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Nostalgia's place among self-relevant emotions

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ABSTRACT

How is nostalgia positioned among self-relevant emotions? We tested, in six studies, which self-relevant emotions are perceived as most similar versus least similar to nostalgia, and what underlies these similarities/differences. We used multidimensional scaling to chart the perceived similarities/differences among self-relevant emotions, resulting in two-dimensional models. The results were revealing. Nostalgia is positioned among self-relevant emotions characterised by positive valence, an approach orientation, and low arousal. Nostalgia most resembles pride and self-compassion, and least resembles embarrassment and shame. Our research pioneered the integration of nostalgia among self-relevant emotions.

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The New Oxford Dictionary of English (1998, p. 1266) defines nostalgia as "a sentimental longing or wistful affection for the past". Nostalgic reverie often occurs in reference to momentous life events (e.g. graduation, anniversaries, holidays) that involve close others (e.g. family, friends, romantic partners; Batcho, 1995; Holak & Havlena, 1992; Wildschut, Sedikides, Arndt, & Routledge, 2006). Nostalgic recollections typically follow a redemptive sequence, in which the individual overcomes a challenge or emerges unscathed from an initially negative encounter (Abeyta, Routledge, Roylance, Wildschut, & Sedikides, 2015; Wildschut et al., 2006). Laypeople conceptualise nostalgia primarily in terms of positive features (e.g. fond memories, keepsakes, personal meaning) rather than negative features (e.g. sadness, anxiety, pain; Hepper, Ritchie, Sedikides, & Wildschut, 2012; see also Batcho, 2007), and nostalgisers report predominantly pleasant, but also partly unpleasant, affect (Sedikides & Wildschut, 2016a; Wildschut et al., 2006). Nostalgia is a universal emotion (Hepper et al., 2014) that is experienced across the life span (Hepper, Wildschut, Sedikides, Robertson, & Routledge, 2017).

So far, scholars have studied nostalgia in isolation of other self-relevant emotions. This lack of integration leaves several questions unanswered: How does nostalgia compare to other self-relevant emotions? Where is nostalgia located among these emotions on dimensions such as valence and arousal? Which self-relevant emotions are most or least similar to nostalgia? For the first time, we attempt to integrate nostalgia among self-relevant emotions.

Self-relevant emotions

We argue that self-relevant emotions (relative to arguably basic emotions such as fear or anger; Ekman, Freisen, & Ancoli, 1980, 2006) involve complex cognitive and motivational processes that implicate directly the self or the self in social context. Specifically, we refer to self-relevant emotions as those that have several (but not all) of the following features: (a) self-awareness and self-evaluation, (b) relatively delayed childhood onset of the capacity to experience the emotion, (c) serving primarily social needs, (d) no discrete, universally recognisable facial expression, and (e) complex cognitive appraisals. When concurrently present, these five features describe self-conscious emotions (Tracy & Robins, 2004a; see also Lewis, 2000; Tracy & Robins, 2007). Thus, self-relevant emotions represent a broader category than self-conscious emotions yet excludes basic emotions. We review these criteria next.

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First, self-relevant emotions feature self-awareness and self-evaluation. That is, they are "uniquely influenced, and in some cases dramatically shifted, by the involvement of self-processes, such as self-reflection and self-evaluation" (Tangney & Tracy, 2011, p. 446; Tracy & Robins, 2004a). Second, people's ability to experience self-relevant emotions develops later in childhood compared to the ability to experience basic emotions (e.g. anger, fear), perhaps because self-relevant emotions "require the capacity for self-awareness and the formation of stable self-representations" (Tracy & Robins, 2004a, p. 106), which develop after approximately 18 months of age (Kochanska, Gross, Lin, & Nichols, 2002). Third, self-relevant emotions are primarily in the service of social needs. Whereas basic emotions "serve survival and social functions" (Tracy & Robins, 2004a, p. 106), self-relevant emotions serve social goals in particular, and benefit survival only indirectly. Fourth, self-relevant emotions lack "discrete, universally recognized facial expressions" (Tracy & Robins, 2004a, p. 107). Although some self-relevant emotions have characteristic bodily expressions, their recognition may require more than just facial expression features, such as posture in the case of pride (Tracy & Robins, 2004b). Fifth and final, self-relevant emotions may necessitate complex cognitive appraisals. As opposed to basic emotions, which require few higher-level cognitive capacities, self-relevant emotions involve advanced cognitive processes such as self-representations, perspective taking, and abstract goals (Tracy & Robins, 2004a).

In the current investigation, we included, besides nostalgia, 10 self-relevant emotions: pride, guilt, embarrassment, shame, self-compassion, gratitude, inspiration, hurt, feelings, passion, and unrequited love. Each of these self-relevant emotions received a large increase in scholarly attention over the past decade, according to Science Direct (http://www.sciencedirect.com), a criterion that guided our selection. Specifically, the amount of publications per year on these emotions approximately doubled (e.g. embarrassment, inspiration), tripled (e.g. shame, hurt feelings), or even quadrupled (e.g. self-compassion, nostalgia) over this 10-year (2005–2015) period, attesting to their growing relevance in psychological science. The exception to these exponential trends was unrequited love. We nonetheless included this emotion, because both unrequited love and nostalgia involve cherished social relationships that may have ended, either due to lack of reciprocity (unrequited love; Baumeister, Wotman, & Stillwell, 1993) or passage of time (nostalgia; Wildschut et al., 2006). Thus, comparing nostalgia to unrequited love could offer insights not afforded by comparing nostalgia to the other self-relevant emotions.

As we mentioned above, the group of self-relevant emotions that meets all five criteria is typically referred to as self-conscious emotions (Tracy & Robins, 2004a). Established self-conscious emotions are pride, guilt, embarrassment, and shame. Pride involves "complex self-evaluative processes" (Tracy & Robins, 2007, p. 147) and features a sense of satisfaction derived from one's own achievements (Tracy & Robins, 2004b). Guilt "involves the negative evaluation of specific transgressions – often ones involving harm to others – and a concern for their rectification" (Pinter et al., 2007, p. 254), as when people have harmed someone or failed to fulfil an obligation (De Hooge, Zeelenberg, & Breugelmans, 2007). Guilt subsequently motivates interpersonal restorative action (Tangney, 1995). Embarrassment is triggered by social faux pas or being the focus of public scrutiny (Tangney, Miller, Flicker, & Barlow, 1996), and is a "product of a continual social monitoring of the self" (Keltner & Buswell, 1997, p. 260). Shame is "an affective reaction that follows public exposure (and disapproval) of some impropriety or shortcoming" (Tangney et al., 1996, p. 1256). Shame is thus associated with exposed inadequacy or internalised failure, and it often motivates attempts to withdraw from social interaction (Giner-Sorolla, Kamau, & Castano, 2010; Tangney & Dearing, 2002).

Other self-relevant emotions are self-compassion, gratitude, inspiration, hurt feelings, passion, and unrequited love. These emotions satisfy one or more, but perhaps not all, of the five criteria described above. Self-compassion involves "being touched by and open to one's own suffering" (Neff, 2003, p. 87). It fosters kindness and understanding towards the self, which in turn promote psychological health. People feel gratitude when they acknowledge that they gained a positive outcome by virtue of an external cause (Emmons & McCullough, 2003). Gratitude "prototypically […] stems from the perception of a positive personal outcome […], that is due to the actions of another person" (Emmons & McCullough, 2003, p. 377), and is accompanied by a focus on one's blessings. Inspiration is an emotion experienced as being triggered by something beyond the self. Inspired individuals report that they are "moved by the truth, ingenuity, goodness, beauty, or superiority

of the trigger object and are motivated to transmit, actualize, or emulate those transcendent qualities" (Thrash & Elliot, 2003, p. 873), and that they are prone to parting with the mundane and gaining an awareness of better possibilities or ideas (Thrash & Elliot, 2004). Inspiration motivates goal pursuit or behaviour. Hurt feelings involve "the perception that another individual does not regard his or her relationship with the person to be as important, close, or valuable as the person desires" (Leary, Springer, Negel, Ansell, & Evans, 1998, p. 1225). Passion is "a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy" (Vallerand et al., 2003, p. 756). Finally, unrequited love involves a "distressing experience marked by mutual incomprehension and emotional interdependence" (Baumeister et al., 1993, p. 377).

