Taking Stock and Moving Forward: A Personalized Perspective on Mixed Emotions

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Abstract

Research on mixed emotions is flourishing but fractured. Several psychological subfields are working in parallel and separately from other disciplines also studying mixed emotions, which has led to a disorganized literature. In this article, we provide an overview of the literature on mixed emotions and discuss factors contributing to the lack of integration within and between fields. We present an organizing framework for the literature of mixed emotions on the basis of two distinct goals: solving the bipolar–bivariate debate and understanding the subjective experience of mixed emotions. We also present a personalized perspective that can be used when studying the subjective experience of mixed emotions. We emphasize the importance of assessing both state and trait emotions (e.g., momentary emotions, general levels of affect) alongside state and trait context (e.g., physical location, culture). We discuss three methodological approaches that we believe will be valuable in building a new mixed-emotions literature—inductive research methods, idiographic models of emotional experiences, and empirical assessment of emotion-eliciting contexts. We include recommendations throughout on applying these methods to research on mixed emotions, and we conclude with avenues for future interdisciplinary research. We hope that this perspective will foster research that results in the organized accumulation of knowledge about mixed emotions.

Keywords

Research on mixed emotions is flourishing. Publications referencing mixed emotions have increased rapidly over the past 15 years, from 12 in 2006 to 131 in 2020.[1] In 2017, both *Emotion Review* and *Current Opinion in Behavioral Sciences* devoted entire special sections to the topic of mixed emotions. This empirical interest reflects practical significance. Evidence suggests mixed emotions are familiar, common experiences; when asked to report their mood, people seldom report only one emotional state (e.g., Scott et al., 2014; Trampe et al., 2015). In one study of emotion in daily life, over half of participant responses included at least one positive and one negative emotion (Scott et al., 2014). Thus, understanding how emotions are experienced outside of the laboratory will require developing a science of emotion sophisticated enough to measure and model mixed emotions.

Given their ubiquity in daily life, it is unsurprising that understanding mixed emotions has emerged as a goal in several diverse fields. Within psychology, research on mixed emotions has often been conducted by affective scientists and clinical psychologists. However, this topic is gaining traction in other subfields of psychology. For example, developmental psychologists have shown that similar patterns of mixed emotions can be identified in adulthood (Oceja & Carrera, 2009) and middle childhood (Burkitt et al., 2019). Indeed, experiencing and recognizing mixed emotions in ourselves and others may reflect important developmental milestones in emotion comprehension (Burkitt et al., 2019; Pons et al., 2004). Outside of psychology, research on mixed emotions is gaining traction in applied fields, particularly among researchers studying marketing and

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consumer decision-making (e.g., Bi et al., 2020; Madrigal & Bee, 2005) and organizational behavior (e.g., Rothman & Melwani, 2017; Rothman & Northcraft, 2015). In sum, there is a burgeoning literature on mixed emotions that spans across several diverse fields of research. So, what have we learned?

Taking Stock

Despite this veritable explosion of empirical research, it is difficult to gain even a cursory overview of the landscape of mixed-emotions literature. Within the psychological literature, no recent major publication reviewing the affective-science literature has devoted even a single chapter to mixed emotions. The 928-page tome *Handbook of Emotions* (Barrett et al., 2016) mentions mixed emotions only twice. The *Handbook of Emotion Regulation* (Gross, 2013) fares similarly; mixed emotions are briefly mentioned only once. Mixed emotions are mentioned four times in *Emotion Measurement* (Meiselman, 2021)—twice in the context of cultural differences and twice briefly in the context of marketing research. In sum, there is a large and growing body of research on mixed emotions that has not been considered when compiling reviews of the psychological literature and handbooks that guide researchers in measuring and modeling emotion.

This lack of integration can be seen both within and between fields studying mixed emotions. Here, we identify and discuss two major areas of confusion in the mixed-emotions literature—terminological confusion and confusion over the goals of research on mixed emotions—that we suspect have contributed to its disorganized nature.

Terminological confusion

Research on mixed emotions is plagued by a lack of consensual terminology both within psychology and across fields. Most researchers define mixed emotions as states of simultaneous positive and negative emotion. However, depending on the article, the simultaneous experience of positive and negative emotion may be referred to as mixed emotions (Berrios et al., 2015; J. T. Larsen & McGraw, 2014), mixed feelings (Schimmack, 2001; I. K. Schneider & Schwarz, 2017), co-occurrence (Scott et al., 2014), ambivalence (Cohen & Minor, 2010; Trémeau et al., 2009), emotional ambivalence (Fong, 2006; Rees et al., 2013), subjective ambivalence (Priester & Petty, 1996; Simons et al., 2018), emotional complexity (Bodner et al., 2015; Brose et al., 2015), poignancy (Ersner-Hershfield et al., 2008; Septianto, 2020), nostalgia (Johnson-Laird & Oatley, 1989; Turner & Stanley, 2021), or affective synchrony (Rafaeli et al., 2007). As

a result, critically reviewing literature on the simultaneous experience of positive and negative emotion is a difficult task partly because of the multitude of terms used to refer to the same phenomenon.

At the same time, some of the aforementioned terms do not exclusively refer to experiences of simultaneous positive and negative emotion. For example, emotional complexity is a multifaceted construct: Many studies examining emotional complexity do not capture simultaneous positive and negative emotion but rather are focused on emotional differentiation or granularity (see Grossmann & Ellsworth, 2017; Grossmann et al., 2016). Thus, research on emotional complexity is not always directly relevant to mixed emotions. In sum, it is also difficult to capture *only* studies examining the simultaneous experience of positive and negative emotion when conducting a review of the mixed-emotions literature.

