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Which emotions last longest and why: The role of event importance and rumination

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Abstract Some emotions last longer than others. However, duration differences have only been explored for a small number of emotions and the observed differences have not been explained. The aim of the present study is to provide a detailed picture of variability in duration between emotions and to account for this variability. Participants were asked to recollect recent emotional episodes, report their duration, and answer questions regarding appraisals and regulation strategies. Out of 27 emotions, sadness lasted the longest, whereas shame, surprise, fear, disgust, boredom, being touched, irritation, and relief were the shortest emotions. One appraisal dimension and one regulation strategy accounted for almost half of the variability in duration between emotions. In particular, compared to short emotions, persistent emotions are typically elicited by events of high importance, and are associated with high levels of rumination. This conclusion holds across emotion duration definitions, and remains valid when taking emotion recency and intensity into account.

Keywords Emotion dynamics · Emotion duration · Appraisals · Emotion regulation · Rumination

Introduction

Emotions are dynamic processes that change over time. Consequently, a full understanding of emotions can only be reached when their temporal properties are examined (Davidson 1998; Frijda 2007; Verduyn et al. 2009). Moreover, research on emotion dynamics is important from a clinical perspective, as disturbances in these dynamics are symptomatic of mental disorders such as depression (Siegle et al. 2002) and may lead to the development of somatic diseases such as cardiovascular illness (Brosschot et al. 2006).

One central temporal characteristic of emotions is the duration of emotional experience, which has been defined as the amount of time that elapses between the beginning and end point of an emotional episode. The beginning of an emotional episode can be identified rather easily because, in contrast to moods, emotions start with the occurrence of an external or internal event (Beedie et al. 2005). An emotional episode ends when the intensity of the emotional response returns to zero or to a baseline level, either for the first time (i.e., uninterrupted activation, Verduyn et al. 2011), or permanently (i.e., full recovery spanning possible interruptions, Frijda 2007).[1]

Irrespective of the duration conceptualization employed, duration has been found to be highly variable, with emotions lasting anywhere from a couple of seconds up to several hours, or even longer (Frijda et al. 1991; Verduyn et al. 2009). Not all emotions are equal in this regard: some emotions have been found to persist for a long time whereas others tend to quickly fade away. In particular, whereas sadness tends to last relatively long, shame, disgust, and fear tend to be relatively short (Scherer and Wallbott 1994; Verduyn et al. 2009a; Verduyn and Brans 2012).

However, previous studies on emotion duration have only examined a limited number of emotions. A notable exception is a study by Scherer and colleagues (Scherer

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[1] An intermediate position has been taken as well by defining the emotion end point as the moment when emotion intensity returns to baseline for at least some time (Sbarra 2006).

et al. 2004). However, because only a few instances of each emotion were reported, Scherer et al. (2004) were unable to properly account for variability in duration between emotions. As such, a detailed picture of duration differences between emotions is currently lacking, which is troublesome as this limits our understanding of one of the most basic and central facets of an emotional response (Schimmack et al. 2000). Moreover, studying the differences in duration between emotions may help to differentiate emotions that are otherwise difficult to distinguish (e.g., shame and guilt, fear and anxiety).

Whereas at least some initial evidence on duration differences between emotions is available, no studies have examined why some emotions tend to last longer than others. Several determinants of duration variability within emotions have been empirically identified (e.g., Verduyn et al. 2009a, 2013) but only theoretical speculations have been made regarding determinants of duration differences between emotions (e.g., Scherer and Wallbott 1994; Brans and Verduyn 2014). In sum, our understanding of which emotions last longest and why is currently very limited.

In the present study, we aim to contribute to a better understanding of duration differences between emotions. First, we aim to chart duration differences for a large set of 27 emotions. Consistent with previous research on emotion duration (Scherer and Wallbott 1994; Verduyn and Brans 2012), we hypothesize that sadness will be among the longest emotions, whereas shame, disgust, and fear will be among the shortest. This particular duration rank order would be functional as sustained fear, disgust or shame following event offset often lacks purpose (Verduyn et al. in press). In contrast, sadness requires one to make meaning of the event and cope with the new situation which takes time (Schön 2010).

