a lot*). As explained earlier, several  
20 findings had suggested that affective valence is important to consider in affect regulation dynamics. We  
21 therefore ignored the two neutrally valenced affects. We then conducted a multilevel confirmatory factor  
22 analysis on the 10 remaining items (i.e., the five positively valenced and five negatively valenced affects), to  
23 test the extent to which a two within-participants and two between-participants factor structure explained the  
24 covariations among these items. Results indicated that the fit of this model was satisfactory (CFI = .97, TLI  
25 = .95, RMSEA = .04). Consequently, we calculated an indicator of positive affect and an indicator of  
26 negative affect by averaging the scores for the five degrees of positive affect and the scores for the five

1 kinds of negative affect. To estimate the reliability of these indicators, we computed the two coefficients  
2 devised for multilevel data by Bolger and Laurenceau (2013): omega ( $\omega$ ) and reliability of change (RC).  
3 Results were  $\omega = .732$  and  $RC = .730$  for our indicator of positive affect, and  $\omega = .760$  and  $RC = .756$  for  
4 our indicator of negative affect. The reliability of both indicators was thus satisfactory.

### 5 **2.3.2. Affect regulation strategies**

6 We assessed participants' implementation of affect regulation strategies with 5 strategies: appreciation,  
7 positive reappraisal, distraction, expressive suppression, and rumination. Our protocol also contained the  
8 assessment of two other strategies (i.e., social sharing of affect and problem-focused coping). However,  
9 these two strategies were not examined in the present study, as previous research (e.g., Zech & Rimé, 2005),  
10 as well as initial analyses on comparable data, had led us to hypothesize that their short-term influence on  
11 affective valence, over and above the effect of the five other strategies, would be negligible. Examples of the  
12 statements that participants had to summarize for each affect regulation strategy are set out in an openly  
13 accessible file available from <https://osf.io/project/s3chz/files/osfstorage/58920befb83f6901f40f7ec4/>. At  
14 each assessment, participants were asked to report the intensity with which they had implemented each  
15 strategy since the last assessment, on a Likert scale ranging from 1 (*not at all*) to 5 (*a lot*). As with previous  
16 experience sampling studies attempting to examine a variety of strategies (e.g., Brans et al., 2013), the only  
17 drawback of measuring strategies with solely one item is that it makes it impossible to assess the factorial  
18 validity of such measures. Nevertheless, initial findings based on these items suggest that they have good  
19 construct validity (Pavani et al., 2015).

### 20 **2.3.3. Extraversion and neuroticism**

21 Extraversion and neuroticism were assessed with two 60-item subscales of a French translation of the  
22 International Personality Item Pool (IPIP; Goldberg, 1999). Participants were asked to rate the degree to  
23 which they agreed with each of the statements in these subscales, on a Likert scale ranging from 1 (*not at*  
24 *all*) to 5 (*a lot*). In the IPIP, extraversion is evaluated through items organized around six facets (i.e., activity,  
25 assertiveness, warmth, gregariousness, positive emotions, and excitement seeking), while neuroticism is  
26 measured through items organized around six other facets (i.e., anxiety, depression, anger, vulnerability to

1 stress, social shyness, and impulsivity). Although this questionnaire has not yet been validated, the reliability  
2 of the indicators of both extraversion ( $\alpha = .90$ ) and neuroticism ( $\alpha = .92$ ) was satisfactory.

### 3 **2.4. Data Analysis Strategy**

4 We inferred the structure of the network of affect regulation dynamics by analyzing the reciprocal  
5 influences between affect and affect regulation strategy over time. These effects were estimated with  
6 multilevel vector autoregressive models (Bringmann et al., 2013). A vector autoregressive model represents  
7 a model in which multiple variables measured at  $t$  for a given individual are predicted by the lagged version  
8 of the same variables measured at  $t-1$ . For example, this tool can be used to determine whether the positive  
9 and negative affect experienced by a person at  $t$  depend on his or her feelings of positive and/or negative  
10 affect at  $t-1$ . This model can be used to analyze the interplay between several variables for individual  
11 participants. However, as our aim was to combine the examinations of intraindividual variability and  
12 interindividual differences, we adopted a multilevel vector autoregressive method.

13 More specifically, each of the seven variables of interest in this study (i.e., positive affect, negative  
14 affect, appreciation, positive reappraisal, distraction, expressive suppression, rumination) measured at  $t$  was  
15 regressed on the lagged version of all the variables of interest measured at  $t-1$  in a linear mixed-effects  
16 model, in which random intercepts were included. By contrast, no random slopes were included. Including  
17 the maximum number of possible random slopes as possible would have incurred convergence problems,  
18 apart from which the utility of this kind of procedure is now in some doubt (Bates, Kliegl, Vasishth, &  
19 Baayen, 2015). However, as omitting random slopes sometimes biases the estimation of the fixed effects,  
20 we ensured that not including them did not substantially change our estimated fixed effects<sup>3</sup>. While the  
21 fixed effects we estimated yielded the connections within the network of affect regulation dynamics, the  
22 variables included in each model represented the network's nodes. These variables were all standardized, to  
23 allow for a direct comparison of the strength of the network connections (Bulteel, Tuerlinckx, Brose, &

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<sup>3</sup> All the models described below were also calculated with all the possible random slopes. This procedure produced negligible changes in the strengths of the fixed effects. More specifically, correlations between the fixed effects of the models with and without random slopes were  $r = .98$  for the models estimating the network at the sample level,  $r = .97$  for the models estimating its change according to extraversion, and  $r = .98$  for the models estimating its change according to neuroticism.

1 Ceulemans, 2016). Moreover, these variables were all grand-mean centered in the analyses reported here<sup>4</sup>.  
2 Each time we provide the results of a multilevel vector autoregressive model below, we begin by presenting  
3 the estimated fixed effects within a matrix, before representing them graphically using qgraph (Epskamp,  
4 Cramer, Waldorp, Schmittmann, & Borsboom, 2012), a package for the statistical programming language R  
5 (R Core Team, 2016). As with previous network-based studies, we omitted 95% confidence intervals for  
6 visualization purpose.

7 To estimate the network of affect regulation dynamics at the sample level, we applied the seven models  
8 mentioned above to the data collected during the experience sampling phase. To examine variations  
9 according to extraversion, we applied them again, adding the multiplicative effect of extraversion to their  
10 predictor variables. We could thus determine which connections in the network were significantly  
11 moderated by this trait. Furthermore, by using predictions, the fixed effects of these models enabled us to  
12 compute the distinctive networks displayed by introverted and extraverted individuals. We used the same  
13 strategy to examine how the dynamic network of affect regulation varied according to neuroticism. By  
14 proceeding thus, we avoided having to transform our continuous personality variables into categorical ones  
15 as Bringmann et al. (2013) did.

16 When calculating multilevel vector autoregressive models, the variables included in the equations must  
17 not change over time (Bringmann et al., 2013; Bringmann et al., 2015). To check that they did not, we  
18 constructed a time variable ranging from 1 (first assessment) to 70 (last assessment). We then determined  
19 whether our seven variables of interest depended on this time variable, by successively computing seven  
20 linear mixed-effects models, where the fixed and random effects of time were included as predictor  
21 variables. Results showed that our variables of interest did not change over time. Besides, when examining  
22 data collected from a sample with large age differences, it is important to include age in every model, to  
23 neutralize its potential effects. However, as including age did not significantly improve our models'  
24 accuracy, the results set out below were obtained with models that did not contain the age variable.

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<sup>4</sup> Reproducing the analyses reported in this study with person-mean centered variables produced negligible changes. For example, correlations between the fixed effects of our models with grand-mean centered or person-mean centered variables were  $r = .97$  for the models estimating the network at the sample level,  $r = .93$  for the models estimating its change according to extraversion, and  $r = .96$  for the models estimating its change according to neuroticism.

