LUNSFORD, JAIMIE M. Ph.D. Negative Emotion Differentiation and Related Processes: A Qualitative Approach. (2022)
Directed by Dr. Kari Eddington. 116 pp.

Negative emotion differentiation (i.e., the tendency to label one's own negative affective experiences in a discrete way rather than having only a vague sense of feeling "bad") has been found to be associated with fewer symptoms of various types of psychopathology, including depression symptoms. However, the mechanisms involved in these relationships are still not well understood. Additionally, current measurement methods using emotion rating scales may be unintentionally capturing confounding variables and do not allow for the examination of key theoretical aspects of the construct. This paper will elaborate upon theoretical and empirical issues in the field and present the results of a recent study. In the study, free-form descriptions of participants' momentary emotions from an existing dataset were coded for two features: the specificity of emotion labels, and the participants' attributional awareness regarding the cause of the emotion. Attributions significantly predicted depression symptoms, rumination, overgeneralizing cognitions, and the emotion regulation strategies of suppression and distraction. Specificity was not significantly associated with any variables of interest. This novel qualitative approach provides insight into individuals' naturalistic use of emotion-related language and allows for the examination of within-person variation in emotion labeling processes.

NEGATIVE EMOTION DIFFERENTIATION AND RELATED PROCESSES:

A QUALITATIVE APPROACH

by

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A Dissertation
Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro

2022

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CHAPTER I: INTRODUCTION

"How are you feeling right now?" In therapy rooms everywhere, clinicians practicing in a variety of theoretical orientations ask clients this question every day. Whatever the diagnosis or modality, the aim of guiding clients to observe and describe their emotions may even be taken for granted as an obvious, implicit treatment target.

It makes sense that many approaches to therapy emphasize working with individuals' experiences of emotion. Emotions are a universal part of the experience of being human. The quality of our feelings in each moment impacts our memory (Mayer et al., 1995), our judgement (Blanchette & Richards, 2010), and our choices (Gray, 1999). Our changes in mood also alter how we view our relationships (Levenson & Gottman, 1985) and ourselves (Brown & Mankowski, 1993). Disruptions in emotion intensity and regulation are a key aspect of many psychological disorders (e.g., inappropriate panic in anxiety disorders, unremitting dysphoria in major depression, and emotional blunting in psychotic disorders).

One core emotion process is finding the words to name our feelings. Prevailing constructionist theories of affect consider the labeling process to be one of the "ingredients" emotions are made of (Lindquist, 2017). The very act of naming an emotion impacts neural activity in the amygdala, an important region in the generation of emotion experience (Torre & Lieberman, 2018). In the therapy room, psychologists often attempt to elicit precise words to describe feelings rather than ambiguous ones. Consider a few examples from diverse therapy modalities – CBT, DBT, and psychoanalysis.

A chapter from the book *Working with Emotion in Cognitive Behavioral Therapy* titled "Creating Change through Focusing on Affect: Affect phobia therapy" provides a therapy transcript (pg. 156):

Therapist: You are putting on a big smile… What's the feeling that's coming up?

Patient: (smiling) It's rough.

Therapist: If you didn't smile, what would you be feeling?

[The therapist is empathically probing for the avoided feeling]

Patient: (laughing) Right, right … Pain?

Therapist: Or is it sad? (Osborn et al., 2015)

In *The Dialectical Behavior Therapy Skills Workbook* (McKay et al., 2007), recognizing emotions is introduced as one of nine "emotion regulation skills." Using an emotional record sheet and a list of common emotion words, readers are encouraged to "be specific about how you feel," (pg. 75).

In the book *Co-Creating Change: Effective Dynamic Therapy Techniques*, psychodynamic therapists are encouraged to notice when patients use "watered-down words" to describe their emotions and direct them to more concrete terms. Example 1:

Therapist: What is the feeling toward her for doing that?

Patient: I feel uncomfortable about the whole situation. Where to go, what to do, you know?

Therapist: *Uncomfortable* is vague. It doesn't tell us how you felt toward her for throwing the ring in the gutter. What is the feeling toward her?

Patient: I threw my glasses on the ground, and they broke.

Therapist: But the glasses didn't do anything to you, did they? If you don't put the feeling out onto your glasses, what is the feeling toward your fiancée?

…

Patient: I'm angry.