Nostalgia as self-relevant emotion

Nostalgia is also a self-relevant emotion. Nostalgia entails self-awareness and self-evaluation (a) as well as complex appraisals (e). In particular, nostalgia pertains to meaningful events about one's personal past (Juhl, Routledge, Arndt, Sedikides, & Wildschut, 2010; Wildschut et al., 2006). Characteristically, nostalgic narratives depict the self as protagonist, although typically surrounded by close others (Sedikides, Wildschut, & Baden, 2004; Wildschut et al., 2006). Nostalgia boosts positive self-evaluation. For example, nostalgising increases the cognitive accessibility of positive self-attributes (Vess, Arndt, Routledge, Sedikides, & Wildschut, 2012, Experiment 2) and augments self-esteem (Hepper et al., 2012, Study 6; Reid, Green, Wildschut, & Sedikides, 2015; Wildschut et al., 2006, Studies 5–6). Additionally, nostalgia serves social needs (c). Nostalgic narratives are rich in social themes (Abeyta, Routledge, & Juhl, 2015; Holak & Havlena, 1992; Wildschut et al., 2006, Studies 1–2). Furthermore, nostalgic (relative to ordinary autobiographical) engagement increases social connectedness (Hepper et al., 2012, Study 7; Reid et al., 2015; Turner, Wildschut, & Sedikides, 2012, Experiments 1–2; Wildschut et al., 2006, Studies 5–6; Zhou, Wildschut, Sedikides, Shi, & Feng, 2012, Study 2), promotes socially oriented action tendencies (Lasaleta, Sedikides, & Vohs, 2014; Turner et al., Experiment 1; Wildschut et al., Study 7; Zhou et al., Studies 1–4), and elicits prosocial behaviour (Stephan et al., 2014, Study 4; Zhou et al., Study 5).

Taken together, nostalgia is a self-relevant emotion. However, little is known about how it compares to other self-relevant emotions. For example, the finding that nostalgic events feature the self in a positive light (Reid et al., 2015; Vess et al., 2012) suggests that nostalgia shares similarities with pride and self-compassion, whereas it may differ from shame and guilt, which involve self-reproach (Giner-Sorolla et al., 2010). The finding that nostalgia fosters creativity (Van Tilburg, Sedikides, & Wildschut, 2015) may suggest that it shares features with inspiration. Further, nostalgia can involve loss and yearning, suggesting similarities with unrequited love and passion. As of yet, such similarities and differences have not been studied. We aimed to redress this imbalance by launching an examination of the unique and shared characteristics of nostalgia in relation to other self-relevant emotions. Our secondary objective was to clarify the relative positioning of the other self-relevant emotions.

Positioning nostalgia via multidimensional representations

In seeking to identify the place of nostalgia among self-relevant emotions, we wondered which of these emotions are perceived and experienced as most (dis)-similar to nostalgia, and how these similarities/differences correspond to the emotions' characteristics (e.g. valence, arousal). We addressed these issues by locating the position of nostalgia and other emotions in a multidimensional model, a common approach in emotion research (Ellsworth & Scherer, 2003; Russell, Lewicka, & Nitt, 1989; Van Tilburg & Igou, 2017).

A frequently used multidimensional representation of emotions is the circumplex model of affect (Russell, 1980), which posits that discrete affective experiences, including emotions, can be arranged along the circumference of a circle characterised by two orthogonal dimensions: "pleasure-displeasure" (p. 1163; i.e. valence) and "arousal-sleep" (p. 1163; i.e. arousal). This circumplex structure has been replicated cross-culturally (Russell et al., 1989), emerges in the context of neurological profiles of emotions (Posner, Russell, & Peterson, 2005), and can be used to position spatially emotions based on their expressions (Russell & Bullock, 1985). The circumplex model, however, does not exhaust all possible dimensional structures. Smith and Ellsworth's (1985) cognitive appraisal model of emotions distinguishes among six orthogonal dimensions: valence (specifically, pleasantness), anticipated effort, certainty, attentional activity, self-other responsibility/control, and situational control. In an investigation of three languages, Fontaine, Scherer, Roesch,

and Ellsworth (2007) reported that, besides valence and arousal, the dimensions of potency-control and unpredictability were required to model accurately the differences among specific emotions.

This literature, however, has focused on emotions or affect in general rather than on a specific family of emotions, such as self-relevant emotions. Whether the models proposed by Russell (1980), Smith and Ellsworth (1985), or Fontaine et al. (2007) capture the dimensionality of specific emotion families is an unanswered question. Although a dimension such as valence or arousal may be informative at the level of emotions in general, additional or different explanatory dimensions may be needed when distinguishing within subgroups of emotions. Consistent with this argument, Gray and Wegner (2011) reported that moral emotions (e.g. anger, disgust, sympathy) can be placed in two-dimensional space characterised by valence and moral type – a dimension unique to this particular group of emotions.

It is yet to be determined whether similarities/differences among self-relevant emotions can be represented within the two-dimensional circumplex model of affect (Russell, 1980) or if a more complex representation of dimensions is required (Fontaine et al., 2007; Smith & Ellsworth, 1985). Thus, in an effort to locate nostalgia among self-relevant emotions, we first developed multidimensional representations of these emotions.

General approach

We attempted to identify the position of nostalgia relative to other self-relevant emotions. We tested, in six studies, which of these emotions were perceived and experienced as most (dis)similar to nostalgia, and how these similarities/differences corresponded to the emotions' characteristics. Hence, we developed multidimensional representations of nostalgia and the other emotions in two initial steps, which we outline below.

Step 1: the dimensional configuration of similarities/differences among the self-relevant emotions

As a first step, we examined how perceived and experienced similarities/differences among self-relevant emotions can be represented in terms of dimensional structures. In our first four studies (Studies 1–4), participants compared emotions to each other. In these studies, we instructed participants to rate the degree to which pairs of emotions (e.g. nostalgia and guilt, nostalgia and shame, shame and guilt) were similar to each other. We did not specify which criteria participants should use to make these assessments.[1] In our final study (Study 5), we used correlations to index emotion similarity. In this study, participants rated their actual felt emotions in response to recalled events. The resultant correlations between emotions indicated their (experiential) similarity (Jaworska & Chupetlovska-Anastasova, 2009; Van Tilburg & Igou, 2017).

In each study, we analysed the similarities/differences between emotions to develop dimensional models, using multidimensional scaling (MDS) analyses (Kruskal & Wish, 1978; Shepard, 1980). MDS is a statistical method that creates a visual representation of the similarities/differences between objects or constructs, such as emotions. Constructs that differ are placed far apart; constructs that are similar are placed close together. These similarities/differences among emotions can be measured in different ways, such as self-report ratings (Study 1–4) or correlation coefficients (Study 5). The resultant multidimensional model can have as many dimensions as the number of constructs being compared minus 1, or as few as a single dimension. Models with many dimensions fit the observed data better, at the cost of parsimony; models with few dimensions are more parsimonious, at the cost of model fit (Jaworska & Chupetlovska-Anastasova, 2009; Maher, Van Tilburg, & Igou, 2017). MDS has been successfully used in various areas, including values (Schwartz, 1994), emotion (Van Tilburg & Igou, 2017), and politics (Kruskal & Wish, 1978). We thus sought to gain insight into the similarities/differences among self-relevant emotions without imposing a preconceived model (Rusbult & Zembrodt, 1983).