All scientific disciplines have traditional ways of naming phenomena; some of the aforementioned terms have a historical tradition rooted in a particular theoretical orientation (e.g., ambivalence in psychoanalytic theory). Although diversity of thought fosters discovery in scientific endeavors, the use of distinct terminology also creates research silos. Indeed, subfields have primarily worked in parallel when studying mixed emotions. For example, the 2017 special section on mixed emotions in *Emotion Review* did not review research conducted on clinical populations. Taken together, terminological differences pose a barrier for both intradisciplinary integration and interdisciplinary collaboration.

Confusion over the goals of mixed-emotions research

We contend the mixed-emotions literature can be broadly organized into two major lines of research differentiated by distinct goals. We believe that disambiguating these goals will advance the scientific study of mixed emotions by providing an organizing framework in which to sort the extant literature.

Goal 1: solving the bipolar–bivariate debate. Debate over the structure of affect has cast mixed emotions as a subject of significant controversy among affective scientists. One side of this debate argues that positive and negative emotion are bipolar endpoints of a single valence dimension (the bipolar hypothesis; e.g., Russell, 1980), whereas the other side considers positive and negative emotion to be separate dimensions (the bivariate hypothesis; e.g., Cacioppo et al., 1997). These views lead to conflicting predictions about mixed emotions: Proponents of the bipolar hypothesis argue mixed emotions cannot occur, whereas advocates of the bivariate hypothesis argue that positive and negative affect can be activated

independently and, therefore, experienced simultaneously. Thus, in this line of research, the goal is to solve the debate over the structure of affect, and the primary question is whether it is possible for positive and negative emotional experiences to temporally overlap.

Goal 2: expanding scientific understanding of the subjective experience of mixed emotions.

In the second line of research, the goal is understanding the subjective experience of mixed emotions. Subjective experience is intrinsic to all emotional states (LeDoux & Hofmann, 2018) and cannot be readily accessed except through self-report. Questions in this line of research are diverse, and many researchers focus on consequences of emotional experiences. For example, how do mixed emotions relate to outcomes such as mental and physical health (Hershfield et al., 2013; Trémeau et al., 2009), leaders' effectiveness in the workplace (Methot et al., 2017; Rothman & Melwani, 2017), or judgments and decision-making (Hostler & Berrios, 2021; Rees et al., 2013)? It is noteworthy that although evidence from affective science suggests mixed emotions are often related to beneficial outcomes (see Hershfield & Larsen, 2012), research on clinical populations suggests mixed emotions are associated with negative outcomes (Cohen & Minor, 2010; Trémeau et al., 2009, 2013).

Interim summary

Assuming that the bipolar–bivariate debate is eventually resolved, an important question to consider is how, and if, this knowledge affects the way we study mixed emotions. Do we need proof that valence is bivariate to take self-reports of mixed emotion seriously? If the structure of valence is actually bipolar, does this mean people are wrong when they report experiencing mixed emotions? Even if research bears out that valence is bipolar, we contend that Goal 1 and Goal 2 are not in conflict.

In our view, even researchers who believe valence is bipolar have good reason to study self-reported mixed emotions. Researchers in nearly every psychological subfield study phenomena they consider to be "errors." For example, our understanding of human memory has been enriched by studying errors in memory (Schacter, 1999) as well as memories known to the researcher to be false (Loftus, 2005; Murphy et al., 2019). This research has elucidated conditions that render people susceptible to forming false memories and shed light on the constructive nature of memory. Likewise, even if valence is represented as bipolar on some level(s) of emotional experience, it may still be informative to study the conditions and outcomes associated with moments in which people perceive positive and

negative affect to occur simultaneously. Thus, looking forward, we envision both goals contributing to the advancement of scientific understanding of mixed emotions.

Moving Forward

In an ideal world, science is a cumulative process: Over time, more tests and better methods allow for evidence to accumulate in meaningful ways (Curran, 2009). We are hopeful that the aforementioned goal-based framework for organizing the mixed-emotions literature will guide future research toward a cumulative science. Different research goals often require different research methods; thus, we believe that teasing apart these goals will help future researchers to "organize research in such a way as to produce accumulation of knowledge that really increases our understanding of the functions and mechanisms of emotion" (Scherer, 2019, p. 37).

In service of Goal 1: solving the bipolar–bivariate debate

Debates shape literature by guiding discourse, theorizing, and study design (e.g., Funder, 2009; Kenrick & Funder, 1988). As the bipolar–bivariate debate has continued, researchers have engaged in dialogue about the type of evidence necessary for ultimately solving the debate. This provides a foundation for systematic research. For example, affective scientists have developed innovative methods of emotion assessment that allow for simultaneous self-reporting of positive and negative emotion (e.g., Carrera & Oceja, 2007; J. T. Larsen & McGraw, 2011). In response, proponents of the bipolarity hypothesis pointed out that even simultaneous emotion assessment may capture processes other than temporally overlapping positive and negative emotion when using self-report data (e.g., judgments, perceptions of affective quality, emotional metaexperiences; Russell, 2017). Thus, it has become apparent that solving the bipolar–bivariate debate will require researchers to move beyond self-report emotion data. For those interested in pursuing this line of research, we refer to previous articles that provide a detailed discussion of next steps for the bipolar–bivariate debate (J. T. Larsen, 2017; Russell, 2017).