Example 2:

> "Therapist: What feeling are you having over your wife's death?
>
> Patient: I feel upset.
>
> Therapist: Obviously her death upset your entire world. And what is your *feeling* over losing her?
>
> Patient: It's terrible.
>
> Therapist: I agree. And what are you feeling over her loss?
>
> …
>
> *[Tears form in the patient's eyes]*
>
> Therapist: What are you feeling now?
>
> Patient: I'm sad. (Fredrickson, 2013)

In all the preceding therapeutic examples, physical or vague ("watered-down") labels like "pain," "uncomfortable," "upset," and "terrible," are meant to be replaced with specific emotion words like "sad," and "angry." In the language of affective researchers, these therapists are trying to promote *emotion differentiation*. Emotion differentiation is thought of as the extent to which individuals use specific labels for their emotion experiences in distinct ways (e.g., sometimes feeling "sad", and at other times "angry", rather than just "upset" for all negative experiences). Emotion differentiation has been statistically measured and studied in emotion research for the past two decades, resulting in a large body of empirical evidence for its adaptiveness. The present paper will first explore this important construct in detail – what differentiation is, how it works, and how best to assess for it in research – and then describe a recent study aiming to advance the field in these areas.

Roadmap of the Present Paper

The present paper will provide (1) a definition of emotion differentiation, (2) an overview of the state of the empirical evidence concerning the construct, (3) a discussion of methodological and statistical considerations regarding its measurement, and (4) the description of emotion differentiation research carried out by the author. This recent study explores a novel, qualitative method of assessing emotion differentiation and tests the relationships between differentiation and clinically important related processes.

To clarify the nature of emotion differentiation, a working definition will be established in the first section of this paper. This will be based on the early introduction of the concept in research, including theoretical considerations rooted in broader models of affect generally, and will also take into account later studies that have cast further light upon the nature of the construct. In particular, two areas of interest will be explored in which emotion differentiation has been viewed from divergent perspectives in past literature. First, differentiation among negative emotions has commonly, but not always, been examined separately from differentiation among positive emotions. Second, some descriptions of emotion differentiation suggest that it is a trait-like variable, differing between individuals, while others emphasize the possibility of fluctuations in differentiation across time and situation. Studies that illuminate our understanding of these features will be discussed.

In the second section, a summary of the literature will show that evidence has mounted over the past two decades to support the hypothesis that differentiating closely between labels for specific emotion states is related to greater psychological well-being and lower levels of psychopathology. In some cases, emotion differentiation has been found to play a moderating role, reducing the negative outcomes conferred by specific risk factors. Though these may be

intuitive findings for many clinicians who have attempted to promote this very process in therapy settings, researchers have yet to establish a complete account of why these relationships exist. For this reason, the review of the literature will give particular attention to three mechanisms that have been proposed and empirically tested: improved emotion regulation, reduced rumination, and reduced overgeneralizing, with each explored individually. Additionally, attributional clarity will be introduced as a key fourth mechanism that has remained implicit in almost all investigations of emotion differentiation, but rarely directly tested.

The third section will begin by charting the current state of measurement in emotion differentiation research. As with any construct, choices about how to measure emotion differentiation greatly impact what hypotheses may be tested and what inferences can be made from the results. Statistical concerns about the current method of calculating an emotion differentiation index using an ICC will be discussed. Additionally, two key methodological limitations will be considered: the inadequacy of measuring emotion differentiation as a trait variable without capturing with person fluctuations in time, and the problems with the exclusive use of standardized rating scales to assess participant emotion labeling. It will be shown that inattention to these concerns will limit our ability to establish confident models of emotion differentiation, and recommendations for how to attend more carefully to these issues in the future will be outlined.

Finally, the aims, methods, and results of the present study will be presented. This study tested a novel, qualitative approach to measuring emotion differentiation and related processes. The intention of the study is to improve our ability to accurately assess the construct in research and to shed light on the mechanisms that may be involved, particularly the often implied but unexamined role of attributional clarity. This study closely follows the recommendations that

will be illuminated in this paper, and it is both firmly grounded in theory and past literature and strongly positioned to open new future directions. Results from the study suggest that qualitatively coding free-form responses from participants allows us to gather more ecologically valid examples of individuals' labeling of emotions. Further, the understudied mechanism of attributional clarity, introduced in Chapter III (Summary of the Literature), is shown to significantly predict multiple variables of interest. This suggests that attributional clarity may play a key role in adaptive emotional functioning and may be assessed using momentary qualitative methods. The implications for future research will be discussed.