1 Finally, to perform the multilevel vector autoregressive models, we lagged the data collected during the  
2 experience sampling period, resulting in two times ( $t_1$  and  $t$ ) that corresponded to two consecutive  
3 assessments to which participants responded. This resulted in the deletion of data for 12% of the 4724  
4 assessments to which participants responded, as these were not directly preceded or followed by a  
5 completed assessment. Consequently, the analyses reported below were performed on data collected from  
6 4150 assessments to which participants responded, representing 76% of the total number of assessments  
7 they could have completed. Another consequence was the deletion of all missing data. As participants were  
8 asked to indicate the affect they currently experienced and the strategies they had implemented since the  
9 previous assessment, considering two consecutive assessments provided information about the affect felt at  $t$   
10 and  $t-1$ , and the implementation of strategies between  $t-1$  and  $t$ , and  $t-2$  and  $t-1$ . Data can be found in an  
11 openly accessible file available from  
12 <https://osf.io/project/s3chz/files/osfstorage/58920bef6c613b01f6cae087/>. Furthermore, the R script we used  
13 to compute and represent graphically the networks are set out in another openly accessible file available  
14 from <https://osf.io/project/s3chz/files/osfstorage/58920bef594d9001ffed1f68/>.

### 15 3. Results

#### 16 3.1. Initial Analyses

17 Before testing our hypotheses, we performed descriptive analyses of the variables of interest in our  
18 research (see Table 1). This first step served mainly to ensure that the relationships we observed between  
19 our indicators of affective experience and affect regulation strategy implementation were consistent with  
20 what is generally outlined in literature. As the analyses did not require the data lagging described above,  
21 they were performed on all 4724 assessments to which participants responded.

22 INSERT HERE TABLE 1

23 First, at a descriptive level, participants' affective feelings throughout the experience sampling period  
24 were characterized by moderate positive affect ( $M = 3.10$ ) and low negative affect ( $M = 1.66$ ). The  
25 distribution of their experience of negative affect was positively skewed. However, we did not transform  
26 this variable, because the residuals of all the models described below were normal. Participants'

1 implementation of strategies was marked by quite intensive use of appreciation ( $M = 3.46$ ), moderate use of  
2 positive reappraisal ( $M = 2.89$ ), distraction ( $M = 2.81$ ) and expressive suppression ( $M = 2.74$ ), and  
3 nonintensive use of rumination ( $M = 1.97$ ).

4 Second, correlations in Table 1 must be interpreted with caution, as some of them do not take into  
5 account the hierarchical organization of our data. Nevertheless, they suggest that the relationships between  
6 engagement in affect regulation strategies in the space of a few hours and the affect experienced at the end  
7 of this time interval were consistent with what is generally reported in the literature. In particular, we found  
8 positive correlations between the use of the three broadminded strategies and the experience of positive  
9 affect, and between the implementation of the two narrow-minded strategies and the experience of negative  
10 affect.

11 Third, the relationships between extraversion, neuroticism, and mean experience of each type of affect  
12 and implementation of each affect regulation strategy for each individual were also generally coherent with  
13 prior findings. A higher level of neuroticism was associated with more negative affect ( $r = .47, p < .001$ )  
14 and less positive affect ( $r = -.28, p < .05$ ) experiences. Conversely, a higher level of extraversion was  
15 accompanied by fewer feelings of negative affect ( $r = -.25, p < .05$ ) and, marginally, more feelings of  
16 positive affect ( $r = .20, p = .08$ ). Moreover, even though most of them were not significant, owing to the  
17 small number of participants (i.e., 78), the strength and the direction of the correlations between  
18 extraversion, neuroticism, and affect regulation strategy implementation were consistent with our  
19 predictions. The clearest example is the moderate correlation between neuroticism and rumination ( $r = .33,$   
20  $p < .01$ ).

21 Finally, the correlation between extraversion and neuroticism ( $r = -.47, p < .001$ ) may seem surprising,  
22 in view of the hypothesis that these two traits are independent (McCrae & Costa, 2005). Even though  
23 several studies using common measures of extraversion and neuroticism (e.g., NEO Five Factor Inventory)  
24 have obtained similar correlation coefficients (e.g., Olesen, Thomsen, & O'Toole, 2015; Sarubin et al.,  
25 2015), the correlation we obtained between these two traits suggests that some of our findings should be  
26 considered with caution.

## 3.2. Hypothesis Testing

### 3.2.1. The network of affect regulation dynamics at the sample level

Our first hypothesis was that the network of affect regulation dynamics would be characterized at the sample level by positive feedback loops between positive affect and appreciation, positive affect and positive reappraisal, positive affect and distraction, negative affect and suppressive expression, and negative affect and rumination.

We used multilevel vector autoregressive models to test this hypothesis. More precisely, we computed seven models. Models 1 and 2 contained experience of positive affect and experience of negative affect at  $t-1$  as predictor variables, as well as implementation of the five strategies of interest between  $t-1$  and  $t$ . The outcome variable was experience of positive affect at  $t$  for Model 1, and experience of negative affect at  $t$  for Model 2. Models 3, 4, 5, 6 and 7 all contained the same predictor variables (experience of positive and negative affect at  $t-1$ , and implementation of the five strategies between  $t-2$  and  $t-1$ ), but the outcome variable was the implementation, between  $t-1$  and  $t$ , of appreciation, positive reappraisal, distraction, expressive suppression, or rumination.

Results are set out in Table 2 and Figure 1. To make this figure easier to understand and interpret, we concealed effects that were not significant, or whose size did not exceed the absolute value of  $\beta = .10^5$ . These effects were concealed but not removed, even though their removal is recommended in certain network approaches (e.g., Costantini et al., 2015). The main point of removing the spurious edges of a network is to refine the estimation of certain characteristics of that network (e.g., betweenness centrality, clustering coefficients). However, we did not need to estimate these characteristics to test our specific hypotheses.

INSERT HERE TABLE 2 AND FIGURE 1

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<sup>5</sup> The choice not to graphically represent effects below the significance threshold for reasons of legibility is commonly made in studies adopting network approaches (e.g., Bringmann et al., 2013, Bringmann et al., 2015, Bringmann et al., 2016). By contrast, our choice not to graphically represent effects equal to or below the absolute value of .10, in order to improve legibility, was made entirely ad hoc. Importantly, by coupling the table with the figure, we enable readers wishing to examine all the effects to view all the information.

1 Results confirmed most of our predictions. First, we clearly observed a virtuous cycle between positive  
2 affect and appreciation, and a vicious cycle between negative affect and rumination. More specifically,  
3 positive affect felt at a particular time significantly promoted engagement in appreciation ( $\beta = .18, p < .001$ )  
4 within the space of a few hours. By the same token, appreciating the present more within this time interval  
5 significantly increased the positive affect experienced afterwards ( $\beta = .28, p < .001$ ). Likewise, within a few  
6 hours of experiencing more negative affect, individuals ruminated more ( $\beta = .10, p < .001$ ), and engaging  
7 more in rumination within this time interval increased their subsequent experience of negative affect ( $\beta =$   
8  $.21, p < .001$ ).

9 Second, when we focused on the significance of the effects we had examined, we observed another  
10 virtuous cycle, between positive affect and distraction, as well as another vicious cycle between negative  
11 affect and expressive suppression. Although these effects were significant, the size of some of them was too  
12 small for us to interpret them as contributing to the occurrence of such positive feedback loops. More  
13 specifically, small effect sizes were found for the effect of implementing distraction on the experience of  
14 positive affect ( $\beta = .05, p < .001$ ), the influence of engaging in expressive suppression on the experience of  
15 negative affect ( $\beta = .07, p < .001$ ), and the influence of negative affect feelings on the subsequent use of this  
16 strategy ( $\beta = .06, p < .01$ ).