Step 2: labels for the derived dimensions

In a second step, we tested what labels can be assigned to the derived dimensions of the multidimensional representation. After identifying the dimensional structure of similarities/differences among self-relevant emotions using MDS, we determined suitable labels for the derived dimensions. In Study 6, psychology graduate students familiar with emotion research evaluated the emotions on five attributes (valence, arousal, activation, approach/avoidance, relevance to morality). We then mapped these emotion evaluations onto the dimensional structure

identified in Studies 1–5 to discern empirically the primary criteria that characterised the similarities/differences between the self-relevant emotions (Anderson & Sedikides, 1991; Rusbult, Onizuka, & Lipkus, 1993; Rusbult & Zembrodt, 1983).

Key objective: evaluating the position of nostalgia among self-relevant emotions

Establishing the dimensional structure of self-relevant emotions and identifying suitable labels for the derived dimensions set the stage for addressing our main question: What is the position of nostalgia within the resultant configurations (Studies 1–6)? Specifically, which of the emotions are most (dis)similar to nostalgia, and how do these similarities/differences correspond to the labels that characterise the emotion models? The relative positioning (i.e. in comparison to other emotions) of nostalgia on the dimension labels is still unknown. The literature portrays nostalgia as overall pleasant but tinged with sadness (Hepper et al., 2012), suggesting that its valence is more positive than negative. Research by Stephan et al. (2014) casts nostalgia as an approach-oriented emotion, indicating that it could be perceived as more approach- than avoidance-oriented. Gabriel (1993) proposed that "the emotional tone of nostalgia is not a loud one, but a contemplative, quiet one" (p. 123), suggesting that nostalgia entails low rather than high arousal/activation. Finally, nostalgia is linked to empathy (Cheung, Sedikides, & Wildschut, 2017; Zhou et al., 2012) and, to the extent that empathy is a hallmark of moral development (Eisenberg, 2000), may therefore be viewed as relevant to morality.

Method of studies 1–6

Step 1: the dimensional configuration of similarities/differences among the self-relevant emotions

In Studies 1–5, we examined the similarities/differences among various self-relevant emotions. For Studies 1–4, each sample consisted of psychology undergraduate students drawn from a separate student cohort (i.e. in different years). Studies 1–4 involved, respectively, 52 participants ($M_{age} = 20.77$, $SD = 1.22$; 41 women, 11 men), 38 participants ($M_{age} = 21.16$, $SD = 0.68$; 31 women, 7 men), 43 participants ($M_{age} = 21.89$, $SD = 2.78$; 36 women, 6 men, 1 undeclared), and 36 participants ($M_{age} = 21.29$, $SD = 2.18$; 29 women, 7 men). The study protocols were the same for these four studies. In Studies 1–4, participants rated the similarity (vs. difference) of 11 self-relevant emotions (nostalgia, pride, guilt, embarrassment, shame, gratitude, inspiration, hurt feelings, passion, and unrequited love). Specifically, they indicated the degree of similarity (vs. difference) for each of the 55 unique emotions pairs (1 = *very different*, 10 = *very similar*). The ratings resulted in an observed "similarity matrix" for each participant (appendix).

In Study 5, we assessed experienced emotions. In this online study, 52 MTurk participants (www.MTurk.com; $M_{age} = 34.00$, $SD = 11.28$; 26 women, 26 men) retrieved four events from memory. Instructions read:

> We ask you to remember four different experiences from your past. These different memories should reflect the full range of experiences that one can have in life. Bring these important memories to mind. Immerse yourself in each memory. In a moment, we will ask you to describe each experience. Before doing so, please give a title (or name) to each one of these four memories.

Participants listed experiences ranging from positive events such as "marriage", "winning county tennis championship", and "buying a house", to unpleasant events such as "fired from job", "uncle's death", and "being bit [by] my dog". After providing a name for each experience, we asked participants to describe the experiences in detail. Instructions read: "Using the space provided below, for the next few minutes, we would like you to write about the first [second/third/fourth] experience. Immerse yourself into the experience. Describe the experience and how it makes you feel.").

Next, participants rated the intensity of the 11 emotions (e.g. "With this event in mind, I experience nostalgia"; 1 = *not at all*, 10 = very *much*).[2] This process resulted in four correlation matrices (one for each event) indicating how strongly the emotions intercorrelated. The emotion comparison matrices from Studies 1–4 and the correlation matrices from Study 5 then served to identify underlying dimensions that clarified the perceived or experienced similarities/differences among the 11 self-relevant emotions, using MDS (Jaworska & Chupetlovska-Anastasova, 2009; Van Tilburg & Igou, 2017).

Step 2: labels for the derived dimensions

In Study 6, we instructed participants to rate the emotions on several attributes. Participants were 20

psychology graduate students familiar with emotion research (16 women, 4 men; $M_{age} = 24.50$, $SD = 5.25$). Thus, the raters possessed a considerable level of expertise. They rated the emotions on five attributes. Valence and arousal are common and often primary dimensions in models of emotions (Ellsworth & Scherer, 2003; Fontaine et al., 2007; Russell, 1980; Smith & Ellsworth, 1985). We therefore instructed participants to evaluate the valence (1 = *extremely negative*, 10 = *extremely positive*) and arousal (1 = *extremely low*, 10 = *extremely high*) of the emotions.[3] We included "activation" as an alternative label, because we anticipated that this term might better map onto participants' lay understanding of the psychological construct arousal. Participants therefore also evaluated perceived activation (1 = *extremely inactivated*, 10 = *extremely activated*). Motivational perspectives propose that emotions can be differentiated in terms of their relation to avoidance of undesirable outcomes versus approach of desirable outcomes (Frijda, Kuipers, & Ter Schure, 1989). Furthermore, recent findings suggest that nostalgia relates to behavioural approach (Stephan et al., 2014). Accordingly, participants evaluated the emotions on approach/avoidance (1 = *extremely avoidance-oriented*, 10 = *extremely approach-oriented*). Finally, some of the self-relevant emotions that we examined related to moral judgment or behaviour (e.g. shame, guilt; Haidt, 2003). Accordingly, a multidimensional representation might reveal a distinction between emotions that are relevant to morality and those that are not. To account for this possibility, participants also evaluated how relevant the emotions were to morality (1 = *not at all associated with morality*, 10 = *very strongly associated with morality*).

Prior to rating the emotions on these attributes, participants received a very brief description of each attribute to facilitate comprehension. The description for valence read: "Some emotions are associated with negative feelings, whereas other emotions are associated with positive feelings." For arousal, this description read: "Some emotions are associated with high levels of arousal (i.e. these emotions are very intense and make one feel alert), whereas other emotions are associated with low levels of arousal." The activation description read: "Some emotions are associated with feeling inactive, whereas other emotions are associated with feeling very active." For approach/avoidance, participants read the description: "Some emotions are associated with avoiding undesirable outcomes (or trying to), whereas other emotions are associated with approaching desired outcomes (or trying to)." For relevance to morality, the description read: "Some emotions are associated with morality (i.e. these emotions relate to the question of what makes a good or bad person), whereas other emotions are not associated with morality."[4]

Key objective: evaluating the position of nostalgia among self-relevant emotions

We determined nostalgia's place within the family of self-relevant emotions by harnessing the results of all six studies. We adopted three approaches. First, we characterised nostalgia by considering its distances to the other self-relevant emotions within the dimensional configurations identified in Studies 1–5. These comparisons addressed the issue of which emotions are perceived as similar (vs. different) to nostalgia (Studies 1–4) or how much their experiences coincided (Study 5). Second, we interpreted nostalgia's position within the dimensional configurations after identifying what labels corresponded to the derived dimensions (Study 6). Third, we charted the specific differences between nostalgia and each of the other emotions in terms of the labelled dimensions. By so doing, we aimed to paint a detailed picture of nostalgia relative to specific other self-relevant emotions.