CHAPTER II: DEVELOPING A DEFINITION OF EMOTION DIFFERENTIATION

Early Conceptualization and Measurement

The first examination of what we now call emotion differentiation was published by Lisa Feldman Barrett in 1998. She conducted a 90-day experience sampling study in which participants rated the degree to which they were feeling 88 standard emotion words in the morning, afternoon, and evening. Examining multiple statistical representations of the results, she observed that individuals had varying magnitudes of "co-occurrence indices" – correlations between same-valenced emotion word rating across time. She proposed that higher co-occurrence indices, with negative emotions seeming to rise and fall together, likely reflected "little discrimination between affective states." Lower indices were interpreted to reflect more discrimination, or a tendency to use emotion words independently at separate time points (e.g., reporting feeling angry but not anxious, or vice versa). The lower discriminators exhibited what she called "valence focus," or a tendency to view their emotions as primarily good or bad.

In a similar 60-day experience sampling study, Feldman Barrett (2004) again examined the correlations of same-valenced emotion word ratings across time, a construct which she called "emotion granularity" (low granularity corresponding to high correlations between words). Participants also rated pairs of same-valenced emotion words presented on a screen for how similar the words seemed to each other. Low granularity predicted greater perceived similarity between different same-valenced emotion words. Describing this phenomenon, Feldman Barrett stated that "some individuals represent their experiences with a good deal of precision (high granularity), whereas others represent their experiences in more global terms (low granularity, primarily in terms of pleasure or displeasure)." This concept of granularity is carried forward in what is termed "emotion differentiation" today.

A similar approach to measurement has also largely been maintained in later studies. An index of emotion differentiation is still most commonly derived from ratings of same-valenced emotion words taken repeatedly over time, whether across multiple mood inducing tasks in a lab or through experience sampling methodology (ESM). Emotion differentiation is then calculated as the reversed intraclass correlation coefficient (ICC) of a participant's emotion ratings across observations. Thus, reporting multiple emotions on one occasion is not considered low differentiation, but consistently using the same emotion words in similar ways across time is (Kashdan et al., 2015). (Further discussion of the use of correlations between ratings to operationalize differentiation will follow in Chapter IV).

The basis of this original conceptualization of granularity (differentiation) was based on Feldman Barrett's descriptions of two major, competing approaches to explaining affect broadly – basic emotion theory and the dimensional model of affect. Feldman Barrett proposed emotion granularity as the extent to which participant ratings of their emotions seemed to be operating under one or the other of these models, with high granularity corresponding to basic emotion theory and low granularity to the dimensional model.

Differentiation and Models of Affect

According to basic emotion theory (e.g., Ekman, 1992), emotions are discrete, independent "packages" of physiological, cognitive, and motor responses that are part of our innate human evolutionary programming. There is a finite set of possible emotions (e.g., sadness, anger, joy, surprise), they are universal, and each is served by a particular biological pathway. The dimensional model is an overarching title for what are really multiple models of the same family. The framework that they share is based on the idea that emotions occur along a continuum rather than existing as independent categorical entities (Scherer, 2000). Most models

share a two-dimensional structure in which the axes of affective space correspond to variations from positive to negative *valence* (pleasantness to unpleasantness) and from low to high *arousal* (bodily activation) (Posner et al., 2005). For example, anger (*high arousal, negative valence*) differs from sadness (*low arousal, negative valence*) in arousal level. Similarly, anxiety (*high arousal, negative valence*) differs from excitement (*high arousal, positive valence*), in valence. Dimensional models distinguish themselves from basic emotion theory by positing that feelings nearby one another in affective space can be experienced as "fuzzy" (Russel & Fehr, 1994), without clear and distinct boundaries. In dimensional models, there is not a single set of evolutionarily programmed and universal emotions that can describe all affective experience.

In Feldman Barrett's paradigm of differentiation (granularity), an individual's style could bear more resemblance to one model of affect over another. For low differentiators, a dimensional model seemed to be the best match. These individuals might experience their emotions as fuzzy or vague, with adjacent emotions (e.g., anger and anxiety) lumped together under an umbrella of valence. For high differentiators, a discrete model like basic emotion theory seemed to be the best match, with specific, distinct words being used independently for different experiences. A review of the evidence for and against these two theories is outside the scope of this paper, and Feldman Barrett was not attempting to support or reject either view. Rather, this paper will use as a foundation for a definition of emotion differentiation the theoretical concept that emotion labeling styles may reflect either basic emotion theory or dimensional models of affect to varying degrees.