17 Finally, contrary to what we predicted, whereas implementing more positive reappraisal increased  
18 feelings of positive affect within a few hours as expected ( $\beta = .12, p < .001$ ), feelings of positive affect did  
19 not influence subsequent implementation of this strategy ( $\beta = .02, p > .05$ ).

20 A more precise examination of Table 2 and Figure 1 reveals three more interesting results. First, each  
21 component of the network displayed self-loops. These autoregressive effects systematically had the largest  
22 sizes, reflecting so-called affective inertia (Kuppens, Allen, et al., 2010) as regards our indicators of positive  
23 and negative affect experience. Affective inertia provides information about the rapidity of change in the  
24 relevant affect during a given interval. High inertia (i.e., regression coefficient very close to 1) reflects slow  
25 change (a form of rigidity) and resistance to change, whereas low inertia (i.e., regression coefficient very  
26 close to 0) reflects rapid change (a form of flexibility, susceptibility to change). In the present research,



1 modest inertia was observed not only in affective experience, but also in affect regulation strategy  
2 implementation, which has received less attention from researchers.

3 Second, within a few hours of experiencing more negative affect, individuals tended to implement  
4 coping strategies (i.e., strategies designed to regulate negative affect experiences) more intensively. Feeling  
5 this type of affect not only enhanced subsequent use of rumination and expressive suppression, but also  
6 promoted the implementation of distraction ( $\beta = .10, p < .001$ ). This suggests that affect regulation  
7 dynamics are partly driven by the motivation to change unwanted feelings after their elicitation, as posited  
8 by the most prominent models of affect regulation (e.g., Gross, 2015).

9 Third, strategies whose implementation is known to exert the strongest influence on affective life  
10 impacted feelings of both positive and negative affect. More intensive engagement in appreciation and  
11 positive reappraisal was associated not only with enhanced subsequent experience of positive affect, but  
12 also with reduced experiences of negative affect ( $\beta s = -.19$  and  $-.10, p < .001$ ). Likewise, ruminating more  
13 was followed not only by a heightened experience of negative affect, but also by a decreased feeling of  
14 positive affect ( $\beta = -.11, p < .001$ ).

15 In summary, regarding our hypothesis, the dynamics of affect regulation at the sample level appeared  
16 to be characterized by two systems. Negative affect and narrow-minded strategies reinforced each other,  
17 even though only the vicious cycle involving rumination had a large effect size. Likewise, virtuous cycles  
18 emerged between positive affect and some broadminded strategies, but only the cycle featuring appreciation  
19 had a large size, the one involving distraction having a smaller one. As regards the positive feedback loop  
20 between positive affect and positive reappraisal that we expected to observe at the sample level, the  
21 following analyses enabled us to determine whether it could be identified among some individuals, or did  
22 not appear at all.

### 23 **3.2.2. Variations in the network of affect regulation dynamics related to extraversion**

24 Our second hypothesis was that the network of affect regulation dynamics varies according to  
25 extraversion. More specifically, we predicted that these variations would mainly be manifested in the

1 positive feedback loops between experience of positive affect and use of broadminded strategies. These  
2 loops would become more intense as the level of extraversion increased.

3 To test this hypothesis, we calculated the same seven models as for the first hypothesis, adding the  
4 multiplicative effect of extraversion to their predictor variables. As neuroticism and extraversion were  
5 correlated in our study, we also included the additive effect of neuroticism, to neutralize its potential  
6 confounding effect. First, these models enabled us to determine which connection in the network was  
7 significantly moderated by extraversion. Second, the coefficients estimated by these models were used to  
8 predict the distinctive networks that fictitious individuals with either low extraversion (1.5 standard  
9 deviations below the mean), or high extraversion (1.5 standard deviations above the mean) would display.  
10 Results for these two networks are set out in Table 3 and on the top of Figure 2. The effects that were  
11 significantly moderated by extraversion are shown in bold in Table 3, and in black in the two networks on  
12 the top of Figure 2. In these networks, we chose to represent some effects whose size was below the  
13 absolute value of  $\beta = .10$  but above the absolute value of  $\beta = .05$ , as they were significantly moderated by  
14 extraversion, and thus relevant to our analyses. Table 3 also provides the AICs of the seven models we  
15 calculated, with and without the inclusion of the multiplicative effect of extraversion.

16 INSERT HERE TABLE 3 AND FIGURE 2

17 Results were generally consistent with our hypothesis. Extraverted and introverted individuals differed  
18 in the form of their affect regulation dynamics. The AICs in Table 3 notably reveal that six of the seven  
19 models we calculated had a better fit when they contained the multiplicative effect of extraversion.  
20 Extraverted individuals were characterized by low positive affective inertia ( $\beta = .21$ ), indicating rapid  
21 change in this affect. This type of low inertia reflects the tendency of the most extraverted individuals to  
22 display greater flexibility in their positive affective lives, possibly manifested in the rapid emergence of the  
23 virtuous cycles we explored in this study.

24 Two observations are consistent with this idea. First, extraverted individuals were the only ones to  
25 exhibit a positive feedback loop between positive affect and positive reappraisal, in addition to the virtuous  
26 cycle between positive affect and appreciation we had already identified at the sample level. Specifically,

1 extraverted individuals were the only participants whose use of positive reappraisal was prompted by a  
2 more intense previous experience of positive affect ( $\beta = .08$ ), even though the size of this effect was small.  
3 Second, the virtuous cycle we had already identified at the sample level tended to be more intense among  
4 these participants. In particular, appreciating the present had a greater influence on the feelings of positive  
5 affect of the most extraverted individuals ( $\beta = .34$ ) than on the feelings of positive affect of their most  
6 introverted counterparts ( $\beta = .21$ ).

7 In contrast to their extraverted peers, the most introverted individuals displayed high positive affective  
8 inertia within the time interval we chose ( $\beta = .38$ ). Their positive affective lives therefore appeared to be  
9 more rigid—a rigidity that may have been expressed in their tendency to go through the virtuous cycles of  
10 interest more slowly. In particular, introverted individuals failed to display a positive feedback loop between  
11 positive affect and positive reappraisal, as they tended to implement less positive reappraisal within a few  
12 hours of experiencing more positive affect ( $\beta = -.06$ ). Furthermore, as set out above, the use of appreciation  
13 had a smaller impact on their feelings of positive affect than on the feelings of positive affect of their  
14 extraverted counterparts.

15 Albeit less closely related to our hypotheses, a final interesting observation regarding the positive affect  
16 feelings of introverted individuals concerns the particular relationship between this type of feeling and their  
17 engagement in expressive suppression. More specifically, suppressing affective expression for a few hours  
18 did not reduce their subsequent feelings of positive affect ( $\beta = .05$ ), contrary to what we observed among  
19 their more extraverted peers ( $\beta = -.10$ ). If using expressive suppression does not noticeably impact affective  
20 experiences in the short term among introverted individuals, and if the main function of affect regulation  
21 strategies is to modify affective experiences, then introverted individuals may be less motivated to modulate  
22 expressive suppression (i.e., change the intensity with which this strategy is used) than extraverted  
23 individuals. This reduced inclination to control this strategy may explain the high expressive suppression  
24 inertia observed among introverted individuals ( $\beta = .35$ ), compared with their extraverted peers ( $\beta = .16$ ).

25 Taken together, our results suggest that considering extraversion is important for understanding affect  
26 regulation dynamics more fully. As expected, the variations in the network of affect regulation dynamics

1 brought about by this trait mainly concerned the positive feedback loops between the experience of positive  
2 affect and the use of broadminded strategies. extraverted individuals displayed more-and more  
3 intense-virtuous cycles than their more introverted peers.