Results

Step 1: the dimensional configuration of similarities/differences among the self-relevant emotions

To uncover the dimensional structure of similarities/differences among the self-relevant emotions, we conducted replicated MDS analyses on the similarity matrices separately for Studies 1–5.[5]

In an initial set of analyses, we estimated models ranging from 1 to 10 dimensions. The plots in Figure 1 show the stress, or "badness of fit" (Rusbult & Zembrodt, 1983), for each of these models. In each study, a two-dimensional model yielded stress below 0.10, with values of .087, .086, .087, .086, and .019, respectively. This indicates that two-dimensional models yielded faithful yet parsimonious descriptions of the data (Jaworska & Chupetlovska-Anastasova, 2009; Kruskal & Wish, 1978).[6] The two-dimensional models that were fitted to the data of Studies 1–5 provide geometrical representations of the similarities/

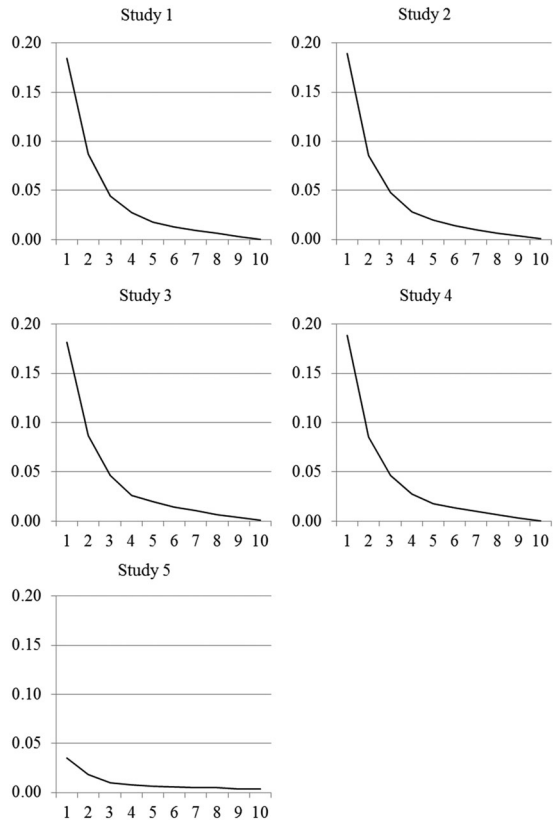

Figure 1. Model stress by dimensional complexity for Studies 1–5.

differences among self-relevant emotions. We tested next whether the two dimensions were congruent across the studies by correlating the coordinates of the emotions on a given dimension with their coordinates on that same dimension in another study (Table 1). For Studies 1–4, these correlations between corresponding dimensions ranged from $r = .88$ to $r = .99$, indicating that the relative positions of self-relevant emotions across those four studies were highly consistent. The first dimension of Study 5 corresponded strongly with Dimension 1 of the other studies, $r = -.87$, to $r = -.94$ (thus essentially mirrored). Dimension 2 of the Study 5 model, on the other hand, corresponded only moderately with the second dimension of the other studies, $r = -.38$ to $r = -.56$ (also mirrored). Thus, whereas the positioning of emotions was consistent across Studies 1–4, Study 5 yielded somewhat different Dimension 2 positions. Accordingly, we averaged the position of each self-relevant emotion by computing their average positions on Dimension 1 and 2 for Studies 1–4 (Figure 2, upper panel); the reliabilities of these averages were excellent for both dimensions ($\alpha_1 = .98$, $\alpha_2 = .99$). Given that the Study 5 model yielded somewhat different Dimension 2 positions, we considered it separately (Figure 2, lower panel).

Step 2: labels for the derived dimensions

We next mapped the attributes assessed in Study 6 onto the aggregated two-dimensional model emerging from Studies 1–4 and that of Study 5 (Sedikides & Anderson, 1994). For each emotion, we first computed an average score across participants on the evaluated attributes. The corresponding reliability coefficients, reflecting whether different participants evaluated the emotions similarly on a given attribute, were adequate ($.90 > \alpha > .99$).

We conducted a series of regression analyses to relate the attribute scores of Study 6 to the average self-relevant emotion coordinates of the two-dimensional aggregate model of Studies 1–4 and that of Study 5 (Rusbult et al., 1993). In these analyses, the average emotion coordinates on Dimension 1 and 2 served as predictors, whereas the attribute ratings

Table 1. Aggregate-level correlations of self-relevant emotion coordinates across studies.

		Study											
		1		2		3		4		5		*Aggregate 1–4*	
Study		*Dim. 1*	*Dim. 2*	*Dim. 1*	*Dim. 2*	*Dim. 1*	*Dim. 2*	*Dim. 1*	*Dim. 2*	*Dim. 1*	*Dim. 2*	*Dim. 1*	*Dim. 2*
1	*Dim. 1*	–	.000	.967	.032	.877	.111	.907	.053	−.871	−.320	.963	.050
	Dim. 2		–	−.065	.902	−.082	.951	.019	.984	.053	−.424	−.033	.978
2	*Dim. 1*			–	.000	.932	.062	.927	−.022	−.908	−.285	.982	−.006
	Dim. 2				–	−.099	.940	−.045	.943	.004	−.379	−.029	.965
3	*Dim. 1*					–	.000	.977	−.094	−.941	−.144	.972	−.070
	Dim. 2						–	.065	.978	−.041	−.555	.061	.986
4	*Dim. 1*							–	.000	−.938	−.167	.978	.010
	Dim. 2								–	.046	−.490	−.016	.995
5	*Dim. 1*									–	.000	−.939	−.004
	Dim. 2										–	0.016	−.471

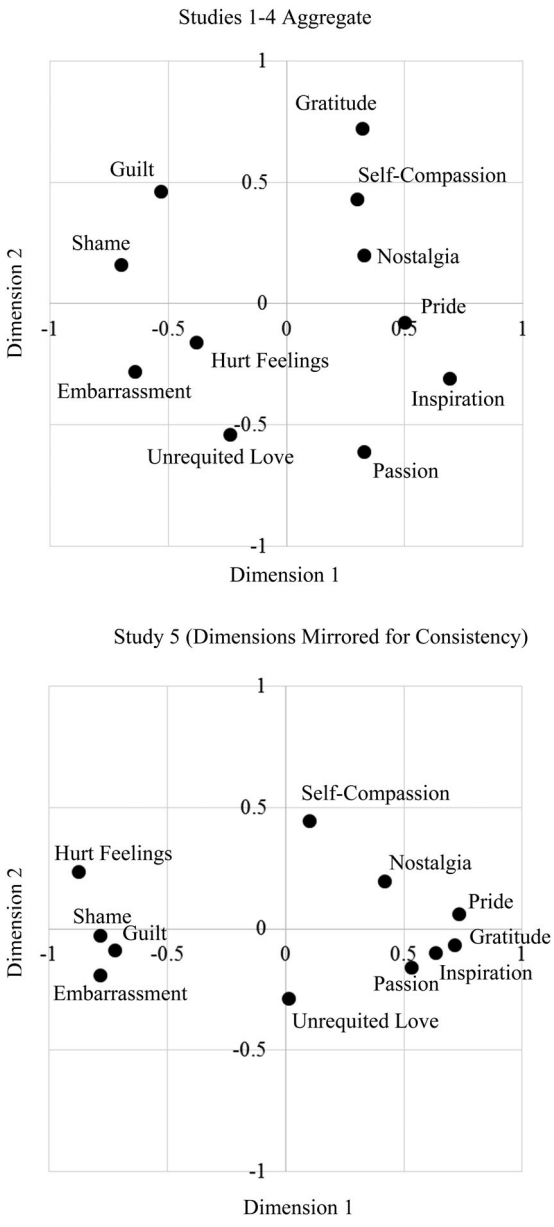

Figure 2. Positioning self-relevant emotions in two-dimensional space.

served as criterion variables (Table 2). The explained variances (R^2) indicate how well the attributes fit (i.e. describe) the two-dimensional models. The standardised coefficients associated with the emotion coordinates on Dimension 1 and 2 are direction cosines that describe the orientation of attribute vectors within the two-dimensional space (Rusbult et al., 1993). Accordingly, they reflect how the attributes are best superimposed on the two-dimensional

Table 2. Fit and orientation of superimposed attributes for self-relevant emotions.