Second, we aim to empirically explain differences in duration across a large set of emotions. For this purpose we will focus on appraisals and emotion regulation strategies for three reasons: (a) appraisals and regulation strategies have been theorized to be among the central predictors of emotion duration (Van Mechelen et al. 2013), (b) both have been found to account for variability in duration within emotions (Verduyn et al. 2011; Brans and Verduyn 2014), and (c) both have been found to vary across emotions (Scherer and Wallbott 1994; Brans and Verduyn 2014).

Among the appraisal dimensions, we hypothesize that the perceived importance of the eliciting event is the central determinant of duration differences between emotions, such that emotions typically elicited by important events will last longest. Event importance is the appraisal dimension that captures to what degree the emotion-eliciting event has consequences for a person's concerns (Sonnemans and Frijda 1995). It is functional that emotions that typically are centered around major concerns remain active and guide behavior for a longer time than those emotions that are relatively often about minor concerns. First suggestive evidence in favor of this hypothesis is available as event importance has been shown to be a central determinant of duration variability within emotions (Verduyn et al. 2011). Moreover, sadness, which tends to be a long lasting emotion, has been found to be typically elicited by events of high importance (Brans and Verduyn 2014).

Among the regulation strategies, we hypothesize that rumination is the central determinant of duration variability between emotions, where emotions associated with high levels of rumination will last longest. Rumination refers to the enduring activation of the cognitive component of an emotional response (Nolen-Hoeksema and Morrow 1993). As rumination is a largely repetitive and passive process one may conjecture that rumination prolongs emotions by sustaining or even strengthening the original affective meaning of the emotional event (Verduyn et al. in press). It is well documented that excessive levels of rumination are characteristic for sadness and prolong the sadness experience (Nolen-Hoeksema 1991). As other emotions also differ in rumination levels (Brans and Verduyn 2014) one may expect that rumination can explain differences in duration between those emotions as well.

Obviously, one cannot rule out the possibility that other appraisal dimensions or regulation strategies will also explain differences in duration between emotions. To examine the specificity of the role of event importance and rumination, we explored other appraisals and regulation strategies as well.

To test our hypotheses, participants were asked to recollect recent emotional episodes, report their duration, and answer questions regarding their appraisal of the emotion eliciting event as well as the strategies they used to regulate the emotion. To examine whether our findings depend on the way emotion duration is defined, half of the participants were explained that an emotion ends as soon it is no longer felt for the first time (similar to Verduyn et al. 2011) whereas the other half were told that an emotion ends as soon as one has fully recovered from the event (similar to Frijda 2007). Emotions were selected from the emotion categorization of Scherer (2005), appraisals were taken from the Geneva Appraisal Questionnaire (Scherer 2001), and the selection of regulation strategies was based on the process model of emotion regulation (Gross and Thompson 2007).

Method

Participants

Participants were 233 high school students (112 women and 118 men, 3 participants did not report gender). The

mean age of the participants was 17.02 year ($SD = .79$). Participation to the study was part of a course requirement.

Materials and procedure

Participants were asked to fill out a questionnaire on their experience of several emotions. Subsequently, two important conceptual clarifications were offered. First, to make sure that participants would report emotions and not moods, they were told that an emotion is always elicited by a certain external or internal event, and thus has a clear onset point (an illustrative example was added). Second, a definition of the end point of an emotion was provided and participants were asked to take this definition into account when providing duration estimates. Half of the participants were told than an emotion ends as soon as the emotion is no longer felt for the first time (the only exception being an interruption due to sleep) whereas the other half was explained than an emotion ends as soon as one has fully recovered from the event (an illustrative example was added).

The remainder of the questionnaire consisted of nine three-page sections with each section corresponding to a different emotion. Each questionnaire consisted of nine emotions taken from a set of 27 emotions (admiration, anger, anxiety, being touched, boredom, compassion, contentment, desperation, disappointment, disgust, enthusiasm, fear, gratitude, guilt, hatred, hope, humiliation, irritation, jealousy, joy, pride, relaxation, relief, sadness, shame, stress, and surprise). As the difference between fear and anxiety is not clear in the language of the participants (i.e., Dutch), fear and anxiety were defined as emotions caused by an event that is situated in the present (e.g., feeling fear when seeing a spider) or future (e.g., feeling anxiety when thinking about a public speech one has to perform), respectively (Öhman 2008). Six different versions of the same questionnaire were created with the only difference being the nature of the emotions included. For each version of the questionnaire, the emotions were presented in one of two orders resulting in a total of twelve questionnaires which were randomly distributed between participants.