Regardless of which model is more accurate generally, the low differentiators (using dimensional rather than discrete affective structures), were speculated to be missing out on the adaptive benefits of specific labels, because "individuals who can distinctly apply a discrete

emotion label to their experience can avail themselves of the motivation and the behavioural repertoire… to cope with the stimulus event that they believed caused their emotional experience," (Feldman Barrett, 1998). This early prediction that differentiation may be adaptive has been supported by the findings of later studies. This will be discussed further in Chapter III (Summary of the Literature), as will this early reference to attribution – "the stimulus event that they believed caused their emotion experience" – as a possible mechanism.

Feldman Barrett's earliest delineation of what we now call emotion differentiation, then, provides us with a working definition based in affective theory. High differentiation is the ability or tendency to precisely distinguish same-valenced emotion experiences from one another using specific, distinct labels (in the style of basic emotion theory). Low differentiation is the tendency to blur together similar emotion states under the umbrella of shared valence (resembling a dimensional model of emotion).

Since this initial study, subsequent research has further explored the nature of the construct of differentiation. Specifically, at least two central questions have been brought to light. First, are positive emotion differentiation (PED) and negative emotion differentiation (NED) two parts of the same process, or distinct from one another? Feldman Barret's original study measured them separately, but subsequent studies varied in approach. More recent studies have asked, if NED and PED are distinct, do they function similarly? That is, would PED also be predicted to have adaptive benefits? Second, Feldman Barrett calculated differentiation as a single index for each individual, based on the correlation of ratings across multiple time points. This implies that some people are generally better at differentiation than others. Is differentiation really a trait-like phenomenon that varies between individuals, or does one person's ability to differentiate vary across time? These two issues will now be discussed.

Additional Questions from Later Studies

Negative and Positive Emotion Differentiation

Researchers today almost exclusively examine emotion differentiation separately for positive and negative affect (Thompson et al., 2021). There tends to be a greater focus on NED, with PED only calculated or reported in a minority of differentiation papers. This may be in part because clinically, disruptions in *negative* emotion processes are most commonly associated with psychopathology. Additionally, negative emotions are often thought to be more functionally important because they signal situations that require attention and coping strategies (Barrett et al., 2001). First, what evidence supports understanding NED and PED independently?

In some studies in which both NED and PED are examined, the two indices have a small to medium correlation with one another (e.g., Emery et al., 2014; Erbas et al., 2015; Selby et al., 2014), but in others they are not associated at all (e.g., Demiralp et al., 2012; Dixon-Gordon et al., 2014; Seo & Barrett, 2007). This suggests that the two kinds of differentiation may vary somewhat independently within individuals rather than being two aspects of the same process.

At least three exceptions to the practice of calculating separate values for NED and PED have been identified to date. Grühn et al. (2013) calculated a global emotion differentiation index from all emotion ratings. The purpose of the study was to compare and contrast various emotion complexity indicators, including dialecticism (the degree to which one tends to experience positive and negative affect simultaneously). Dialecticism is calculated as the correlation between positive and negative emotions over a series of momentary reports (Thompson et al., 2021). It has been found to vary cross-culturally (Sims et al., 2015) and between individuals within cultures (Grossmann et al., 2016). Multiple studies indicate that both PED and NED, considered separately, tend to correlate positively with dialecticism (e.g., Erbas et al., 2015,

Grossman et al., 2016). This makes sense theoretically, because low differentiation is by definition the tendency to separate emotion terms from one another primarily by valence.

However, using a global index of emotion differentiation that collapses positive and negative emotion actually makes low differentiation nearly statistically equivalent to high dialecticism. That is, if all emotions correlate more highly with each other, rising and falling together (i.e., low differentiation using a global index), then of course the co-occurrence of positive and negative emotions with be more frequent (i.e., high dialecticism). In fact, that is what Grühn and colleagues found; high dialecticism ("positive affect-negative affect covariation") predicted low "global" differentiation, but this may simply be a statistical artifact. While the authors do not state a rationale for calculating global differentiation (no *a priori* hypotheses regarding global differentiation were made) this index does not seem to represent the same theoretical definition of differentiation we have discussed previously.