### 4 **3.2.3. Variations in the dynamic network of affect regulation related to neuroticism**

5 Our third hypothesis was that the network of affect regulation dynamics varies according to  
6 neuroticism. These variations would mostly be identified in the positive feedback loops between experience  
7 of negative affect and implementation of narrow-minded strategies. These loops would become stronger as  
8 neuroticism increased, and their components (i.e., negative affect, expressive suppression, rumination)  
9 would become less inhibited by the components of the virtuous cycles.

10 We tested this hypothesis by performing the same seven models as before, adding the multiplicative  
11 effect of neuroticism and the additive effect of extraversion to their predictor variables, and using the  
12 coefficients estimated by these models to predict the distinctive networks that fictitious individuals with low  
13 (1.5 standard deviations below the mean) and high (1.5 standard deviations above the mean) neuroticism  
14 would exhibit. The results are set out in Table 4 and in the two networks at the bottom of Figure 2. The  
15 effects that were significantly moderated by neuroticism are shown in bold in Table 4, and in black in the  
16 two networks at the bottom of Figure 2. Table 4 also contained the AICs of the 7 models constituting the  
17 network with and without the inclusion of the multiplicative effect of neuroticism.

18 **INSERT HERE TABLE 4**

19 Results did not entirely support our hypothesis. Differences emerged in the affect regulation dynamics  
20 of the most and the least neurotic individuals. In particular, the AICs in Table 4 reveal that four of the seven  
21 models constituting the network had a better fit when they contained the multiplicative effect of  
22 neuroticism. However, the neuroticism-related differences we observed did not exactly follow the predicted  
23 pattern.

24 One of the main characteristics of the affect regulation dynamics of the most neurotic individuals was  
25 the rigidity of their affective feelings, that is, the resistance of these feelings to change during the time  
26 interval we examined. First, this rigidity manifested itself in a high level of negative affective inertia ( $\beta =$

1 .42). This resistance to change may explain why, as compared with what occurs among their less neurotic  
2 peers, the engagement in rumination by the most neurotic individuals had a reduced influence on their  
3 negative affect experiences ( $\beta = .18$ ), contrary to what we had predicted. Therefore, even though the most  
4 neurotic individuals were particularly inclined to ruminate after feeling negative affect ( $\beta = .15$ ), the reduced  
5 effect of rumination on this negative affect meant that there was no intensification in the vicious cycle  
6 between negative affect and rumination among the most neurotic individuals. Similarly, the most neurotic  
7 individuals showed no intensification of the vicious cycle between negative affect and expressive  
8 suppression, owing to the resistance of their negative affect feelings to change brought about by previous  
9 use of this strategy ( $\beta = .01$ ). Interestingly, their negative affect experiences were also resistant to the  
10 intensity with which they used positive reappraisal ( $\beta = -.04$ ), confirming our hypothesis that, as neuroticism  
11 increases, some vicious cycle components are less inhibited by virtuous cycle components.

12 Rigidity was also observed in the positive affect feelings of the most neurotic individuals, as suggested  
13 by their high positive affective inertia ( $\beta = .34$ ). Once again, their positive affect feelings were characterized  
14 by low dependence on the strategies they had previously used. More specifically, compared with what we  
15 observed among their less neurotic peers, these feelings were quite resistant to the intensity with which they  
16 engaged in appreciation ( $\beta = .22$ ), expressive suppression ( $\beta = .03$ ), and rumination ( $\beta = -.04$ ).

17 Contrary to their more neurotic counterparts, the least neurotic participants displayed low positive ( $\beta =$   
18  $.22$ ) and low negative ( $\beta = .33$ ) affective inertia. This may have reflected their tendency to experience  
19 intense virtuous and vicious cycles within the short time interval we chose, mainly owing to the dependence  
20 of their affective experiences on the strategies they implemented.

21 Finally, the specific tendency of positive affect experiences to inhibit subsequent engagement in  
22 rumination among the least neurotic individuals ( $\beta = -.10$ ) was an interesting finding in relation to our  
23 hypothesis. In addition to the enhanced influence of positive reappraisal on feelings of negative affect ( $\beta = -$   
24  $.15$ ), it suggests that some of the vicious cycles were particularly inhibited by components of the virtuous  
25 cycles among these individuals.

1 In summary, interindividual differences in neuroticism were associated with several variations in the  
2 network of affect regulation dynamics. Contrary to what we had predicted, the positive feedback loops  
3 between experience of negative affect and implementation of expressive suppression and rumination did not  
4 intensify as the level of neuroticism increased. This may have been due to the increased rigidity (i.e.,  
5 resistance to change) that the most neurotic individuals displayed in their feelings of negative affect,  
6 compared with their less neurotic peers. Nevertheless, the components of these vicious cycles tended to be  
7 less inhibited by virtuous cycle components as the level of neuroticism increased, in line with our prediction,  
8 even though neuroticism had few significant moderating effects on these inhibitory influences.

#### 9 **4. Discussion**

10 The present study was designed to test a model of affect regulation dynamics based on the reciprocal  
11 influences that affect and affect regulation strategies exert on each other over time. To this end, we applied a  
12 network approach resting on multilevel vector autoregressive models (Bringmann et al., 2013), to data  
13 collected using an experience sampling method comprising five daily assessments over a 2-week period.  
14 This procedure enabled us to reveal a network of short-term relationships between the experience of  
15 positive and negative affect, and engagement in broadminded strategies (i.e., appreciation, positive  
16 reappraisal and distraction) and narrow-minded strategies (i.e., expressive suppression and rumination) that  
17 occur in daily life. To understand these dynamics more fully, we also analyzed how they vary according to  
18 extraversion and neuroticism.

19 The results obtained at the sample level suggested that affect regulation dynamics can be characterized  
20 by two systems, as hypothesized. The first one mainly consists of a virtuous cycle between experience of  
21 positive affect and implementation of the broadminded strategy of appreciation. A virtuous cycle also  
22 appeared between experience of positive affect and engagement in another broadminded strategy, namely  
23 distraction, but its size was weak. The second system was mainly composed of a vicious cycle between  
24 experience of negative affect and engagement in the narrow-minded strategy of rumination (the vicious  
25 cycle we identified between this type of affect and the implementation of expressive suppression was  
26 considerably weaker).

1        Our results regarding the impact of affect regulation strategy implementation on affective experience  
2 are consistent with prior findings that appreciating the present and distracting oneself promote feelings of  
3 positive affect, whereas suppressing one's affective expressions and ruminating encourage negative affect  
4 experiences (e.g., Erisman & Roemer, 2010; John & Gross, 2004; Nolen-Hoeksema & Morrow, 1993). As  
5 regards the impact of affective experience on the implementation of affect regulation strategies, our findings  
6 are in line with theory-based hypotheses focusing on the broad influence of affective feelings on cognition  
7 and behavior.