Each section started with the instruction to recall a recent episode of the emotion in question and to briefly describe the emotion-eliciting event.[2] Subsequently, participants were asked to indicate when the emotion-eliciting event occurred (1 = days ago, 2 = weeks ago, 3 = months ago, or 4 = years ago). Next, they were asked to rate the duration and intensity of the emotional episode. For duration, participants were asked to specify the number of days, hours, minutes and/or seconds the emotional experience had lasted. Intensity was rated on a 7 point Likert scale, ranging from 0 (*not intense at all*) to 6 (*very intense*).

Subsequently, participants reported the regulation strategies they adopted. In particular they indicated to what degree they *decided to enter the situation* (situation selection), *attempted to change the event that elicited the emotion* (situation modification), *attempted to distract their attention away from what happened* (distraction), *kept on thinking about their feelings and the consequences of the event that elicited the emotion* (rumination), *reflected quietly on the emotion-eliciting event* (reflection), *attempted to view the emotion-eliciting event in a different way* (reappraisal), *suppressed their emotion* (emotion suppression), *suppressed the expression of their emotion* (expressive suppression). Each strategy was rated on a 7-point Likert scale ranging from 0 (*not at all*) to 6 (*very much*).

Finally, participants were asked to rate the emotion-eliciting event on a number of appraisal dimensions. In particular, participants indicated to what extent *the event that elicited the emotion was important to them* (importance); *the event that elicited the emotion was advantageous/disadvantageous to them* (advantageous/disadvantageous); *they thought that someone else was responsible for the occurrence of the event that elicited the emotion* (other responsibility); *they thought they were themselves responsible for the occurrence of the event that elicited the emotion* (own responsibility); *they thought that they could change something about the event that elicited the emotion* (problem-focused coping); *they thought that they could deal with the emotions that were elicited by the event* (emotion-focused coping); *they expected the event that elicited the emotion to happen* (expectedness); *they thought that the event that elicited the emotion had a negative impact on their self-image* (impact on self-image); *they thought that the event that elicited the emotion to be unjust* (injustice); *they thought that the event that elicited the emotion was immoral* (immorality). All appraisal items were rated on a 7-point Likert scale ranging from 0 to 6, with 6 indicating strong agreement; the only exception is the advantageous/disadvantageous dimension which ranged from (−3 = very disadvantageous to +3 = very advantageous).

Results

Participants reported an average of 8.42 emotional episodes (out of a maximum of 9). In line with the instructions, the

[2] Two raters verified independently whether the essays were compatible with the emotion participants were asked to recall (good interrater agreement: kappa = .74). In 2 % of the cases no essay was provided by the participant. In a similar percentage of cases (rater 1: 1 %, rater 2: 2 %) the essay did not seem to correspond with the emotion listed at the top of the page. However, removing these cases did not substantively alter any of the conclusions we reported.

majority of these emotional episodes happened recently with 72 percent of the episodes being experienced within the last couple of weeks. In the sections below, we will chart and explain differences in duration between emotions. The duration distribution was highly positively skewed as is typical for emotion duration data. To avoid the undue influence of outliers on our findings, we logarithmically transformed duration ratings (in seconds). Subsequently, we examined the transformed duration distribution of each emotion, separately for each definition of duration. Fifteen observations (<1 % of the data) were found to be outliers and were removed from all further analyses. The remaining logarithmically transformed duration ratings were used as the dependent variable whenever modelling variability in emotion duration. To ease interpretation, we also provide median durations when illustrating duration differences between emotions.

Charting differences in duration between emotions

For each duration definition and emotion, the mean [log (duration)] and median duration are presented in Fig. 1. A highly similar pattern of duration differences was observed regardless whether one inspects the mean [log (duration)] ratings (top) or median duration ratings (bottom) in Fig. 1.[3] Multilevel analyses (episodes nested within participants) revealed a main effect of duration definition ($F(1, 1621) = 4.66$, $p = .03$) and a main effect of emotion type ($F(26, 1621) = 7.85$, $p < .0001$) but no interaction between them ($F(26, 1621) = 1.00$, $p = .47$). The absence of an interaction between emotion type and definition implies that differences in duration between emotions are highly similar across duration definitions[4]. The main effect of duration definition reflects that shorter durations are reported when the emotion endpoint is equated with a first return to baseline (mean [log (duration)] = 4.12, median = 2 h) compared with a permanent return (mean [log (duration)] = 4.33, median = 5 h). The main effect of emotion type reflects that some emotions tend to last longer than others.