A second study measured global emotion differentiation across both positive and negative emotion words (which they called emotion granularity) in patients with schizophrenia (Kimhy et al., 2014). Their results showed that higher global differentiation was associated with better social functioning among the participants. Their study cites Feldman Barrett's initial investigation and analyses of granularity but does not provide a reason for their departure from the typical method of calculating NED and PED separately. Finally, a recent study considered "global differentiation" in a different way, by summing participants' NED and PED scores to create a new index (Liu et al., 2020). Their combination index was found to attenuate the association between rumination and depression in a community sample. However, they note transparently that these analyses were conducted *ad hoc* after their initial hypotheses (focused on

NED) were not supported. They also ran analyses testing a model that used the interaction of NED and PED terms, which were not significant.

In sum, there is a lack of consistent correlation between NED and PED within persons. There are problems with using a global calculation because of the artificial statistical overlap with the construct of dialecticism, which conflicts with theory and empirical evidence showing that PED and NED individually are inversely associated with dialecticism. One study has shown an association between global differentiation (calculated as an overall ICC) and positive outcomes for people with schizophrenia. Another recent study has shown a moderation effect for global differentiation (calculated as a sum of NED and PED indices) on rumination and depression, but this was part of a series of unplanned analyses. This amounts to limited and conflicting information about how to consider PED and NED together, while considering NED and PED as separate constructs appears to be better grounded in theory. Now we may move on to our second question regarding NED and PED: are they both expected to be adaptive, and to function similarly?

Based on broader models of negative and positive emotions generally, there are reasons to expect that differentiation of positive emotions may not serve the same purposes that differentiation of negative emotions could. Positive emotions can be thought of as a "response to the potential for reward," (Shiota et al., 2014). According to the broaden and build theory of positive emotions (Fredrickson, 2001), positive affective experiences promote more expansive and open cognitive perspectives and behavioral repertoires, and allow individuals to take advantage of physical, social, and psychological resources to enhance well-being and resilience for the future. Negative emotions, on the other hand, function by narrowing and focusing attention and action preparedness to a reduced range of survival-relevant features. Perhaps this is

why individuals feel more pressure to understand and respond to negative emotions than positive ones (Pratto & John, 1991). Through this lens, one could argue that a more precise differentiation of negative emotions might complement the specific, narrowing functions of those feelings, whereas a diffuse sense of connected positive emotions might fully serve the broaden and build functions of those feelings.

Empirically over the years, PED has shown less consistent and smaller associations with well-being compared with NED according to a review by Thompson et al. (2021). The authors posit that there could be differences in the function of PED and NED that are language specific since English simply contains fewer positive emotion words than negative ones, making it difficult to distinguish between as many positive states as negative ones. Another untested possibility is that NED may be more adaptive for individuals who experience more frequent negative states (e.g., high neuroticism), while PED may be more adaptive for individuals who experience more frequent positive states (e.g., high extraversion).

At least one study provides evidence for a positive effect of *low* PED. Starr et al. (2017) found that low PED predicted a strengthened relationship between positive daily experiences and reduced daily depression, suggesting that low differentiators were better able to harness the potential of positive events to improve their mood. They also observed a similar moderation between savoring (a sort of "positive rumination" involving thinking back frequently to positive experiences and feelings) and reduced daily depression symptoms by PED. Savoring improved participants' mood more for those who differentiated positive emotions *less* well. The authors theorized that excessively differentiating between specific positive emotion states may lead to a more constrained experience and reduce the emotional reward.

To summarize, the distinction between PED and NED is consistent with current theory about the functions of positive and negative emotions. Additional research into the nature and function of PED is recommended (perhaps in individuals with differing levels of general positive and negative affect). The findings of Starr et al. (2017) suggest that low PED could be important for processes that promote well-being and thriving, pointing to a separate and perhaps even opposite role from NED in emotional functioning. The remainder of this paper will focus on NED, which has been shown to be related to the types of psychopathology that are the focus of therapeutic interventions such as the examples elaborated in the introduction.

Trait Versus State Conceptualization

Feldman Barrett originally conceptualized emotion granularity as a trait-like variable, with some individuals possessing a greater ability to differentiate than others. By the typical methods of assessment, NED can only be measured as a trait, because the ICC is calculated between emotion words over time for one individual, yielding a person-level variable. However, other emotion-related processes vary situationally. For example, it has been found that complex, mixed emotional experiences are more likely to occur in the presence of others than when one is alone (Grossmann & Ellsworth, 2017). Individuals may also use different strategies to regulate emotions depending on physiological experiences such as heart rate (Birk & Bonanno, 2016).