In service of Goal 2: expanding scientific understanding of the subjective experience of mixed emotions

By contrast, there is currently no systematic approach for studying the subjective experience of mixed emotions. This work is spread across multiple fields that

Table 1. Considerations in the Study of Self-Reported Mixed Emotions

Type	Affect	Context
State	"Indicate to what extent you feel this way right now, that is, at the present moment"[a] • Positive emotion (e.g., enthusiastic) • Negative emotion (e.g., scared)	Subjective factors • Cognitive appraisals (e.g., goal conduciveness, novelty) • Subjective characteristics (e.g., a reassuring other is present)[b] Objective factors • Physical location • Objective characteristics (e.g., social interaction is possible)[b]
Trait	"Indicate to what extent you generally feel this way, that is, on the average"[a] • Positive emotion • Negative emotion	Age Cognitive functioning Culture Emotion traits (e.g., positivity offset, negativity bias) Personality traits (e.g., neuroticism) Presence of psychological disorder

Note: This is a nonexhaustive list of variables to consider when studying self-reported mixed emotions. We recommend capturing both emotion and context data at both the state and trait level. Variables in the "state" category should be measured repeatedly using intensive, longitudinal design, whereas variables in the "trait" category can be measured at a single time point.
[a]These prompts are from PANAS-X (Watson & Clark, 1999).
[b]These items are from the Situational 8 DIAMONDS (Rauthmann et al., 2014).

are each making important but independent advancements. Notably, emotion researchers have tended to focused more on the consequences of emotions rather than antecedents (see Scherer & Moors, 2019), and research on mixed emotions is no exception. Looking forward, a unified approach to this topic is needed to lay the foundation for a cumulative science of mixed emotion that captures the full emotion process from antecedents to outcomes.

To fill this gap, we present a personalized perspective on mixed emotions. Our goal is to take steps toward developing best practices in methodology and highlight areas where collaboration among fields will enhance knowledge. As previously discussed, terminological differences have made interdisciplinary integration difficult. We propose researchers use the term "mixed emotions" to refer to experiences of simultaneous positive and negative emotion, consistent with the majority of the affective-science literature. Regardless of the term chosen, we encourage researchers to explicitly define the construct they are measuring.

We spend the remainder of this article detailing this perspective, which is characterized by the use of inductive research methods, idiographic models of emotional experiences, and empirical assessment of emotion-eliciting contexts. Given that a cornerstone of this perspective is collecting descriptive data, we include practical recommendations for collecting emotion and context data at both the state level and trait level throughout. Table 1 provides a summary of these recommendations. We discuss the strengths and limitations

of current research methods and describe how a personalized perspective will advance the science of mixed emotions. Notably, because this perspective is focused on the subjective experience of mixed emotion, research conducted using this approach is potentially irrelevant to resolving the bipolar–bivariate debate. We include specific recommendations throughout for research methodology. We close by considering two interdisciplinary avenues for future research from a personalized perspective.

A Personalized Perspective on Mixed Emotions

Across fields and disciplines, personalized research is characterized by idiographic models, theories, and sometimes data-collection tools. In other words, in personalized research the level of analysis is within-persons rather than between-persons, and the resulting models are person-specific (e.g., Conner et al., 2009; Wright & Woods, 2020). The personalized approach originated in health care, in which the aim of personalized medicine is to develop customized treatment plans tailored to fit each patient's lifestyle and characteristics (e.g., genetic, environmental; Chan & Ginsburg, 2011). The principle underlying this approach is that unique qualities of the patient affect treatment outcomes. Personalized approaches to scientific research have gained traction in several areas of psychology in which current theoretical models cannot account for heterogeneity observed in data (for use in emotion regulation, see

Doré et al., 2016; for use in psychopathology, see Wright & Woods, 2020).

Personalized research methods are a promising route for advancing affective science because emotions are highly variable and individual phenomena (e.g., Barrett, 2009; Molenaar & Campbell, 2009). Given the same objective situation, such as an airline losing one's baggage, people show a range of emotional responses (Scherer & Ceschi, 1997). But there is signal in what appears to be noise. For example, this variation can be explained in part by cognitive appraisals or how people think and reason about emotion-eliciting situations (e.g., Beck, 1963; Scherer & Ceschi, 1997; Siemer et al., 2007). Emotional experiences also vary within individuals along predictable patterns (Eid & Diener, 1999), and disruptions in these patterns can be explained by certain contexts, such as social stress (Koval & Kuppens, 2012). Thus, although emotions are variable, they are not inexplicable; explaining and predicting emotional experiences require using methods that capture both inter- and intraindividual variability and situational contexts.

In line with the personalized medicine movement (Chan & Ginsburg, 2011), our personalized perspective seeks to advance research on mixed emotions by measuring "individual, not average, responses" (Schork, 2015, p. 609). Therefore, we consider a variety of individual-level and situational factors relevant to the generation, maintenance, and resolution of mixed emotions. This includes affective processes such as momentary emotion (i.e., state affect), the way in which emotions fluctuate over time (i.e., affective dynamics), and emotions that tend to be present across situations (i.e., trait affect). This also includes subjective and objective aspects of the situation. We broadly refer to these internal processes and situational factors as a person's "context" (see Table 1). The use of this perspective represents a shift in mixed-emotions research by integrating methods and outcomes from multiple disciplines. Next, we discuss three recommendations for future research using a personalized perspective on mixed emotions.

Take an inductive approach to research

The ultimate goal of a personalized perspective on mixed emotions is to develop a theory that is capable of predicting variation both within and between individuals and useful in testing whether that variation relates to outcomes of interest. Given the fractured state of the literature, we believe it is premature to put forth such a theory at present. On the heels of the replicability crisis, there have been reemerging concerns over a "theory crisis" in psychology (Muthukrishna & Henrich, 2019; Oberauer & Lewandowsky, 2019;

Smaldino, 2019). In brief, psychological theories are often imprecisely specified and, as a result, make unclear or unfalsifiable predictions. To avoid contributing to this theory crisis and to instead promote the development of a data-driven theory of mixed emotions, we advocate for the use of inductive research methods.