8        Specifically, consistent with the broaden-and-build theory (Fredrickson, 1998, 2001), positive affect  
9 feelings appeared to trigger a broadening mechanism for cognition and behavior, as these feelings facilitated  
10 the subsequent use of two broadminded strategies (i.e., appreciation and distraction). Likewise, the strategies  
11 we perceived of as narrow-minded (i.e., expressive suppression and rumination) were more intensively used  
12 within a few hours of experiencing more negative affect, supporting the notion that this type of affect  
13 triggers a narrowing process. In addition, affective priming theory (Bowers, 1991) may explain why we  
14 found that experiencing positive affect encouraged the implementation of appreciation more than that of  
15 distraction, and why feeling negative affect facilitated engagement in rumination more than that in  
16 expressive suppression. This theory states that, owing to the particular organization of information in  
17 memory, the experience of a positive affect activates a number of pleasant information items stored in  
18 memory, whereas the experience of a negative affect activates a variety of unpleasant information items.  
19 Consequently, an experience of positive affect temporarily leads individuals to be more inclined to display  
20 positive thoughts, positive interpretations of the environment, or positive biases in attention deployment. In  
21 this state, individuals may be more likely to use appreciation (i.e., a strategy based on the display of all these  
22 positive characteristics) than distraction (i.e., a strategy that can merely consist of a departure from negative  
23 stimuli). As with positive affect experiences, according to affect priming theory (Bowers, 1991), an  
24 experience of negative affect temporarily leads individuals to be more inclined to display negative thoughts,  
25 negative interpretations of the environment, or negative biases in attention deployment. In this state,  
26 individuals are more likely to ruminate (i.e., a strategy based on the display of negative thoughts and the

1 fixation of attention on negative stimuli) than to use expressive suppression (i.e., a strategy that consists  
2 mainly of mere behavioral inhibition). Finally, contrary to what these two theories led us to hypothesize, we  
3 did not observe any influence of the experience of positive affect on subsequent engagement in positive  
4 reappraisal at the sample level. One possible reason is that we did not examine the interaction between  
5 positive and negative affect experiences, even though positive reappraisal may be used in a context in which  
6 both affects are intensely felt (Folkman, 2000).

7       Examining the way that affect regulation dynamics varied according to extraversion and neuroticism  
8 yielded other interesting findings. As predicted, variations due to extraversion were mainly expressed in the  
9 virtuous cycles of interest in this research. The most extraverted individuals displayed more intense and  
10 more numerous virtuous cycles than their most introverted counterparts. Specifically, extraverted  
11 individuals were the only ones to display a virtuous cycle between positive affect and positive reappraisal, in  
12 addition to the virtuous cycle between positive affect and appreciation we had already identified at the  
13 sample level. Furthermore, this virtuous cycle observed at the sample level was stronger among extraverted  
14 individuals than among their most introverted peers. Importantly, both cycles appeared to be driven by an  
15 aspect of affect regulation dynamics that was present in the most extraverted individuals and mainly lacking  
16 in their most introverted peers, namely a form of flexibility (i.e., easily changing their feelings of positive  
17 affect). Taken together, these findings confirm the observation that an enhanced level of extraversion is  
18 associated not only with greater susceptibility to feelings of positive affect (Larsen & Ketelaar, 1991), but  
19 also with a stronger dependency of psychological functioning on current experience of positive affect (Hirsh  
20 et al., 2010).

21       Neuroticism-related variations in affect regulation dynamics were first identified in the expected  
22 inhibition of vicious cycle components by virtuous cycle ones. We found that this inhibition tended to  
23 disappear as the level of neuroticism increased. By contrast, contrary to what we predicted, the vicious cycle  
24 between negative affect and rumination, as well as the fainter one between negative affect and expressive  
25 suppression, tended to be weaker among neurotic individuals than among their less neurotic peers. One  
26 possible cause of this reduced intensity of the vicious cycles between negative affect and narrow-minded



1 strategies among neurotic individuals is the overall resistance of their affective feelings to the intensity with  
2 which they implemented one strategy or another. The weak impact that affect regulation strategy use had on  
3 affective feelings among neurotic individuals may reflect the deterioration in affect regulation skills that  
4 accompanies an enhanced level of neuroticism (Yoon et al., 2013). Importantly, it may also reflect the  
5 increased inertia (i.e., resistance to change) we observed in the negative and positive affect feelings of  
6 neurotic individuals compared with their less neurotic counterparts. Interestingly, the stronger affective  
7 inertia that accompanies an increased level of neuroticism, especially in negative affect experiences, has  
8 already been identified or suggested by a number of studies (e.g., Bringmann et al., 2016; Kuppens, Allen,  
9 et al., 2010; Suls et al., 1998).

10 Taken together, our findings may have theoretical implications. In particular, they suggest that a  
11 considerable proportion of the affect regulation dynamics that take place within the space of a few hours  
12 consists of positive feedback loops between the experience of certain affects and the use of certain affect  
13 regulation strategies. This idea contrasts with the main models of affect regulation currently endorsed in the  
14 literature (e.g., Gross, 2015; Kuppens, Oravecz, et al., 2010), as these models mainly predict the occurrence  
15 of negative feedback loops between affect and affect regulation strategies. This contrast is intriguing, as  
16 several affect regulation strategies have been thought to give rise to negative feedback processes with the  
17 experience of certain affects. One simple example is positive reappraisal or, more generally, cognitive  
18 reappraisal. This strategy is assumed to arise in a context in which individuals feel a negative affect owing to  
19 their negative interpretation of a situation. Furthermore, this strategy is assumed to decrease this initial  
20 negative affect by generating more favorable interpretations of the situation (e.g., Beck, 2011; Lazarus &  
21 Folkman, 1984), thus contributing to a negative feedback process. However, in the short term, owing to  
22 their impact on behavior and cognition (Bowers, 1991; Fredrickson, 1998, 2001), affective experiences  
23 appear mainly to promote the use of affect regulation strategies that are likely to maintain or reinforce them,  
24 thus creating positive rather than negative feedback loops. Importantly, Gross (2015) acknowledges in one  
25 sentence that an affective feeling can influence the use of affect regulation strategies not only by  
26 heightening, when this feeling is negatively evaluated, the motivation to change it (i.e., process that

1 generally gives rise to negative feedback loops), but also through the *impulse* this feeling triggers (Gross,  
2 2015, p. 14). This impulse seems to refer to the broad impact that affective experience has on cognition and  
3 behavior (Bowers, 1991; Fredrickson, 1998; 2001), which may deserve greater attention in affect regulation  
4 theories, as our findings suggest that it makes a considerable contribution to the short-term dynamics of  
5 affect regulation.

6 Nevertheless, further research is needed to extend our exploration of this area, while addressing some  
7 of the present study's limitations. To begin with, even though this initial study yielded some interesting  
8 findings, it might be worthwhile exploring a wider range of affect regulation strategies than that covered in  
9 this research. This might help us gain a better understanding of the number and proportion of positive and  
10 negative feedback loops between affect and affect regulation strategies that constitute affect regulation  
11 dynamics. However, proceeding thus would be complex for two reasons. First, experience sampling studies  
12 require short assessments to which quick responses can be made, knowing that these assessments need to  
13 contain both affect- and affect regulation strategy-related items. This therefore constrains the number of the  
14 latter items. For instance, our decision to use 12 affect-related items in the present study on the basis of Yik  
15 et al. (2011)'s model considerably constricted the number of affect regulation strategies we could examine.  
16 Second, examining a larger number of affect regulation strategies could prove complex, as the multilevel  
17 vector autoregressive approach adopted in the literature only considers the unique effects that the variables  
18 have on each other. In other words, examining too many affect regulation strategies is likely to considerably  
19 reduce, or even suppress, the influence exerted by each of these strategies on affective experience. Tools  
20 enabling both unique and shared effects to be considered, such as relative importance matrices, are available  
21 in the literature, but are hardly applicable to multilevel vector autoregressive approaches (Bulteel et al.,  
22 2016).

23 A second limitation of this study is its generalizability. Our results were obtained from a single sample  
24 of 78 individuals, all living in the same country. Thus, future research will need to be conducted with  
25 different samples, to determine the extent to which our initial results can be generalized. Importantly, the  
26 sample from which we collected our data was sufficient to identify statistically significant effects, including

1 cross-level interaction effects. However, some of the data analysis strategies we used in this study (i.e., not  
2 including random slopes, not using correction for multiple comparisons) may have led to the significance of  
3 the effects we examined being overstated. Although it is conceivable that not including random slopes can  
4 yield just as many Type-II errors as Type-I errors, and although applying corrections for multiple  
5 comparisons to multilevel vector autoregressive models is, for the time being, virtually unfeasible  
6 (Epskamp, Borsboom, & Fried, 2015), further research is needed to address the robustness of our findings.