To get a better understanding of the main effect of emotion type, we ran a series of pairwise comparison contrasts (see Table 1). Four remarks about this table should be made. First, one-third (i.e., 117 out of 351 contrasts) of the pairwise comparisons were significant which implies that a sizeable number (but not the majority) of emotions can be distinguished from each other based on their average duration. Second, sadness was found to be the longest emotion and lasted significantly longer than all other emotions under study. Third, shame was found to be the shortest emotion even though it should be noted that shame did not significantly last shorter than surprise, fear, disgust, boredom, being touched, irritation and relief. Fourth, when looking at the emotion pairs that show conceptual overlap fear was found to last significantly shorter than anxiety ($t(1647) = 4.12$, $p < .0001$), and guilt was found to last significantly longer than shame ($t(1647) = 2.71$, $p = .0067$).

Explaining differences in duration between emotions

To account for the observed differences in duration between emotions, we calculated the mean of the [log (duration)] ratings, appraisal ratings, and regulation ratings for each emotion by duration definition. Subsequently, we correlated emotion duration with appraisals and regulation strategies across emotions for each duration definition separately. The resulting correlations are presented in Table 2. Two regulation strategies (rumination and reflection) and one appraisal dimension (event importance) correlated significantly with duration. Emotions that were typically elicited by important events (first return to baseline: $r = .59$, $p = .001$; permanent return to baseline: $r = .57$, $p = .002$) and were accompanied by high levels of rumination (first return to baseline: $r = .36$, $p = .068$; permanent return to baseline: $r = .56$, $p = .003$) lasted longest regardless of duration definition. Reflection was positively correlated with duration but only when equating the end of an emotion with a permanent return to baseline ($r = .44$, $p = .02$).

To examine the simultaneous contribution of these three predictors and their possible interaction with duration definition directly, we collapsed the averaged data across duration definitions. Duration definition did not interact with event importance, rumination, or reflection when predicting duration ($ps > .74$) and reflection did not have a unique contribution in the prediction of duration differences between emotions on top of event importance and rumination ($t(49) = 1.33$, $p = .19$); these non-significant effects were removed from the regression model. Next, we examined whether event importance and rumination remained significant predictors of duration when controlling for emotion intensity and found that both predictors indeed remained significant. As such, our final regression model revealed that an emotion tends to last especially long when the emotion is typically elicited by a highly important event

[3] This is also reflected by a high correlation between the mean [log (duration)] and median duration across emotions. In particular, when equating the end of an emotional episode with a first return to baseline, a correlation of .76 was observed between both duration measures, and when equating the end of an emotional episode with a permanent return to baseline a correlation of .77 was found.

[4] This is confirmed when comparing the left and right panels of Fig. 1, as well as by the high correlation in duration between definitions across emotions. In particular, a correlation of .60 was observed when correlating the mean [log (durations)] between definitions and a correlation of .58 when correlating the median durations between definitions.