Previous researchers have highlighted the usefulness of an inductive approach in studying human emotion (e.g., Barrett, 2006). This approach is characterized by building theory from data rather than starting with theory and postulating hypotheses. Put simply, instead of viewing research as an attempt to find evidence for the categorical concept of "mixed emotion," we suggest researchers aim to observe whether and when mixed emotions arise. Exploratory, descriptive research is capable of answering questions that are informed by theories and data but not necessarily hypothesis-driven (e.g., see Wilt & Revelle, 2019). As an example, recent evidence suggests mixed emotions can be characterized into subtypes on the basis of patterns of change in positive and negative emotion (Barford et al., 2020). This finding emerged from observing and describing the emotions people report in daily life, not controlled experimentation or hypothesis testing.

An inductive approach does not limit researchers to conducting only qualitative or descriptive research; it also does not require researchers to abandon best research practices or sophisticated statistical techniques. One promising class of statistical models for conducting inductive research on mixed emotions is network analysis (Borsboom & Cramer, 2013). Network analysis has become increasingly common in psychology and has been used to study diverse topics, including personality (Cramer et al., 2012), psychopathology (McNally, 2016), and emotions (Moeller et al., 2018). When a network approach is applied to intensive longitudinal data, emotions can be modeled as a system of interacting and interrelated phenomena, in which, for example, *nodes* represent emotional states and *edges* represent the relationship between various emotional states. Using this technique, the structure of a persons' emotional network (e.g., which emotional states tend to co-occur) can be modeled at both within- and between-subjects levels (Bringmann et al., 2015, 2016; for a detailed review on network analysis, see Costantini et al., 2019). In other words, this approach can be used to understand inter- and intraindividual variation in emotional experience. To our knowledge, only one article has taken this approach to study mixed emotions (Moeller et al., 2018). Similar tools for modeling both within- and between-subjects variation across multiple time points are available in the *gimme* package (Version 0.7-7; Lane et al., 2020) for the R software environment (Version 3.5.0;

R Core Team, 2018) and the *DSEM* package (Asparouhov et al., 2018) in Mplus (Version 8; Muthén & Muthén, 2017.

Develop idiographic models of emotional experiences

We believe that idiographic models of emotional experiences will usher in a new understanding of mixed emotions. In the broader emotion literature, affective scientists have already made a paradigmatic shift toward assessing variability in emotion at the intraindividual level (for a review, see Brose et al., 2020). Indeed, the call to move beyond the assessment of mean levels of emotional intensity is not recent or novel (e.g., Scherer, 2009). Intraindividual variability in emotion experience is the cornerstone of theories of affective dynamics, which describe how emotional responses change over time. Indices of affective dynamics (e.g., inertia, instability, variability) provide a way to describe intraindividual variation (e.g., Jahng et al., 2008; Trull et al., 2015) and have been linked to important health outcomes. For example, emotional inertia reflects the tendency for emotional states to persist, and higher levels of inertia have been linked to depression (Koval et al., 2012; Kuppens et al., 2010). These findings suggest there are costs to affective inflexibility, leading researchers to consider intraindividual variation an important component of emotion experience (e.g., Hollenstein, 2015).

Although early theoretical accounts of the bivariate perspective attempted to draw attention to within-persons changes in the structure of affect (Cacioppo & Berntson, 1994; Cacioppo et al., 1997; J. T. Larsen et al., 2003), indices of affective dynamics have not yet been integrated into theories of mixed emotion. Preliminary evidence suggests this is a promising approach. In one study, Barford and colleagues (2020) took an affective-dynamics approach to studying mixed emotions and found that several different patterns of emotion fluctuation resulted in simultaneous positive and negative emotion (see also Cohen et al., 2016; Oceja & Carrera, 2009). These patterns of change can be used to identify subtypes of mixed emotions, which are differentiated on the basis of change in positive and/or negative emotion. Positive and negative emotion both increasing is one pattern, but it appears this subtype is not the most common (Barford et al., 2020; Hershfield & Larsen, 2012). More often, mixed emotions result when people experience bursts of negativity (or positivity) against a backdrop of trait positive (or negative) affect (e.g., Barford et al., 2020). Put simply, it appears that most instances of mixed emotions in daily life occur when people deviate from their emotional baseline.

Like Barford and colleagues (2020), we and others (Hershfield & Larsen, 2012; Oceja & Carrera, 2009) view mixed emotions as the umbrella term describing a category of heterogeneous experiences. Thus, asking participants about their momentary emotion at only a single time point results in conflating subtypes of mixed emotions. For example, a person who tends to experience more positive than negative emotion in daily life (e.g., high trait positive affect) will often report mixed emotions when negativity arises and positivity remains stable. At the same time, a person who tends to experience more negative emotion in daily life (e.g., high in neuroticism) will often report mixed emotions when positive emotion arises and negativity remains stable. When assessed at a single time point, both people would report high positive and high negative emotion. Further, neither of these experiences could be distinguished from a simultaneous increase in positive and negative emotion. We suspect the phenomenological experience of these mixed emotions subtypes differs; thus, differentiating subtypes of mixed emotions is a major goal of a personalized perspective.

Understanding how participants' emotional baseline, or their trait affect, plays a role in generating mixed emotions will shed light on those who are most likely to experience mixed emotions and when those experiences may be expected to occur. For example, people with major depressive disorder (MDD) characteristically exhibit higher baseline levels of negative emotion. Researchers have observed elevated trait negative affect and increases in both positive and negative emotion among people with MDD in response to positive events (Peeters et al., 2003). Moreover, in the same study, people with MDD were more likely to rate the positive event as "stressful." These findings suggest trait affect influences momentary emotional experiences and how those experiences are interpreted. Thus, we recommend that future research on mixed emotions assesses emotional experiences at both the state and trait level. We expect that modeling intraindividual variability and stability in emotional experiences will highlight the false dichotomy that occurs when bipolar and bivariate hypotheses are presented as competing (Mattek et al., 2020; Vaccaro et al., 2020).