	R^2	Dim. 1β	Dim. 2β
Valence			
Study 1–4 aggregate model	.893	.994	.038
Study 5	.832	−.894	.181
Approach/Avoidance			
Study 1–4 aggregate model	.905	.950	−.041
Study 5	.800	−.889	.096
Relevance to morality			
Study 1–4 aggregate model	.683	−.600	.565
Study 5	.872	.660	.660
Arousal			
Study 1–4 aggregate model	.455	−.187	−.649
Study 5	.204	.278	−.356
Activation			
Study 1–4 aggregate model	.508	.522	−.484
Study 5	.186	−.420	−.099

model. The resultant standardised regression coefficients revealed high consistency across the aggregated Studies 1–4 model and the Study 5 model. Coefficients for a given attribute did not differ between studies by more than $\beta = 0.30$. The exception to this was activation, which displayed some inconsistency (Figures 3 and 4). Three of the four attributes with consistent orientations across the studies (similar βs) also yielded consistently large explained variances: valence, $R^2 \geq .832$, approach/avoidance, $R^2 \geq .800$, and relevance to morality, $R^2 \geq .683$. The fourth attribute with consistent orientation, arousal, explained a relatively large amount of variance in the aggregate model of Studies 1–4, $R^2 = .455$, but less so in the model of Study 5, $R^2 = .204$.

The main horizontal axis of the two-dimensional models was strongly characterised by valence and approach/avoidance. Emotions scoring low on Dimension 1 (shame, embarrassment, guilt, hurt feelings, unrequited love) were associated with negative valence, whereas those scoring high on this dimension (inspiration, pride, self-compassion, gratitude, passion, and nostalgia) were associated with positive valence. Likewise, emotions scoring high on Dimension 1 were associated with approach of valued outcomes, whereas those scoring low on this dimension were associated with avoidance of negative outcomes.

Arousal characterised the vertical axis, Dimension 2, of the aggregated model of Studies 1–4. Emotions scoring low on Dimension 2 (unrequited love, passion, inspiration, hurt feelings, embarrassment) were associated with high arousal, whereas those scoring high on this dimension (gratitude, self-compassion, guilt, nostalgia, shame, pride) were associated

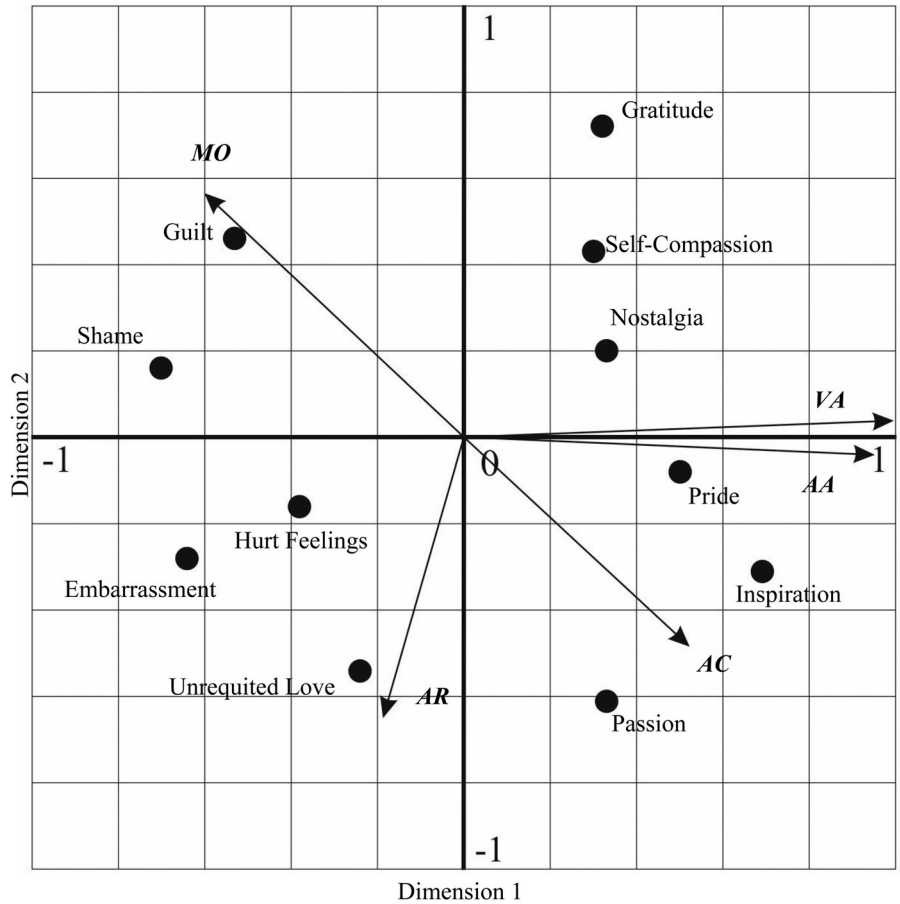

Figure 3. Study 6 Attributes superimposed on Studies 1–4 aggregated model (emotion comparisons).

Note: Arrow lengths are proportional to the square root of the attributes' explained variances. VA = negative to positive valence; AA = approach to avoidance; AR = low to high arousal; MO = low to high relevance to morality; AC = low to high activation.

with low arousal. In this model, arousal was oriented orthogonally to valence and approach/avoidance, indicating that participants perceived arousal to be independent of valence or approach/avoidance. Interestingly, arousal did not characterise Dimension 2 of the Study 5 model equally well. We further consider this particular finding for arousal in the General Discussion.

Finally, relevance to morality was oriented at a diagonal angle through the two-dimensional space. Emotions located towards the upper left quadrant of the aggregated Studies 1–4 model or towards the lower left quadrant of the Study 5 model (guilt, shame, embarrassment, hurt feelings, gratitude, self-compassion), were seen as more strongly associated with morality than those located opposite (inspiration, pride, passion, nostalgia, unrequited love), a pattern broadly consistent with literature on moral emotions (Haidt, 2003).

Key objective: evaluating the position of nostalgia among self-relevant emotions

Among the self-relevant emotions, nostalgia occupied a position characterised by positive valence, in line with a host of nostalgia research (Hepper et al., 2012; Sedikides & Wildschut, 2016b; Sedikides, Wildschut, et al., 2015). Furthermore, nostalgia featured a mild approach orientation, which aligns with findings that experimentally induced nostalgia triggers approach motivation (Abeyta, Routledge, & Juhl, 2015; Stephan et al., 2014, 2015). Nostalgia also featured comparatively low arousal, consistent with Gabriel's (1993) speculation that the emotional tone of