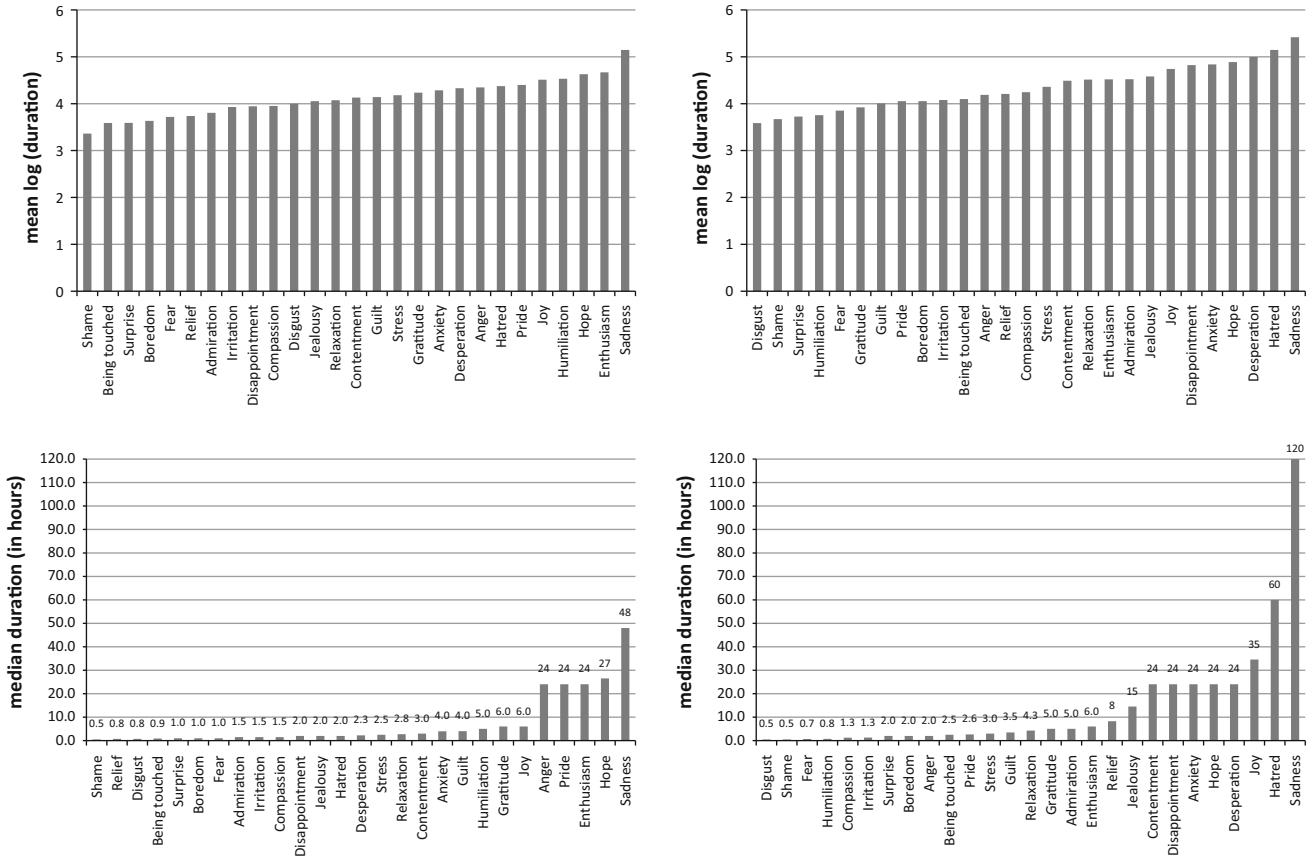

Fig. 1 Mean [log(duration)] ratings (*top*) and median duration (*bottom*) by emotion when equating the end of an emotional episode with a first return to baseline (*left*) or with a permanent return to baseline (*right*)

(B = .14, t(49) = 2.45, $p = .018$, partial $\eta^2 = .11$), is typically associated with high levels of rumination (B = .16, t(49) = 2.92, $p = .005$, partial $\eta^2 = .15$), and is typically very intense (B = .41, t(49) = 3.49, $p = .001$, partial $\eta^2 = .20$), while controlling for duration definition. Event importance and rumination accounted for 43 percent of the differences in duration between emotions on top of duration definition, and for 13 percent on top of duration definition and emotion intensity.

Finally, we examined the possible influence of retrospective bias on our conclusions. For this purpose we re-estimated our final regression model including only the emotional episodes that occurred within the last couple of weeks.[5] Event importance (B = .12, t(49) = 2.15, $p = .036$, partial $\eta^2 = .09$), rumination (B = .10, t(49) = 1.75, $p = .087$, partial $\eta^2 = .06$), and intensity (B = .35, t(49) = 3.24, $p = .002$, partial $\eta^2 = .18$) were again found to account for differences in duration between emotions while controlling for duration definition, even though the effect of rumination became marginally significant.