It is not surprising then, that some recent evidence points to the variable nature of differentiation within persons. Widdershoven et al. (2019) found that among depressed adults in outpatient treatment, emotion differentiation significantly increased over the course of six weeks for participants who self-reported on mood ten times per day for three days a week, compared with a control group who did not participate in experience sampling during this period. The finding that repeated measures of emotion could alter an individual's emotion reporting

tendencies is consistent with a review by Barta et al. (2012) which discusses issues of "measurement reactivity" in daily diary studies.

Another study found a significant increase in differentiation after participation in a mindfulness intervention among individuals with varying degrees and types of psychological distress (Van der Gucht et al., 2019). This effect remained at a four month follow up assessment. More recently, one study found that an eight-week protocol called Emotion Regulation Therapy (ERT), which was designed to improve emotion clarity and regulation ability, increased NED for distressed caregivers of cancer patients (Mikkelsen et al., 2021).

One ESM study with a sample of first-year college students used 6-10 emotion rating occasions over the course of each day to calculate a day-level differentiation index. (Erbas et al., 2018). Greater stress on one day was found to predict lower differentiation on the following day, showing that aside from increases in differentiation due to intervention, within-person fluctuations related to changes in everyday experiences can also occur. The authors suggest that perhaps when individuals are stressed and overwhelmed, they experience a decrease in cognitive resources, which limits their capacity to differentiate.

These findings suggest that emotion differentiation may vary within individuals, over a period of weeks as well as day-to-day. However, the typical form of measurement for NED can only capture differentiation across some defined time period within which multiple ratings can be taken. Without the ability to measure NED in the moment, it is impossible to determine whether associations exist between NED and other relevant momentary processes, such as emotion regulation strategies.

Chapter II Summary

As discussed above, emotion differentiation is a construct introduced by Feldman Barrett (1998, 2004) to describe how people label their emotion experiences. The idea was developed from an understanding of two theoretical models of affect – basic emotion theory, and dimensional models of emotion. High differentiation can be thought of as the tendency to distinguish same-valenced emotion experiences from one another using specific labels (similar to basic emotion theory), and low differentiation as the blurring of emotion states together under the category of valence (essentially a dimensional approach, with a focus on the single continuum of valence). Later studies have explored additional features of the construct. There are empirical and theoretical reasons to consider PED separately from NED, and this paper will focus on the latter. Finally, there is evidence to suggest that NED is a state, rather than trait variable, that changes within individuals across time. These facts will be incorporated into final recommendations for emotion differentiation research in Chapter V (Overall Conclusions and New Directions).

CHAPTER III: SUMMARY OF THE LITERATURE

Adaptive Correlates of NED

NED has been found to correlate with several adaptive outcomes and processes. For example, it has been shown to be associated with greater self-esteem (Erbas et al., 2014), quality of life (Boden et al., 2015), and mindfulness, or attention to the present moment (Fogarty et al., 2015; Hill & Updegraff, 2012). Recently, in one of only a few longitudinal studies of differentiation, Lazarus and Fisher (2021) found that higher NED before beginning psychotherapy predicted better self-reported treatment response among patients presenting with mood and anxiety disorders in CBT.

NED has consistently been found to be negatively associated with depressive symptoms, including in samples of undergraduates (e.g., Erbas et al., 2014), veterans (Starr et al., 2017), and community participants (Willroth et al., 2020). In one study examining a clinical population with a diagnosis of major depressive disorder, NED was found to be significantly lower than in healthy controls (Demiralp et al., 2012).

Similar studies have found lower NED in other groups exhibiting various types of psychopathology compared to controls, including borderline personality disorder (Suvak et al., 2011, Zaki et al., 2013) and social anxiety disorder (Kashdan & Farmer, 2014). Low NED has also been linked to substance use issues, including alcohol related problems (Emery et al., 2014), substance abuse relapse (Anand et al., 2017), and heavy smoking (Sheets et al., 2015).

NED was found to be associated with fewer eating disorder symptoms and fewer daily compensatory behaviors (e.g., dietary restriction, excessive exercise) among female undergraduate students in one study (Wililams-Kerver & Crowther, 2021). In another study,

higher NED predicted lower caloric intake after a lab-based negative mood induction, further suggesting that NED may play a role in healthy eating behaviors (Jones & Herr, 2018).