Collecting state emotion data. Consistent with previous idiographic (Conner et al., 2009) and personalized approaches (e.g., Wright & Woods, 2020) to topics in psychology, the foundation of our personalized perspective is intensive longitudinal design (i.e., collection of data from multiple time points). In experience-sampling methodology (ESM) and ecological momentary-assessment (EMA) designs, data are collected from participants several times throughout the day for several consecutive

days (Trull & Ebner-Priemer, 2013, 2014). ESM/EMA designs have been used to capture a variety of types of data (e.g., physiological data, observational data) and are currently considered the gold standard for assessing emotions in daily life. When emotions are not reported in the moment, participants may use other sources of information—such as beliefs about oneself (e.g., cultural and gender stereotypes), beliefs about the event in question, and/or relevant memories—to construct, and ultimately contaminate, emotion ratings (Robinson & Clore, 2002). By contrast, ESM/EMA designs capture momentary emotion within the participant's typical contexts, preserving ecological validity and circumventing issues associated with retrospective emotion reporting (Trull & Ebner-Priemer, 2013, 2014). Therefore, a personalized perspective on mixed emotions involves repeated collection of self-reported state emotion (i.e., "How are you feeling right now?") using an ESM/EMA design. Advances in technology have made these designs increasingly feasible, including the popularity of smartphones (e.g., 81% of American adults report owning one; Pew Research Center, 2019) and the availability of free, open-source smartphone apps to collect experience sampling data (e.g., MobilQ, ExperienceSampler; Meers et al., 2020; Thai & Page-Gould, 2018).

State emotion can be assessed using myriad items and scales. We and others (e.g., Barford et al., 2020; J. T. Larsen et al., 2009; Oceja & Carrera, 2009; Schimmack, 2001) have suggested that mixed emotions are present in subjective experience if participants are asked to report their emotion in the moment (i.e., "How are you feeling right now?"), and their report includes both positive and negative emotion. Some idiographic research utilizes fully personalized assessments in which participants respond to survey items that reference their unique life circumstances (e.g., "My husband used that tone with me"; Wright & Woods, 2020). We advocate a "moderate approach" (Wright & Woods, 2020, p. 56) whereby researchers use at least some standardized scales to allow for a meaningful between-persons analysis.

But what items or scales should be used? In a personalized perspective, the empirical question, as well as participant characteristics, should be considered when determining what items or scales to use when collecting momentary self-report emotion data. For example, the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was developed to measure high-arousal positive and negative emotions. Thus, this scale would not be ideal if participants are expected to experience emotions that are low in arousal. After selecting what terms to measure, researchers must decide how to index mixed emotions. For a critical review of common statistical techniques

used to index mixed emotion, see Hershfield and Larsen (2012). In brief, co-occurrence-based measures (e.g., the minimum statistic, dichotomous co-occurrence) are better measures of mixed emotions than measures of emotional complexity (i.e., correlation between positive and negative emotion). Last, to ensure between-persons differences in mixed emotions are not driven by differences in the absolute value or range of positive and negative affect, we suggest researchers consider modifying their mixed-emotions index by standardizing positive and negative affect scores (e.g., the minimum statistic; Mather & Ready, 2021).

We note that not all previously validated scales are appropriate for use in intensive longitudinal designs. There is currently no general agreement about the emotion scales researchers should utilize when collecting within-persons emotion data (for review, see Brose et al., 2020). However, some research suggests that simply adapting between-persons scales for use in ESM/EMA may not be appropriate. For example, Brose and colleagues (2020) observed decreases in internal reliability when between-persons scales were used to estimate within-persons variation. Last, longer ESM/EMA surveys may be perceived as burdensome and are associated with lower compliance and more careless responding relative to shorter surveys, even when shorter surveys are administered with greater frequency (Eisele et al., 2020). Therefore, we recommend researchers prioritize brevity in state emotion assessment.

Although less common, affective dynamics can be captured in the lab using self-reported state emotion in response to emotion-eliciting stimuli (e.g., Koval et al., 2013; Oceja & Carrera, 2009). Laboratory procedures result in a loss of ecological validity but have the advantage of allowing researchers to examine the complete trajectory of an emotional response to standardized stimuli. One innovative study used a series of film clips to examine affective dynamics by taking advantage of, rather than attempting to control for, emotional spillover between films (Koval et al., 2013). Koval and colleagues (2013) found a relationship between depression and higher inertia of negative affect when short-term emotional responses were assessed in the lab but not when participants rated their emotions over longer sampling periods outside of the lab. Capturing a complete picture of a participant's emotional landscape apparently requires assessing affective dynamics at multiple time scales. As a result, we suggest that, when possible, researchers collect state emotion data both in the lab and in daily life.

Collecting trait emotion data. Although assessing state emotion is a necessary component of research on mixed emotions, it is not sufficient to provide an explanatory

account of who experiences mixed emotions or when. Assessing the relations between trait emotion and mixed emotions provides a way to identify mechanisms through which mixed emotions arise and illuminates the psychological processes that underlie mixed emotions. For example, previous research suggests that trait affect contributes to the generation of mixed emotions (Barford et al., 2020). Thus, heightened trait positive or negative emotion appears to be an important mechanism underlying mixed emotions in daily life. In sum, we recommend future researchers assess both trait and state emotion and explore this mechanism when modeling the data.