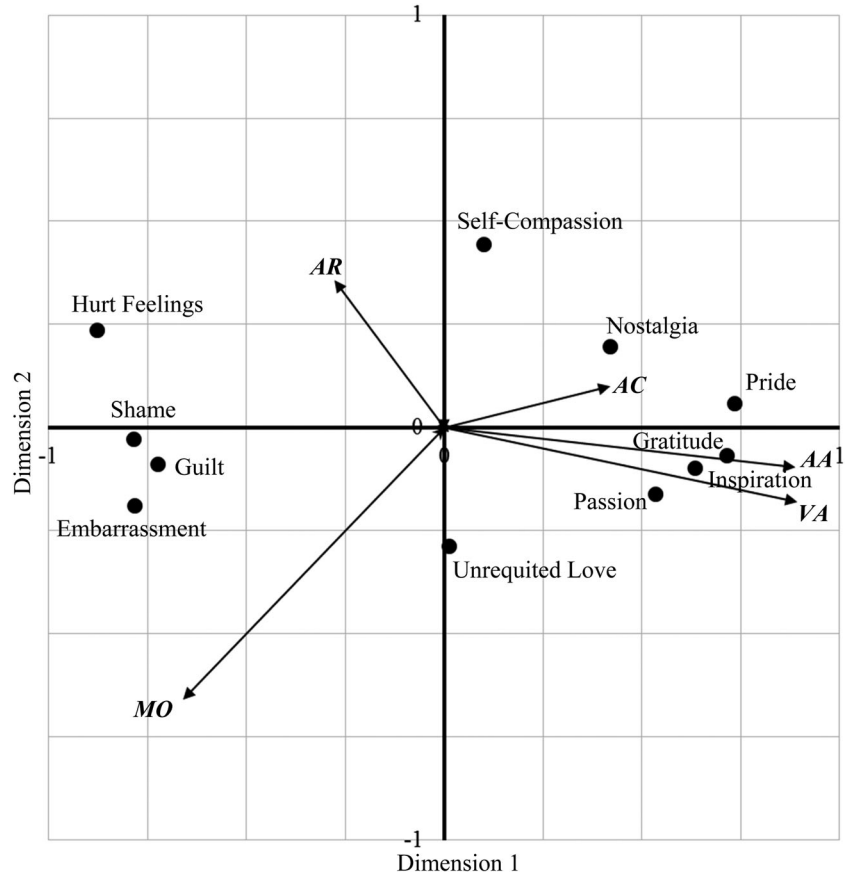

Figure 4. Study 6 attributes superimposed on Study 5 model (actual emotion experiences).

Note: Dimensions are mirrored for consistency. Arrow lengths are proportional to the square root of the attributes' explained variances. VA = negative to positive valence; AA = approach to avoidance; AR = low to high arousal; MO = low to high relevance to morality; AC = low to high activation.

nostalgia is quiet rather than loud. Finally, participants perceived it as having little relevance to morality.

Euclidean distances

We inspected the similarities/differences between nostalgia and the other self-relevant emotions (Figure 2). First, we calculated the Euclidian distances between nostalgia and the other emotions (based on aggregate positions across the Studies 1–4 model and, separately, the Study 5 model). These Euclidean distances are equal to the length of a straight line that connects two emotions. The Euclidean distances (Figure 5) portrayed nostalgia as most similar (i.e. close) to self-compassion and pride. Nostalgia was most dissimilar (i.e. distant) to shame and embarrassment. In all, nostalgia shared closer resemblance to positive than negative self-relevant emotions, and these results were remarkably similar for the aggregated model of Studies 1–4 (which dealt with perceived similarities) and the model of Study 5 (which dealt with actual experiences). These findings are consistent with prior evidence that nostalgia is a predominantly (albeit not exclusively) positive emotion (Barrett et al., 2010; Sedikides & Wildschut, 2–16a; Wildschut et al., 2006) or "a joy tinged with sadness" (Werman, 1977, p. 393).

The comparative profile of nostalgia

We next examined nostalgia's position in detail. In particular, the descriptive attributes can help to clarify what characterises the differences between nostalgia and each of the other emotions. For example, the different positions occupied by nostalgia and embarrassment in the two-dimensional models corresponded to relatively high versus low valence in Figures 3 and 4. Stated otherwise, the difference

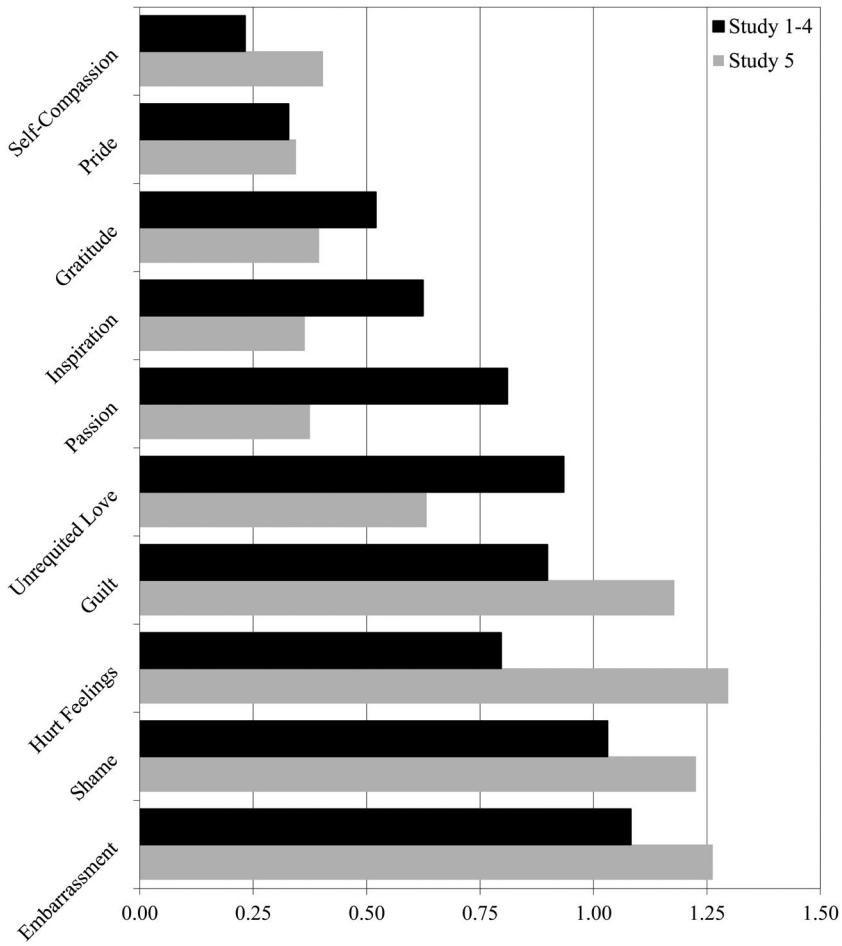

Figure 5. Euclidian distances to nostalgia.

Note: Higher scores indicate greater Euclidian distance from nostalgia.

between these two self-relevant emotions resides partially in their distinct levels of valence. Accordingly, we characterised the differences between nostalgia and the other self-relevant emotions in terms of each of the descriptive attributes.

Figures 6 and 7 display the magnitude of differences between nostalgia and the other self-relevant emotions along valence, approach/avoidance, arousal, and relevance to morality. Valence and approach/avoidance characterised the differences between nostalgia and most of the other self-relevant emotions particularly well: nostalgia was seen and experienced as more positive and approach-oriented than guilt, shame, embarrassment, or hurt feelings. Yet, nostalgia was less positive and approach-oriented than inspiration. In the aggregated model based on emotion comparisons (Studies 1–4), participants perceived nostalgia as higher in arousal than self-compassion and guilt, but lower than embarrassment, passion, and inspiration. For the model of experienced emotions (Study 5), arousal was less useful in characterising differences between nostalgia and other emotions. Finally, participants considered nostalgia less relevant to morality than guilt, shame, and embarrassment, but more relevant to morality than pride and inspiration.