Exploratory analysis: Gender differences

In a final analysis we explored whether men and women tend to have emotions of different duration. A main effect of gender was found (F (1, 1603) = 18.03, $p < .0001$) reflecting that women (mean [log (duration)] = 4.42, median = 5.04 h) experience longer emotions than men (mean [log (duration)] = 4.04, median = 2 h). Gender did not interact with definition (F (1, 1603) = 1.61, $p = .20$) or emotion type (F (26, 1603) = 1.18, $p = .24$) which implies that gender differences were highly similar across duration definitions and emotions. Controlling for gender in the aforementioned analyses did not alter any of the conclusions we reported.

Discussion

Some emotions tend to persist whereas others quickly fade away. Even though the majority of emotions have a similar duration, duration differences were observed in one-third

[5] We did not limit this analysis to the episodes that happened during the preceding days only as duration averages would in that case be based on a very low number of episodes for some emotion categories. Moreover, within this time frame very long episodes would by definition be excluded which would shrink the duration variability between emotions.

Table 1 Pairwise comparisons of duration between emotions

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
01. Sadness	X	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
02. Hope	S	X														L	L	L	L	L	L	L	L	L	L	L	L
03. Desperation	S		X													L	L	L	L	L	L	L	L	L	L	L	L
04. Hatred	S			X												L	L	L	L	L	L	L	L	L	L	L	L
05. Enthusiasm	S				X											L	L	L	L	L	L	L	L	L	L	L	L
06. Anxiety	S					X														L	L	L	L	L	L	L	L
07. Joy	S						X													L	L	L	L	L	L	L	L
08. Disappointment	S							X																L	L	L	L
09. Jealousy	S								X															L	L	L	L
10. Anger	S									X															L	L	L
11. Contentment	S										X														L	L	L
12. Relaxation	S											X													L	L	L
13. Stress	S												X												L	L	L
14. Pride	S													X												L	L
15. Humiliation	S														X												L
16. Gratitude	S	S	S	S	S											X											L
17. Compassion	S	S	S	S	S												X										L
18. Admiration	S	S	S	S	S													X									L
19. Guilt	S	S	S	S	S														X								L
20. Relief	S	S	S	S	S	S	S													X							
21. Irritation	S	S	S	S	S	S	S														X						
22. Being touched	S	S	S	S	S	S	S															X					
23. Boredom	S	S	S	S	S	S	S																X				
24. Disgust	S	S	S	S	S	S	S	S	S															X			
25. Fear	S	S	S	S	S	S	S	S	S	S	S	S	S												X		
26. Surprise	S	S	S	S	S	S	S	S	S	S	S	S	S	S												X	
27. Shame	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S								X

Above diagonal: L reflects that emotion in row is significantly ($p < .01$) longer than emotion in column; Below diagonal: S reflects that emotion in row is significantly ($p < .01$) shorter than emotion in column

Table 2 Correlations of mean regulation ratings and mean appraisals ratings with mean [log(duration)] ratings across emotions by duration definition

	Duration definition	
	First return to baseline	Permanent return to baseline
Emotion regulation		
Situation selection	.18	.08
Situation modification	−.06	.03
Distraction	−.02	−.03
Rumination	.36†	.56**
Reflection	.17	.44*
Reappraisal	−.04	.18
Emotion suppression	−.04	.09
Expression suppression	.12	.14
Appraisals		
Importance	.59**	.57**
Disadvantageous/advantageous	.04	−.10
Other responsibility	.14	−.09
Self responsibility	−.03	−.01
Problem focused coping	.05	.00
Emotion focused coping	−.14	−.28
Expectancy	−.10	.15
Self-ideal	.12	.11
Injustice	.12	.15
Immorality	.16	.10

† $p < .10$, * $p < .05$, ** $p < .01$

of the cases when comparing emotions pairwise and the duration range is large with the longest emotion (i.e. sadness) lasting up to 240 times longer than the shortest emotion (i.e., shame). However, in the majority of the cases duration differences are much smaller.

Even though shorter durations were found when equating the end point of an emotional episode with a first return rather than a permanent return to baseline, differences in duration between emotions were found to be highly similar regardless of the way duration was defined. Consistent with previous research on emotion duration, sadness was found to be the longest emotion whereas shame, surprise, fear, disgust, being touched, irritation, and relief were the shortest (Scherer and Wallbott 1994; Verduyn and Brans 2012). Interestingly, boredom was also found to be among the shortest emotions. As such, even though time seems to pass slowly when one is bored (Gallagher 2012), an episode of boredom typically doesn't last that long.