7 A third limitation of the present study is that it did not contain any assessment of the occurrence of  
8 affectively salient events. However, an individual's current affective feeling depends on a myriad of  
9 influences interacting with one another, including previous affective feelings, thoughts, behaviors,  
10 motivational states, and events. The interplay between these main determinants will need to be the subject  
11 of future comprehensive network approach-based studies.

12 To conclude, the present study yielded two main findings. First, affect regulation dynamics, when  
13 conceptualized as a network made up of units (i.e., affect and affect regulation strategies) that influence each  
14 other over time, is mainly characterized by positive feedback loops between positive affect and some  
15 broadminded affect regulation strategies, and between negative affect and some narrow-minded strategies.  
16 Second, stable interindividual differences in extraversion and neuroticism are not only manifested in the  
17 tendency to display one affect or another, or one affect regulation strategy or another, but are also expressed  
18 in the pattern of temporal relationships between these units.

1       References

2       Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The Twenty-Item Toronto Alexithymia Scale:  
3       Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*, 23-32.

4       Bates, D., Kliegl, R., Vasishth, S., & Baayen, H. (2015). Parsimonious Mixed Models.  
5       arXiv:1506.04967 [stat]. Retrieved from <http://arxiv.org/abs/1506.04967>

6       Beck, J. S. (2011). *Cognitive behavior therapy: Basics and beyond (second edition)*. New York:  
7       Guilford Press.

8       Bolger, N., & Laurenceau, J.-P. (2013). *Intensive longitudinal methods: an introduction to diary and*  
9       *experience sampling research*. New York, NY: Guilford Press.

10       Bowers, G. H. (1991). Mood congruity of social judgements. In J. P. Forgas (Ed.), *Emotion and social*  
11       *judgements* (pp. 31-53). Elmsford, NY: Pergamon Press.

12       Brans, K., Koval, P., Verduyn, P., Lim, Y. L., & Kuppens, P. (2013). The regulation of negative and  
13       positive affect in daily life. *Emotion*, *13*, 926-939.

14       Bringmann, L. F., Lemmens, L. M., Huibers, M. H., Borsboom, D., & Tuerlinckx, F. (2015).  
15       Revealing the dynamic network structure of the Beck Depression Inventory-II. *Psychological Medicine*, *45*,  
16       747-757.

17       Bringmann, L. F., Madeline, L. P., Vissers, N., Ceulemans, E., Borsboom, D., Vanpaemel, W., ... &  
18       Kuppens, P. (2016). Assessing temporal emotion dynamics using networks. *Assessment*,  
19       doi:1073191116645909.

20       Bringmann, L. F., Vissers, N., Wichers, M., Geschwind, N., Kuppens, P., Peeters, F., ... Tuerlinckx, F  
21       (2013). A network approach to psychopathology: New insights into clinical longitudinal data. *PLOS ONE*,  
22       *8*, e60188.

23       Bulteel, K., Tuerlinckx, F., Brose, A., & Ceulemans, E. (2016). Using raw VAR regression coefficients  
24       to build networks can be misleading. *Multivariate Behavioral Research*, *51*, 1-15.

1 Burns, A. B., Brown, J. S., Sachs-Ericsson, N., Plant, E. A., Curtis, J. T., Fredrickson, B. L., & Joiner,  
2 T. E. (2008). Upward spirals of positive emotion and coping: Replication, extension, and initial exploration  
3 of neurochemical substrates. *Personality and Individual Differences, 44*, 360-370.

4 Carver, S. C., & Connor-Smith, J. K. (2010). Personality and coping. *Annual Review of Psychology,*  
5 *61*, 679-704.

6 Costantini, G., Epskamp, S., Borsboom, D., Perugini, M., Möttus, R., Waldorp, L. J., and Cramer, A.  
7 O. J. (2015). State of the aRt personality research: A tutorial on network analysis of personality data in R.  
8 *Journal of Research in Personality, 54*, 13–29.

9 Davis, M. A. (2009). Understanding the relationship between mood and creativity: A meta-analysis.  
10 *Organizational Behaviour and Human Decision Processes, 108*, 25-38.

11 Epskamp, S., Borsboom, D., & Fried, E. I. (2016). Estimating psychological networks and their  
12 accuracy: a tutorial paper. arXiv:1604.08462 [stat]. Retrieved from <https://arxiv.org/abs/1604.08462>

13 Epskamp, S., Cramer, A. O. J., Waldorp, L. J., Schmittmann, V. D., & Borsboom, D. (2012). qgraph:  
14 Network visualizations of relationships in psychometric data. *Journal of Statistical Software, 48*, 1-18.

15 Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effect of experimentally  
16 induced mindfulness on emotional responding to film clips. *Emotion, 10*, 72-82.

17 Fagley, N. S. (2012). Appreciation uniquely predicts life satisfaction above demographics, the Big 5  
18 personality factors, and gratitude. *Personality and Individual Differences, 53*, 59-63.

19 Folkman, S. (1997). Positive psychological states and coping with severe stress. *Social Science &*  
20 *Medicine, 45*, 1207-1221.

21 Forgas, J. P. (1995). Mood and judgement: The affect infusion model. *Psychological Bulletin, 117*,  
22 39-66.

23 Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology, 2*,  
24 300-319.

25 Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-  
26 build theory of positive emotions. *American Psychologist, 56*, 218-226.

- 1 Fredrickson, B. L., & Joiner, T. E. (2002). Positive emotions trigger upward spirals toward emotional  
2 well-being. *Psychological Science, 13*, 172-175.
- 3 Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local  
4 processing of visual information. *Psychological Science, 13*, 34-40.
- 5 Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the  
6 lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf  
7 (Eds.), *Personality psychology in Europe* (Vol. 7, pp. 7-28). Tilburg, The Netherlands: Tilburg University  
8 Press.
- 9 Gross, J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for  
10 experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*, 224-237.
- 11 Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry, 26*,  
12 1-26.
- 13 Hamilton, L. (1989). Fight, flight or freeze: Implications of the passive fear response for anxiety and  
14 depression. *Phobia Practice and Research Journal, 2*, 17-27.
- 15 Hektner, J. M., Schmidt, J. A., & Csikszentmihalyi, M. (2006). *Experience Sampling Method:  
16 Measuring the quality of everyday life*. Thousand Oaks, CA: Sage Publications.
- 17 Hirsh, J. B., Guindon, A., Morisano, D., & Peterson, J. B. (2010). Positive mood effects on delay  
18 discounting. *Emotion, 10*, 717-721.
- 19 John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes,  
20 individual differences, and life span development. *Journal of Personality, 72*(6), 1301-1334.
- 21 Koval, P., Butler, E. A., Hollenstein, T., Lanteigne, D., & Kuppens, P. (2015). Emotion regulation and  
22 the temporal dynamics of emotions: Effects of cognitive reappraisal and expressive suppression on  
23 emotional inertia. *Cognition & Emotion, 29*, 831-851.
- 24 Koval, P., Kuppens, P., Allen, N. B., & Sheeber, L. (2012). Getting stuck in depression: The roles of  
25 rumination and emotional inertia. *Cognition & Emotion, 26*, 1412-1427.