Assess emotion-eliciting contexts

Most affective scientists consider situations, and their meaning for the individual, relevant to emotional experiences (Arnold, 1960; Frijda, 1993; Lazarus, 1966, 1982; Smith & Ellsworth, 1985). In line with Mischel's (1973) argument that perceptions of situations matter in determining behavior, research suggests that people show stable individual differences in appraisal styles that relate to differences in emotional responses (e.g., Kuppens et al., 2007; T. R. Schneider, 2004). Nevertheless, researchers have not yet systematically assessed antecedents, such as the situations and/or appraisals of situations that elicit mixed emotions in daily life (see Charles et al., 2017). For example, daily diary studies have been used to capture mixed emotions as they occur in the context of daily life (e.g., Ready et al., 2008; Scott et al., 2014); however, these studies often collected little (Scott et al., 2014) or no data (e.g., Ready et al., 2008) on the situations or stimuli that participants encountered (for review, see Mestdagh & Dejonckheere, 2021). Even experience-sampling studies, viewed as an improvement on the daily diary method, rarely assessed situations (e.g., Hershfield et al., 2013) or assessed situations only in broad terms (e.g., pleasantness vs. unpleasantness; Barford et al., 2020).

Among studies that have examined antecedents of mixed emotions, the literature suggests two situations reliably elicit mixed emotions: goal conflict (Berrios et al., 2015, 2018) and meaningful endings (Ersner-Hershfield et al., 2008; Zhang et al., 2010). Still, it is unclear why these situations elicit mixed emotions. For example, what makes "meaningful endings" meaningful? Cognitive appraisals might help explain when, and why, these situations elicit mixed emotions.

Appraisal theory offers a series of testable hypotheses linking situational appraisals to mixed emotions, as evidence suggests that cognitive appraisals are causally related to affect (e.g., Kuppens et al., 2012). Shuman and colleagues (2013) predicted three possible routes through which mixed emotions may arise: Conflict may occur within a single appraisal criterion, between different appraisal criteria, or between the cognitive system's processing appraisals (Shuman et al., 2013). By this logic, endings may become imbued with meaning because they elicit goal conflict; for example, graduation may fulfill students' goals of achieving their degree but conflict with goals to maintain friendships (i.e., conflict within the appraisal of goal-conduciveness). Alternatively, graduation may fulfill students' goals of achieving their degree, but the host of changes that graduation confers may threaten coping potential (i.e., conflict between different appraisal criteria). In sum, assessing appraisals is a promising approach for clarifying both why specific situations commonly elicit mixed emotions and why variation in mixed emotions exist between people experiencing the same situation.

Accounting for the context in which mixed emotions are experienced may be especially important given evidence that laboratory-based mixed emotional experiences differ from those of daily life (Newman et al., 2019). Newman and colleagues (2019) found that participant ratings of nostalgia elicited in the lab were rated as more positive and less negative than nostalgia spontaneously experienced in daily life. In other words, the same emotional experience may feel different depending on the context and stimuli that elicit the emotional response. This is consistent with evidence that the term "mixed emotions" describes a class of experiences, not a homogeneous emotional state. Thus, an important step toward developing a more coherent literature on mixed emotions is capturing aspects of emotional episodes—such as the influence of state and trait context—that occur before participants label the experience as mixed emotions.

From a personalized perspective, we move beyond the idea that simply measuring mixed emotions outside of the lab with ESM/EMA sufficiently accounts for context. Taking cues from social psychology (e.g., Mischel, 1973, 2009), we contend that a nuanced assessment context should include internal processes (e.g., cognitive appraisals) and situational factors (subjective and objective). Further, in a personalized perspective, context refers to both momentary state factors as well as stable individual differences. Therefore, we suggest researchers assess and model context at the state and trait level. The spirit of a personalized perspective is not to prescribe a predetermined list of context variables that must be assessed in all research on mixed emotions but rather to emphasize that context variables relevant to mixed emotions differ on the basis of the sample and study design. Thus, we do not present an exhaustive list but instead highlight several examples of variables and scales to consider when collecting

context data that may apply depending on a researcher's empirical question (see Table 1). These data will bring the field closer to answering basic questions about mixed emotions, such as what stimuli/events commonly elicit mixed emotions in daily life.

Collecting state context data. State context refers to factors that describe the current, momentary situation or environment a participant is experiencing. Adopting a personalized perspective, we suggest that data about the participant's state context are collected in the moment alongside state emotion data using an ESM/EMA design. Further, we suggest both subjective and objective aspects of state context should be considered and modeled when appropriate.

To collect data on subjective aspects of state context, we recommend that researchers assess participants momentary cognitive appraisals at the same time as state emotion. People appraise events using a variety of criteria, such as novelty, coping potential, and goal-conduciveness (for a more complete list, see Scherer, 2019). We believe these appraisals will help clarify why certain situations elicit mixed emotions and add an additional route through which researchers can characterize differences between subtypes of mixed emotions.

Advances in situation assessment by social psychologists can also aid emotion researchers in collecting state context data. Although there is not agreement on a single taxonomy of variables necessary for situation assessment (Rauthmann & Sherman, 2018, 2020), researchers have identified a number of dimensions that people use to appraise situations (Luhmann et al., 2020; Parrigon et al., 2017; Rauthmann et al., 2014). One scale that may be useful for examining the relationship between contexts and mixed emotions is the Situational 8 DIAMONDS (Rauthmann et al., 2014; Rauthmann & Sherman, 2016), which assesses both objective (e.g., "Social interaction is possible") and subjective (e.g., "A reassuring other person is present") qualities of the current situation. For a review of situation-assessment techniques, we point readers to Rauthmann and Sherman (2020).