Duration was also found to be a dimension that can differentiate between otherwise similar emotions. Shame and guilt have many overlapping features (Tangney and Dearing 2002), but the present data reveal that guilt is an emotion that persists much longer than shame. Similarly, fear and anxiety are overlapping aversive states centered on threat (Öhman 2008), but fear was found to be much shorter than anxiety.

Most importantly, the present study is the first to find clear empirical evidence explaining why some emotions persist for a longer time than others. Emotions that are rather short were found to be typically (but, of course not always) elicited by events of relatively low importance whereas long lasting emotions tend to be about something highly important. An event is perceived to be important when it has strong implications for an individual's major concerns (Sonnemans and Frijda 1995). Some of these implications may only become apparent over time which maintains or strengthens the emotion, causing the emotion to endure (Verduyn et al. 2009b).

A second central determinant of variability in duration between emotions is rumination, with emotions that tend to be associated with high levels of rumination lasting longer. Within the context of negative emotions, it has been shown that sustained attention to the emotion eliciting event prolongs emotions (Verduyn et al. 2009a), especially when this attention is passive and coupled with an inefficient meaning-making strategy such as rumination (Nolen-Hoeksema 1991). Within the context of positive emotions, it has been shown that persistently thinking about a positive event lengthens feelings of joy (Verduyn et al. 2011). The present finding for rumination is consistent with these earlier findings and extends them by showing that rumination does not only explain differences in duration within emotions but between emotions as well.

Even though the present study adds to our understanding of why some emotions tend to last longer than others, it also has some limitations. First, event importance and rumination account for almost half of the variability in duration between emotions. This is a sizeable effect but it also implies that half of the variability remains unexplained. Future research is needed to identify other determinants beyond rumination and event importance.

Second, participants reported emotional episodes that occurred in the past, possibly introducing a certain degree of retrospective bias in the data. However, our conclusions remained valid when only analyzing the episodes that happened recently, and the observed duration rank order is consistent with the order observed in diary studies on emotion duration (Verduyn and Brans 2012; Verduyn et al. 2011), which suggests that our conclusions are not a mere reflection of retrospective bias. Moreover, it is hard to avoid a minimal amount of retrospection when studying emotion duration, especially if one hopes to capture both short (i.e., a couple of seconds or minutes) and long emotional episodes (i.e., several hours or longer) of many different emotions.

As argued elsewhere (Brans and Verduyn 2014), experience sampling methods using time or signal-contingent sampling are not ideally suited to studying the duration of emotional episodes as the exact onset, end, or even the total episode may be missed when using a typical sampling rate. Event-contingent sampling (i.e., participants report on the occurrence of an emotional event and are subsequently asked to report repeatedly on the emotion over time) avoids this problem to some extent (i.e., the onset is identified) and can be used in future research to deepen our understanding of emotion duration variability. However, whereas event-contingent sampling combined with a high follow-up sampling rate is ideally suited to studying the duration of short emotions, it is troublesome in case of long emotional episodes as it may be overly burdensome for participants.

An alternative approach to avoid retrospective bias when studying duration differences between emotions is to induce different emotions in the laboratory and subsequently measure the emotional response repeatedly over time. Such an approach would also allow testing the prediction that differences in duration between emotions would be smaller when using emotion eliciting stimuli that are perceived as equally important or instructing participants to avoid ruminating.

Third, the sample of participants included only high school students. Even though research on the relationship between age and emotion duration is largely lacking, it might be that duration differences between emotions vary with the age group being studied. Future studies on emotion duration are needed to examine whether our conclusions generalize across age groups.

In sum, the present study revealed that meaningful differences in duration between emotions exist and that these differences can be partially explained by differences in one appraisal dimension (i.e., event importance) and one regulation strategy (i.e., rumination). However, in addition to this psychological mechanism differences in duration between emotions may also be due to neural mechanisms (Verduyn et al. in press). At present no systematic research on this topic has been conducted. This is especially surprising given the abundance of studies aimed at identifying discrete neural correlates for basic emotions, which has led to mixed findings (e.g., Lindquist et al. 2012; Vytal and Hamann 2010). However, time is typically not taken into account in these studies which is troublesome as the difference in neural signature between emotions may not be a matter of which neural regions are involved but when, and for how long neural regions become and remain active.

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