- 1 Kuppens, P., Allen, N. B., & Sheeber, L. (2010). Emotional inertia and psychological maladjustment.  
2 *Psychological Science, 21*, 984-991.
- 3 Kuppens, P., Oravecz, Z., & Tuerlinckx, F. (2010). Feelings change: Accounting for individual  
4 differences in the temporal dynamics of affect. *Journal of Personality and Social Psychology, 99*,  
5 1042-1060.
- 6 Larsen, R. J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional  
7 states. *Journal of Personality and Social Psychology, 61*, 132-140.
- 8 Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- 9 Loas, G., Otmani, O., Verrier, A., Fremaux, D., & Marchand, M. P. (1996). Factor analysis of the  
10 French version of the 20-Item Alexithymia Scale (TAS-20). *Psychopathology, 29*, 139-144.
- 11 Matthews, G., & Wells, A. (2000). Attention, automaticity, and affective disorders. *Behavior*  
12 *Modification, 24*, 69-93.
- 13 McCrae, R. R., & Costa, P. T. (2005). *Personality in adulthood (second edition)*. New York: Guilford  
14 Press.
- 15 Mikolajczak, M. (2009). La régulation des émotions négatives. In M. Mikolajczak (Ed.), *Les*  
16 *compétences émotionnelles* [Emotional skills] (pp. 153-192). Paris: Dunod.
- 17 Mikolajczak, M., & Desseilles, M. (2012). *Traité de régulation des émotions [Treaty of emotion*  
18 *regulation]*. Louvain: De Boeck.
- 19 Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality:  
20 Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological*  
21 *Review, 102*, 46-68.
- 22 Moberly, N. J., & Watkins, E. R. (2008). Ruminative self-focus and negative affect: an experience  
23 sampling study. *Journal of Abnormal Psychology, 117*, 3-14.
- 24 Nesselroade, J. R., Gerstorf, D., Hardy, S. A., & Ram, N. (2007). Idiographic filters for psychological  
25 constructs. *Measurement, 5*, 217-235.

1 Nesselroade, J. R., & Molenaar, P. C. M. (2016). Some behavioral science measurement concerns and  
2 proposals. *Multivariate Behavioral Research*, *51*, 396-412.

3 Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed  
4 anxiety/depressive symptoms. *Journal of Abnormal Psychology*, *109*, 504-511.

5 Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally  
6 occurring depressed mood. *Cognition and Emotion*, *7*, 561-570.

7 Olesen, M. H., Thomsen, D. K., & O'Toole, M. S. (2015). Subjective well-being: Above neuroticism  
8 and extroversion, autonomy motivation matters. *Personality and Individual Differences*, *77*, 45-49.

9 Pavani, J.-B., Le Vigouroux, S., Kop, J.-L., Congard, A., & Dauvier, B. (2015). Affect and affect  
10 regulation strategies reciprocally influence each other in daily life: The case of positive reappraisal,  
11 problem-focused coping, appreciation and rumination. *Journal of Happiness Studies*, *17*, 2077-2095.

12 Pe, M. L., Kircanski, K., Thompson, R. J., Bringmann, L. F., Tuerlinckx, F., Mestdagh, M., ... &  
13 Kuppens, P. (2015). Emotion-network density in major depressive disorder. *Clinical Psychological Science*,  
14 *3*, 292-300.

15 Philippot, P. (2011). *Émotion et psychothérapie [Emotion & Psychotherapy]*. Brussels: Mardaga.

16 Quoidbach, J. (2009). La régulation des émotions positives. In M. Mikolajczak (Ed.), *Les compétences*  
17 *émotionnelles [Emotional skills]* (pp. 193-220). Paris: Dunod.

18 R Core Team (2016). R: A language and environment for statistical computing. R Foundation for  
19 Statistical Computing, Vienna, Austria. URL: <https://www.R-project.org/>.

20 Riediger, M., Schmiedek, F., Wagner, G. G., & Lindenberger, U. (2009). Seeking pleasure and seeking  
21 pain: Differences in prohedonic and contrahedonic motivation from adolescence to old age. *Psychological*  
22 *Science*, *20*, 1529-1535.

23 Rood, L., Roelofs, J., Bögels, S. M., & Arntz, A. (2012). The effects of experimentally induced  
24 rumination, positive reappraisal, acceptance, and distancing when thinking about a stressful event on affect  
25 states in adolescents. *Journal of Abnormal Child Psychology*, *40*, 73-84.



1 Sarubin, N., Wolf, M., Giegling, I., Hilbert, S., Naumann, F., Gutt, D., & ... Padberg, F. (2015).  
2 Neuroticism and extraversion as mediators between positive/negative life events and resilience. *Personality*  
3 *and Individual Differences*, 82, 193-198.

4 Schmittmann, V. D., Cramer, A. J., Waldorp, L. J., Epskamp, S., Kievit, R. A., & Borsboom, D.  
5 (2013). Deconstructing the construct: A network perspective on psychological phenomena. *New Ideas in*  
6 *Psychology*, 31, 43-53.

7 Seligman, M. E. P., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American Psychologist*,  
8 61, 774-788.

9 Shiota, M. L., & Levenson, R. W. (2012). Turn down the volume or change the channel? Emotional  
10 effects of detached versus positive reappraisal. *Journal of Personality and Social Psychology*, 103, 416-429.

11 Smits, D. J. M., & Boeck, P. D. (2006). From BIS/BAS to the Big Five. *European Journal of*  
12 *Personality*, 20, 255-270.

13 Suls, J., Green, P., & Hillis, S. (1998). Emotional reactivity to everyday problems, affective inertia, and  
14 neuroticism. *Personality and Social Psychology Bulletin*, 24, 127-136.

15 Tsai, P. H., Lin, H. Y., Chen, H. C., & Lin, W. L. (2014). How does emotion influence different  
16 creative performances? The mediating role of cognitive flexibility. *Cognition and Emotion*, 28, 834-844.

17 Van Dillen, L. F., & Koole, S. L. (2007). Clearing the mind: A working memory model of distraction  
18 from negative mood. *Emotion*, 7, 715-723.

19 Watson, D., & Clark, L. A. (1992). On traits and temperament: General and specific factors of  
20 emotional experience and their relation to the five-factor model. *Journal of Personality*, 60, 441-476.

21 Weber, H., de Assunção, V. L., Martin, C., Westmeyer, H., & Geisler, F. C. (2014). Reappraisal  
22 inventiveness: The ability to create different reappraisals of critical situations. *Cognition and Emotion*, 28,  
23 345-360.

24 Yik, M., Russell, J. A., & Steiger, J. H. (2011). A 12-point circumplex structure of core affect.  
25 *Emotion*, 11, 705-731.

1           Yoon, K. L., Maltby, J., & Joormann, J. (2013). A pathway from neuroticism to depression: Examining  
2 the role of emotion regulation. *Anxiety, Stress, & Coping: An International Review*, 26, 558-572.

3           Zech, E., & Rimé, B. (2005). Is talking about an emotional experience helpful? Effects on emotional  
4 recovery and perceived benefits. *Clinical psychology & Psychotherapy*, 12, 270-287.