Collecting trait context data. Trait context describes stable, enduring characteristics of participants and how participants exist in, or experience, their environment. All people experience emotion at the intersection of multiple trait contexts (e.g., personality, culture). Thus, to answer questions about the nature and prevalence of mixed emotions in daily life, researchers need to collect data on traits known to relate to emotional experiences. This method improves on previous research in which differences in emotional experiences have been examined between groups that differ on only a single trait characteristic. To

illustrate how researchers might collect and model trait context data, here we provide an overview of four trait contexts expected to influence mixed emotions: cognitive functioning, culture, personality, and emotion traits.

Cognitive functioning. A broad glance at the literature on mixed emotions in older adults reveals researchers have found evidence of both increases and decreases in mixed emotions with age (for review, see Charles et al., 2017). To be sure, there are methodological differences between many of these studies. However, it has also been suggested that differences in cognitive functioning may account for discrepant findings (Charles et al., 2017). Because all people do not experience declines in cognitive functioning at the same rate, samples of older adults likely contain wide variation in cognitive abilities. Accounting for variation in cognitive functioning, rather than viewing all participants above the age of 65 as a homogeneous group, may clarify the relationship between mixed emotions, age, and outcomes. This example illustrates the necessity of assessing multiple trait context factors (i.e., age and cognitive functioning) that may explain variation between participants.

Culture. There is extensive evidence that culture is related to mixed emotions. Early evidence for cultural differences in mixed emotions came from studies that found differences in the strength of correlation between positive and negative emotion among East Asians and North Americans (e.g., Bagozzi et al., 1999; Kitayama et al., 2000). This research has been interpreted as a tendency for East Asians to experience more mixed emotions than North Americans (for review, see Grossmann & Ellsworth, 2017). However, correlational measures of emotional complexity are not the best metrics for capturing simultaneous positive and negative emotion (Hershfield & Larsen, 2012). Studies that used measures that capture simultaneous mixed emotions have found mixed evidence for cultural differences; some studies have reported no differences (Zheng et al., 2021) and others have reported differences in specific situations (e.g., Miyamoto et al., 2010). For example, participants from Western cultures appear less likely to report mixed emotions during positive situations compared with participants from East Asian cultures (Miyamoto et al., 2010). In sum, to capture cultural differences in mixed emotions, researchers cannot test only for main effects. A personalized perspective is well suited to aid researchers in examining how and when culture affects mixed emotional experiences by modeling the influence of both state and trait contexts.

Personality. Personality is a potent, stable context in which people experience emotion. Decades of research have established connections between personality traits

and emotional experiences (e.g., Barford & Smillie, 2016; Diener et al., 1995, 2003; R. J. Larsen & Ketelaar, 1991), including more recent work on mixed emotions (Barford et al., 2020; Barford & Smillie, 2016). It is noteworthy that personality research has identified mechanisms that underlie relationships between personality traits and emotion. For example, neuroticism is associated with increased rumination (Hervas & Vazquez, 2011; Muris et al., 2005) and biases in information processing (Gomez et al., 2002; Rafienia et al., 2008). Thus, examining the relation between personality traits and mixed emotions holds promise for uncovering mechanisms that underlie experiences of mixed emotion in daily life.

Emotion traits. People also exhibit stable, trait-like differences in their responses to emotional stimuli (e.g., positivity offset and negativity bias; Ito & Cacioppo, 2005; Ito et al., 1998; Norris et al., 2011) and in their emotional experiences (e.g., trait metamood; Salovey et al., 1995; for review, see Norman & Furnes, 2014). Research suggests these traits are not redundant with personality measures (Norris et al., 2011; Salovey et al., 1995); therefore, we broadly refer to these concepts as "emotion traits." How emotion traits are related to experiences of mixed emotions remains an open question. However, given that emotion traits reflect characteristic patterns of appraisal, such as trait rumination (Ray et al., 2005), we suspect such traits may explain individual differences in frequency of mixed emotions. We encourage researchers to continue bridging personality psychology and affective science by examining the relationship between mixed emotions and personality traits. The personality literature may in turn guide affective scientists toward identifying mechanisms that contribute to the generation or maintenance of mixed emotions.

Overall, a personalized perspective on mixed emotions emphasizes the importance of assessing and modeling context at both the state and trait level. We encourage researchers to consider the range of variables necessary for a thorough characterization of the trait context of their sample beyond typical demographics such as culture (Sims et al., 2015) or the presence of psychological disorders (Cohen & Minor, 2010). Here, we have highlighted several trait contexts the scientific literature suggests influence mixed emotions, but we encourage researchers to think broadly about other traits that may influence how people experience emotion in daily life.

Summary

Research focused on capturing only the moment during which mixed emotions occur is ill-equipped to (a) identify potential mechanisms through which mixed emotions

arise, (b) give an explanatory account for why certain people or groups experience mixed emotions more frequently than others, and (c) differentiate subtypes of mixed emotional experiences. By contrast, research conducted using a personalized perspective on mixed emotions identifies state- and trait-level variables that contribute to the generation of mixed emotions and is capable of differentiating among subtypes of mixed emotional experiences. Whether subtypes of mixed emotions differ in important ways (e.g., are linked to differential mental- or physical-health outcomes) is an open question. Characterizing diversity in mixed emotional experiences and related outcomes is a fruitful avenue for future research that can be pursued more effectively from a personalized perspective.