General discussion

We were concerned with nostalgia's place among self-relevant emotions. In particular, we sought to identify which of these emotions resemble nostalgia most or least, and why they do so. To this end, we examined the dimensional configuration underlying perceived

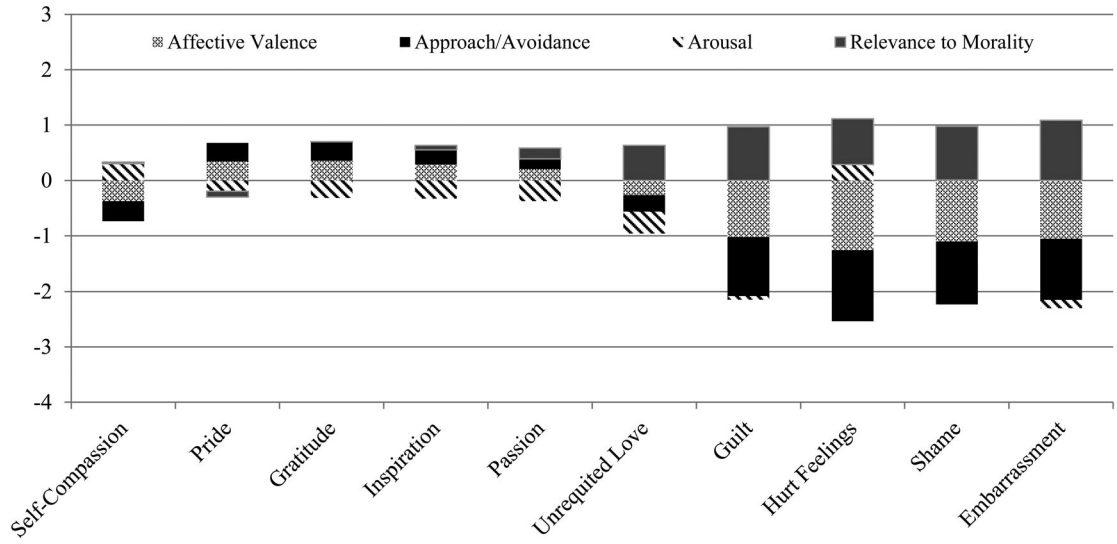

Figure 6. Differences with nostalgia on Study 6 attributes for Studies 1–4 aggregated model (emotion comparisons).
Note: Scores indicate difference with nostalgia on a given superimposed dimension.

and experienced similarities/differences among self-relevant emotions (Step 1), interpreted the derived dimensions (Step 2), and inspected the relative location of nostalgia (key objective).

In Studies 1–4, participants rated the similarities of 55 unique emotions pairs, based on combinations of 11 self-relevant emotions. In Study 5, participants retrieved and described emotional events and evaluated how these made them feel. Based on the emotion comparison ratings of Studies 1–4 and the emotion correlations of Study 5, we found that two-dimensional models provided appropriate (i.e. accurate and parsimonious) representations for the self-relevant emotions. The corresponding emotion coordinates that these models produced were consistent across studies, suggesting that, besides

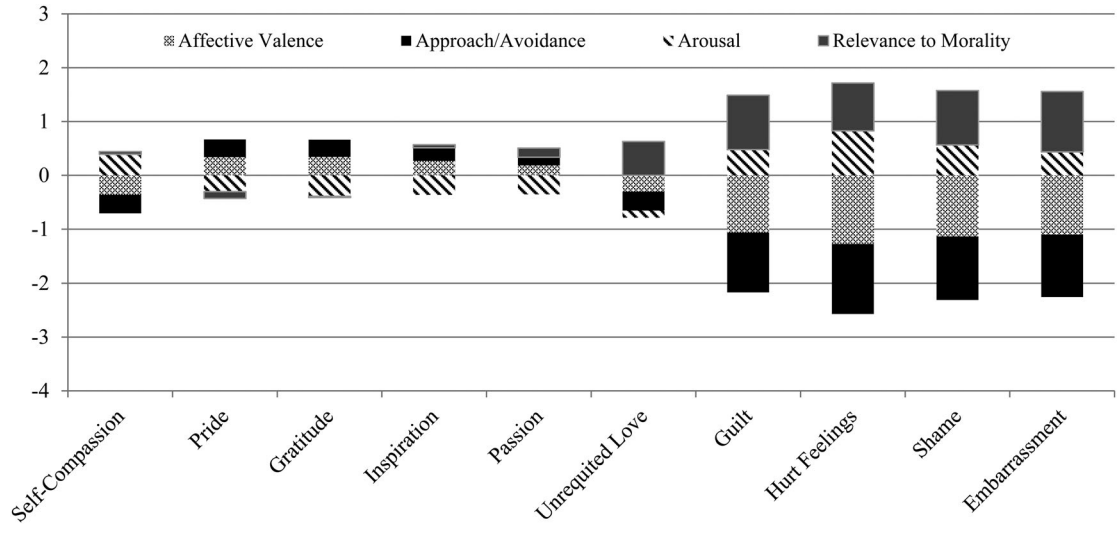

Figure 7. Differences with nostalgia on Study 6 attributes for Study 5 model (actual emotion experiences).
Note: Scores indicate difference with nostalgia on a given superimposed dimension.

convergence in number of dimensions, the dimensions were also similar. The exception was Dimension 2 of Study 5, which only moderately corresponded to the same dimension in the Studies 1–4. To prevent oversimplification, we therefore separated Study 5 from Studies 1–4 in subsequent analyses.

We next labelled the dimensions of the emotion models in an attempt to facilitate our understanding of what psychological variables correspond to differences between the emotions in general and between nostalgia and the other emotions in particular. In Study 6, participants evaluated the emotions on several attributes. We then tested whether these attributes corresponded to differences between the emotions in the two-dimensional model. The horizontal dimension represented valence and approach/avoidance. The vertical dimension of the aggregated model of Studies 1–4 represented arousal. In Study 5, however, arousal did not characterise the vertical dimension as clearly. Using these dimension labels, we could then characterise nostalgia's position, and how this position differed from the other self-relevant emotions.

Nostalgia was closest to self-compassion and pride, and farthest from shame and embarrassment. This was the case whether examining participants' explicit emotion comparisons (Studies 1–4) or the correlations between experienced emotions (Study 5). Also, nostalgia featured comparatively low arousal and was perceived as having little relevance to morality. Here, we obtained first evidence that individuals perceive nostalgia as relatively low on arousal. Finally, nostalgia occupied a position relatively high in valence and approach orientation. Note that experimental findings also paint nostalgia as more positive than negative (Hepper et al., 2012; Sedikides et al., 2017; Van Tilburg, Igou, & Sedikides, 2013; Wildschut et al., 2006) and as approach-oriented (Abeyta, Routledge, & Juhl, 2015; Stephan et al., 2014; Van Tilburg et al., 2015).

The two-dimensional configuration of self-relevant emotions based on Studies 1–4 shows a striking resemblance to circumplex models of emotions (Russell, 1980). We found that this two-dimensional space could be described in terms of valence and arousal as two virtually orthogonal dimensions. Uncovering this Valence × Arousal dimensional structure in the context of perceived self-relevant emotions suggests that these fundamental dimensions transcend differences between separate emotion families (i.e. basic emotions, self-conscious emotions, moral emotions). Valence and arousal dimensions emerged in many emotion research traditions, including cognitive appraisal theories (Smith & Ellsworth, 1985), neuroscientific models of emotions (Posner et al., 2005), and emotion expression research (Russell & Bullock, 1985).

Although valence also characterised the primary dimension of the experienced emotions in Study 5, arousal did not characterise the secondary dimension. The finding that valence characterised Dimension 1 indicates that people who experience a positive (negative) emotion are more likely to simultaneously experience other positive (negative) emotions. However, whereas experienced emotions seem to "cluster together" based on their valence, this was not the case for arousal. We suspect that arousal did not characterise Dimension 2 in Study 5, because this study focused on experienced emotions. That is, whereas individuals may readily recognise similarities/differences among emotions in terms of arousal, the experience of a given high-arousal emotion does not necessarily entail concurrent experience of other high-arousal emotions. In addition to this, the divergent findings for arousal might have resulted from the different samples we used. Studies 1–4 relied on relatively young students residing in the UK; Study 5 consisted of a comparatively older and mixed sample residing in the U.S.A.

Of the five attributes that we examined (valance, arousal, activation, approach/avoidance, relevance to morality), activation did not describe the dimensional models in a consistent way. Perhaps the activation associated with emotions is better measured using other methods than self-report, such as physiological assessment (Bradley, Miccoli, Escrig, & Lang, 2008). Alternatively, the description of activation we gave participants ("Some emotions are associated with feeling inactive, whereas other emotions are associated with feeling very active") may have insufficiently reflected physiological activation or may have been difficult to decipher.