5           Rumination: I have wasted time thinking of a past event again and again.

1 Table 1

2 Means, standard deviations, skewness, and correlations between affective experience, affect regulation  
 3 strategy implementation, and personality

	M	SD	SC	1	2	3	4	5	6	7	8
1. PA	3.10	.90	-.03								
2. NA	1.66	.83	1.48	-.51**							
				-.54 (.27)							
3. App	3.46	1.24	-.43	.53**	-.30**						
				.44 (.27)	-.34 (.26)						
4. PR	2.89	1.24	-.07	.38**	-.10**	.27**					
				.24 (.27)	-.14 (.30)	.21 (.29)					
5. Dis	2.81	1.34	.06	.25**	.08**	.25**	.30**				
				.14 (.28)	-.02 (.29)	.16 (.29)	.22 (.30)				
6. Sup	2.74	1.37	.14	.17**	.16**	.10**	.30**	.38**			
				-.01 (.32)	.12 (.33)	-.01 (.34)	.17 (.30)	.19 (.31)			
7. Rum	1.97	1.19	1.04	-.15**	.45**	-.11**	.10**	.18**	.28**		
				-.22 (.28)	.34 (.27)	-.21 (.30)	-.01 (.31)	.05 (.29)	.19 (.30)		
8. E	3.26	.37	.55	.20	-.25*	.10	.07	-.06	-.08	-.03	
9. N	2.78	.47	.11	-.28*	.47**	-.18	-.07	.11	.01	.33**	-.47**

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

4 Note. *M* = mean; *SD* = standard deviation; *SC* = skewness coefficient; PA = positive affect; NA =  
 5 negative affect; App = appreciation; PR = positive reappraisal; Dis = distraction; Sup = expressive  
 6 suppression; Rum = Rumination; E = extraversion; N = neuroticism. For the cells containing three  
 7 coefficients, the first one is the correlation coefficient for all observations, omitting the hierarchical  
 8 organization of our data, the second one is the mean of the correlation coefficients of each individual, and  
 9 the third one (in parentheses) is the standard deviation of the correlation coefficients of each individual. The  
 10 correlations involving extraversion or neuroticism were computed at the between-participants level (i.e.,  
 11 between each individual's mean level of affective experience or affect regulation strategy implementation  
 12 and his or her level of extraversion or neuroticism).

1 Table 2

2 *Regression coefficients and statistical significance of the reciprocal influences between affective*  
 3 *experience and affect regulation strategy implementation at the sample level*

	PA	NA	App	PR	Dis	Sup	Rum
PA	.30**	.06**	.18**	.02	.12**	.05*	-.02
NA	.01	.38**	.01	.02	.10**	.06**	.10**
App	.28**	-.19**	.20**	-.01	-.03	-.04*	-.01
PR	.12**	-.10**	.01	.23**	.02	.01	-.01
Dis	.05**	-.01	0	.05**	.20**	.02	-.02
Sup	-.02	.07**	-.03	.06**	.06**	.25**	.04**
Rum	-.11**	.21**	-.03	.03	.04**	.04*	.26**

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

4 *Note.* PA = positive affect; NA = negative affect; App = appreciation; PR = positive reappraisal; Dis =  
 5 distraction; Sup = expressive suppression; Rum = Rumination. Predictor variables are displayed in rows,  
 6 and outcome variables in columns. Regression coefficients are standardized.

1 Table 3

2 *Regression coefficients of the reciprocal influences between affective experience and affect regulation*  
 3 *strategy implementation among individuals with low versus high extraversion scores.*

		Low extraversion					
	PA	NA	App	PR	Dis	Sup	Rum
PA	<b>.38</b>	.04	.18	<b>-.06</b>	.06	-.01	.02
NA	<b>.05</b>	.36	.05	.02	.09	.05	.10
App	<b>.21</b>	-.17	.24	<b>.05</b>	<b>.02</b>	<b>.03</b>	-.02
PR	.10	-.10	-.01	.20	.02	<b>-.04</b>	.01
Dis	.04	-.05	.04	.01	.22	.01	.01
Sup	<b>.05</b>	.04	-.05	.04	.11	<b>.35</b>	<b>.11</b>
Rum	-.09	.21	-.05	<b>.11</b>	<b>.10</b>	<b>.13</b>	.26
		High extraversion					
	PA	NA	App	PR	Dis	Sup	Rum
PA	<b>.21</b>	.08	.19	<b>.08</b>	.16	.09	-.06
NA	<b>-.05</b>	.40	-.03	.01	.11	.07	.11
App	<b>.34</b>	-.20	.17	<b>-.07</b>	<b>-.07</b>	<b>-.09</b>	.01
PR	.14	-.09	.02	.26	.03	<b>.05</b>	-.03
Dis	.06	.02	-.03	.08	.17	.02	-.05
Sup	<b>-.10</b>	.10	0	.07	.02	<b>.16</b>	<b>-.01</b>
Rum	-.13	.22	-.01	<b>-.02</b>	<b>-.02</b>	<b>-.05</b>	.25
AIC Pop	7042.16	7504.3	9721.25	9240.97	8784.39	8812.87	8940.48
AIC E	6998.92	7499.53	9729.99	9233.67	8781.07	8782.16	8930.69

4 *Note.* PA = positive affect; NA = negative affect; App = appreciation; PR = positive reappraisal; Dis =  
 5 distraction; Sup = expressive suppression; Rum = Rumination. *Low extraversion* corresponds to a fictitious  
 6 individual scoring 1.5 standard deviations below the mean on this trait, and *high extraversion* to a fictitious  
 7 individual scoring 1.5 standard deviations above the mean on this trait. Predictor variables are displayed in  
 8 rows, and outcome variables in columns. Regression coefficients are standardized. The coefficients in bold  
 9 represent the ones that were significantly moderated by extraversion. *AIC Pop* represents the AICs of the  
 10 seven models that did not include extraversion in their predictors, and *AIC E* the AICs of the seven models  
 11 that did include it.

1 Table 4

2 *Regression coefficients of the reciprocal influences between affective experience and affect regulation*  
 3 *strategy implementation among individuals with low versus high neuroticism scores*

		Low neuroticism					
	PA	NA	App	PR	Dis	Sup	Rum
PA	<b>.22</b>	.03	.17	0	.10	.02	<b>-.10</b>
NA	<b>-.07</b>	<b>.33</b>	-.01	0	.10	.04	<b>.04</b>
App	<b>.34</b>	-.21	.20	<b>-.07</b>	-.02	-.06	0
PR	<b>.15</b>	<b>-.15</b>	0	.26	.05	.05	0
Dis	.07	.01	-.02	<b>.13</b>	.17	.01	-.07
Sup	<b>-.08</b>	<b>.13</b>	-.05	<b>.01</b>	<b>.01</b>	.22	<b>0</b>
Rum	<b>-.20</b>	<b>.25</b>	-.01	.01	.02	-.01	.28
		High neuroticism					
	PA	NA	App	PR	Dis	Sup	Rum
PA	<b>.34</b>	.09	.20	.03	.13	.07	<b>.05</b>
NA	<b>.05</b>	<b>.42</b>	.04	.03	.11	.08	<b>.15</b>
App	<b>.22</b>	-.17	.21	<b>.05</b>	-.02	-.01	-.02
PR	<b>.10</b>	<b>-.04</b>	.01	.21	0	-.02	-.03
Dis	.03	-.03	.03	<b>-.02</b>	.22	.02	.02
Sup	<b>.03</b>	<b>.01</b>	-.01	<b>.11</b>	<b>.12</b>	.28	<b>.10</b>
Rum	<b>-.04</b>	<b>.18</b>	-.05	.06	.05	.07	.23
AIC Pop	7042.16	7504.3	9721.25	9240.97	8784.39	8812.87	8940.48
AIC N	6977.98	7479.71	9734.26	9237.84	8791.1	8819.25	8926.7

4 *Note.* PA = positive affect; NA = negative affect; App = appreciation; PR = positive reappraisal; Dis =  
 5 distraction; Sup = expressive suppression; Rum = Rumination. *Low neuroticism* corresponds to a fictitious  
 6 individual scoring 1.5 standard deviations below the mean on this trait, and *high neuroticism* to a fictitious  
 7 individual scoring 1.5 standard deviations above the mean on this trait. Predictor variables are displayed in  
 8 rows, and outcome variables in columns. Regression coefficients are standardized. Coefficients that were  
 9 significantly moderated by neuroticism are shown in bold. *AIC Pop* represents the AICs of the seven  
 10 models that did not include neuroticism in their predictors, and *AIC N* the AICs of the seven models that did  
 11 include it.

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