Emerging and Future Avenues for Research on Self-Reported Mixed Emotions

Previous research suggests numerous contexts influence the frequency and subtype of mixed emotional experiences, many of which cross disciplinary boundaries within the field of psychology. We believe that a personalized perspective on mixed emotions offers an opportunity to advance research through interdisciplinary collaboration. Here, we highlight two exciting interdisciplinary areas of research on mixed emotions.

Mixed emotions in interpersonal relationships

Social relationships are complex. Specific interactions, such as making sacrifices for another (Righetti et al., 2020), and types of relationships, such as competitive friendships and volatile romances (Holt-Lunstad & Uchino, 2019; Uchino et al., 2001), can give rise to co-occurring positivity and negativity. Given that social support and relationships have robust effects on health outcomes and morbidity across many different diseases (Holt-Lunstad et al., 2010), researchers have been interested in examining whether co-occurring positivity and negativity in close relationships affect health. Evidence suggests that close relationships characterized by both positivity and negativity are associated with increased stress (Holt-Lunstad et al., 2007), increased cardiac reactivity (Holt-Lunstad et al., 2007; Reblin et al., 2010), and higher blood pressure in daily life (Holt-Lunstad et al., 2003), all of which are linked to poor long-term health (Benjamin et al., 2017). It appears that, despite the positive emotions these relationships elicit, experiencing both positivity and negativity in the context of a close relationship partner is associated with worse outcomes.

Whether these relationships elicit the state experience of mixed emotions remains an open question (see Uchino & Eisenberger, 2019). These findings present an opportunity for emotion researchers to collaborate with relationship researchers and health psychologists to unpack whether relationships described as both positive and negative actually elicit simultaneous positive and negative emotion. Using a personalized perspective to study mixed emotions in close relationships could confirm whether people experience more frequent mixed emotions in these relationships, and, if so, characterize the subtypes of mixed emotions common to close relationships.

There are several direct applications of the methods suggested in this article to the study of close relationships. First, consistent with our focus on affective dynamics, recent advances in statistical techniques allow researchers to model dynamic, nonlinear patterns within dyads (Girme, 2020). Examining affective dynamics at both the intrapersonal and dyadic level would allow researchers to observe how one partner's mixed emotions influence their partner's emotions and relate to relationship outcomes. Second, network analysis can be used to model emotion dynamics between dyads (Bar-Kalifa & Sened, 2020; Bringmann et al., 2018). Examining couple-level differences in networks presents a new method of examining mixed emotions in close relationships, for example, by testing whether stronger associations between positive and negative emotion are predictive of worse outcomes.

Mixed emotions in clinical populations

Higher trait negative affect and lower levels of trait positive affect are commonly reported by people with psychological disorders, relative to people without psychological disorders (e.g., Blanchard et al., 1998; Watson, Clark, & Carey, 1988). Given that most instances of mixed emotions in daily life appear to occur when people deviate from their emotional baseline (Barford et al., 2020; Hershfield & Larsen, 2012), it stands to reason that experiences of mixed emotions may differ in these groups. Specifically, some clinical groups (e.g., individuals diagnosed with depression or schizophrenia) may be more likely to experience mixed emotions in response to positive stimuli or events than nonclinical groups. There is some evidence in support of this (e.g., Cohen & Minor, 2010; Peeters et al., 2003). Approximately 25 studies have investigated mixed emotions in the lab using samples of people with schizophrenia or at risk of developing schizophrenia. These studies involved presenting stimuli (e.g., pictures, words, flavored liquids) generally considered to be positively or negatively valenced (e.g., Trémeau et al.,

2009). In response to each stimulus, participants were asked to make positive and negative affect ratings on separate scales or using a bipolar scale (for review, see Cohen & Minor, 2010). Compared with control participants, clinical and at-risk groups experienced more frequent mixed emotions in response to both positive and negatively valenced stimuli.

More frequent mixed emotions among clinical populations are related to poorer outcomes. Among clinical groups, mixed emotions evoked in the laboratory have been associated with having fewer practical life skills (e.g., performing household chores, paying bills), increased physical and social anhedonia (i.e., reports of reduced pleasure to typically pleasurable stimuli; Trémeau et al., 2009), and greater symptom severity in schizophrenia (Trémeau et al., 2013). Put simply, frequent mixed emotions may be detrimental to health in the context of psychological disorders. Because clinical samples differ from controls on several variables that we believe to be important for the experience of mixed emotions (e.g., trait affect, affective dynamics), studying mixed emotions in clinical samples presents an important test for theories developed using nonclinical samples. Moreover, we consider collaboration between clinical and affective scientists to be a necessary step toward the development of more inclusive theories of emotion that speak to the experiences of both clinical and nonclinical populations.

Conclusion

Research on mixed emotions is flourishing both within and outside of the psychological literature. We contend that a more organized approach to research on mixed emotions will help unify the diverse perspectives in the existing literature and guide future research. In this article, we have organized the extant mixed-emotions literature by two distinct goals: solving the bipolar–bivariate debate and understanding the subjective experience of mixed emotions. Although it will not resolve the debate over the structure of affect, studying the subjective experience of mixed emotions is of both practical and theoretical importance. Evidence suggests the subjective experience people call "mixed emotions" is a highly variable class of experiences. Thus, to foster a cumulative science of mixed emotions, researchers need a systematic approach capable of differentiating among subtypes of mixed emotions by identifying sources of variability within and between people. We presented a personalized perspective on mixed emotions and proposed methods capable of capturing and modeling this subjective experience. We hope to inspire researchers from a variety of psychological fields to join affective scientists in this pursuit.

Transparency

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Note

1. This search was conducted on Web of Science on July 13, 2021. Results were limited to original articles, review articles, early-access articles, and book chapters published in English. We used the search query "mixed emotion*" OR "mixed feelings" OR "emotional ambivalence."

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