By establishing the dimensionality of self-relevant emotions, identifying the meaning of these dimensions, and understanding nostalgia's relative position within the configurations, our research provides a framework for further investigations into self-relevant emotions, the dimensional structure of affect, and nostalgia in particular. Our findings offer a range of novel and testable hypotheses. For example, gratitude is high on relevance to morality, consistent with the idea that gratitude is a moral affective state

(McCullough, Kilpatrick, Emmons, & Larson, 2001), and may consequently bolster people's appraisal of events in terms of their moral ramifications. As another example, shame, relative to nostalgia, is avoidance-oriented. Hence, shame likely prompts stronger withdrawal behaviour than nostalgia. Moreover, the findings suggest that pride and self-compassion may serve as stringent comparison standards in experimental research geared toward isolating the unique psychological outcomes of nostalgic reverie.

Our findings indicate that nostalgia may elicit other positive emotions. Study 5 revealed concurrence of nostalgia with pride, gratitude, and inspiration. Indeed, recent work by Stephan et al. (2015) indicates that nostalgia evokes inspiration. Nostalgia builds self-esteem (Wildschut et al., 2006), and it may do by increasing pride over past achievement (Leary, Tambor, Terdal, & Downs, 1995; Mahadevan, Gregg, Sedikides, & de Waal-Andrews, 2016). More generally, our findings suggest that nostalgia may frequently be accompanied by other positive and approach-oriented emotions. Conversely, pondering past occasions that feature pride, gratitude, and inspiration may elicit nostalgia.

In Study 5, we examined experienced emotions. The emotions were induced using an event recall procedure; participants retrieved and described past experiences, which in turn elicited emotions. Future research could examine such experienced emotions in different contexts than recalled events. For example, it would be interesting to assess co-occurrence of emotions in everyday life via a diary study method. Besides revealing emotion co-occurrence per se, this practice could provide further insight into the frequency of co-occurrence and its contextual characteristics.

We wish to re-emphasise that the spatial representations of emotions were based on indicators of similarity/difference among the emotions (self-reports or correlations) and *not* on the ratings that emotions received on the dimension labels. Instead, the ratings that emotions received on the dimension labels were fitted to the spatial representations after these representations were created. Given that the spatial representations will not change as a function of the scores that emotions received on the dimension labels, it is possible that other labels, not included in the current research, could be added to the models. For example, the emotions we examined may be arranged by the extent to which they are more or less central to the self (Sedikides & Gregg, 2003). To illustrate, self-compassion (Neff, 2003) may feature a more prominent role of the self than gratitude, which is characterised by a strong focus on another person (Emmons & McCullough, 2003). We encourage researchers to explore labels other than the ones we examined and fit them to the spatial representations of emotions that we extracted.

Our research did not address possible cultural or lifespan variation in the conceptualisation or experience of nostalgia and its relation to other emotions. The literature suggests that culture influences several of the emotions of interest (Mesquita & Karasawa, 2004; Wallbott & Scherer, 1995). For example, whereas pride "celebrates the accomplishments of a competent self" (Wallbott & Scherer, 1995, p. 165) in North American and Western European cultures, in East Asian cultures pride is more likely to be associated with group honour or successful joint efforts (Sedikides, Gaertner, & Cai, 2015). Likewise, expressions of shame are more socially valued in collectivist cultures compared to individualist cultures (Wallbott & Scherer, 1995). Furthermore, although nostalgia is experienced across the lifespan (Hepper et al., 2017) it is possible that individuals' conceptualisation of nostalgia in terms of valence, arousal, and activation may change with age. Future empirical endeavours would do well to examine whether the dimensional configurations of the self-relevant emotions, and nostalgia's place therein, are universal or culture specific, and consistent or variable across the lifespan.

Concluding remarks

We investigated the position of nostalgia among self-relevant emotions. In particular, we examined which self-relevant emotions are least and most similar to nostalgia, and why this is the case. For this purpose, we developed spatial models that describe their differences and similarities, provided psychological labels that characterised these dimensional representations, and subsequently analysed nostalgia's relative position in these representations. Within the resultant two-dimensional representations, nostalgia was characterised as mildly positive, approach-oriented, and comparatively low in arousal. It was most similar to positive self-relevant emotions, such as self-compassion and pride, and was most dissimilar to negative self-relevant emotions, such as embarrassment and shame. Taken together, our findings establish for the first time how nostalgia can be integrated in the family of self-relevant emotions.

Notes

1. Although the methods and procedures were identical across Studies 1–4, we treated them as separate studies for several reasons. One is expositional clarity. Another is methodological: We collected these data across different student cohorts, with a significant passage of time between collections (approximately 1 year in each case). The third reason is statistical: This practice also allowed us to assess the consistency and stability of our models across samples.
2. For Study 5, the events elicited the full range (1–10) of intensities for all emotions. The average intensities, in declining order, were: gratitude ($M = 6.47$, $SD = 3.28$), nostalgia ($M = 6.38$, $SD = 3.06$), inspiration, ($M = 6.38$, $SD = 3.27$), pride ($M = 6.29$, $SD = 3.32$), passion ($M = 6.22$, $SD = 3.18$), self-compassion, ($M = 6.05$, $SD = 2.93$), unrequited love ($M = 4.22$, $SD = 3.53$), hurt feelings, ($M = 3.10$, $SD = 3.02$), embarrassment, ($M = 2.85$, $SD = 2.57$), guilt, ($M = 2.59$, $SD = 2.55$), and shame, ($M = 2.42$, $SD = 2.43$).
3. In a separate study, 50 MTurk participants (28 women, 22 men; $M_{age} = 37.02$, $SD = 12.51$) evaluated positive and negative valence separately (1 = *not at all positive*, 10 = *extremely positive*; 1 = *not at all negative*, 10 = *extremely negative)*. This allowed us to explore their potential independence (Russell & Carroll, 1999). Positive and negative valance were highly and negatively correlated, $r = -.988$, indicating that it is appropriate, in the present context, to treat valence as a uni-dimensional attribute.
4. The non-expert participants in Study 4 also completed these attribute ratings (after comparing the emotions). Their ratings closely resembled the reported ratings by Study 6 experts and are available upon request.
5. Replicated MDS analysis permits the simultaneous analysis of multiple matrices, which suited our data structure. Each participant in Study 1–4 contributed a similarity/dissimilarity matrix; in Study 5, each event produced such a matrix.
6. For Study 5, a unidimensional model also fitted adequately (*Stress* = .035). We adopted the two-dimensional model, however, because *Stress* approximately halved by adding this second dimension. Furthermore, adopting the slightly more complex two-dimensional model allowed us to draw comparisons between the models from Studies 1–4 and Study 5, enriching understanding of the self-relevant emotions. We consider the secondary dimension in the General Discussion.

Acknowledgements

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. All authors consented to the submission of this manuscript.

Disclosure statement

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix

Similarity matrix example for a participant in Study 1

In this matrix, higher scores indicate more similarity between emotions according to this participant. Note that elements on the top-left bottom-right diagonal need be assigned values of 0 for the analysis.

	Emotion	1	2	3	4	5	6	7	8	9	10	11
1.	Nostalgia	0										
2.	Inspiration	3	0									
3.	Passion	4	4	0								
4.	Pride	1	2	2	0							
5.	Gratitude	3	5	1	1	0						
6.	Embarrassment	1	1	1	2	1	0					
7.	Unrequited love	1	1	4	4	2	6	0				
8.	Hurt feelings	2	1	1	7	1	6	6	0			
9.	Guilt	1	1	1	1	1	4	4	2	0		
10.	Shame	1	1	2	2	1	8	8	8	9	0	
11.	Self-compassion	3	2	5	1	3	2	4	8	5	3	0