NED as a Moderator of Risk

In addition to these findings, higher NED has been shown to serve as a protective factor against maladaptive behavior even among high risk or symptomatic individuals in multiple studies. In participants with borderline personality disorder, more brooding rumination predicted higher rates of non-suicidal self-injury (NSSI). However, this association was moderated by NED, such that high differentiators did not experience increases of NSSI with rumination (Zaki et al., 2013). In another study, intense negative emotions predicted episodes of binge drinking among underage drinkers, but high differentiators drank less after experiencing these intense negative emotions than did low differentiators (Kashdan et al., 2010). Similarly, Pond and colleagues (2012) found that the association between intense experiences of anger and subsequent aggressive behavior was weaker for high differentiators, suggesting that they were better able to choose non-aggressive responses even when experiencing intense anger.

Similar patterns have been observed in the domain of internalizing symptomology. In a study of veteran participants recruited from VA primary care, low NED predicted stronger associations between baseline depressive symptoms and brooding rumination, as well as stronger associations between daily negative events and increases in daily depression symptoms (Starr et al., 2017). Nook and colleagues (2021) followed thirty teens over an intensive yearlong longitudinal study after using a lab-based task to measure NED at baseline. Adolescence is a period of increased risk for the onset of depression and anxiety, and in this study high NED was found to attenuate associations between momentary perceived stress and feelings of depression, as well as month-level associations between stressful life events and anxiety symptoms.

In summary, high NED has been linked to both positive outcomes and the mitigation of negative outcomes among populations with clinical concerns. One limitation to these findings is that most of the studies conducted to date have been correlational, so the direction of these effects has not been extensively tested. More research using longitudinal or experimental designs will be needed to confirm directionality. Currently, theoretical arguments have been proposed for how NED could be adaptive or protective, and therefore drive the observed associations in a causal manner. In the following section, we will explore these in detail, focusing on four possible mechanisms suggested in the literature to explain how NED may facilitate the positive outcomes described above.

Proposed Mechanisms

The first three mechanisms most frequently proposed in the literature are: improved emotion regulation, reduced rumination, and reduced overgeneralizing. All three of these processes are supported by a fourth mechanism – increased attributional clarity or knowledge about the source of an emotion experience. That is, a specific emotion label is thought to provide greater awareness of the cause of a feeling, which in turn alters the first three mechanisms mentioned. The reasons for this, and why attributional clarity remains an often implicit and unmeasured variable, will be discussed in the next section. First, however, we will begin with the most commonly discussed mechanism, improved emotion regulation (Erbas et al., 2016; Kashdan et al., 2015; Sheets et al., 2015; Smidt & Suvak, 2015; Cameron et al., 2013; Zaki et al., 2013; Pond et al., 2012, and many others).

Improved Emotion Regulation

In the very first examination of individual differences in what we now call emotion differentiation (Feldman Barrett, 1998), low differentiators were speculated to be missing out on

the benefits that specific labels might provide: “individuals who can distinctly apply a discrete emotion label to their experience can avail themselves of the motivation and the behavioral repertoire… to cope with the stimulus event that they believe caused their emotional experience.” In other words, differentiated labels were hypothesized to provide attributional clarity (about “the stimulus event they believe caused their emotional experience”) and provide access to adaptive regulatory strategies (“the behavioral repertoire to cope”). While having a sound theoretical basis, this proposal has been examined empirically on several occasions with mixed results.

In a study by Barrett et al. (2001), more emotion regulation (ER) of all types (e.g., suppression, reappraisal, distraction) self-reported retrospectively over the past two weeks was associated with greater emotion differentiation. In this study, only the overall amount of ER across strategy types was examined, even though the various types have important differences. For example, in the long-term, suppression is thought to be generally maladaptive, while reappraisal is generally adaptive (Gross, 2007). Distraction may be a good short-term way to lift one’s mood, but chronic distraction as a means of avoidance may be harmful (Nolen-Hoeksema et al., 2008). Additionally, some strategies seem to be more aligned, by definition, with the process of emotion differentiation than others. For example, acceptance has been described as an ER strategy requiring adaptive engagement with the emotion experience, whereas distraction is characterized by disengagement (Naragon-Gainey et al., 2017). Therefore, there is theoretical reason to expect that differentiation would be linked to the use of acceptance, whereas distraction could even interfere with differentiation. So, though this study is frequently cited as showing that higher differentiators engage in more *adaptive* regulation, it is a limitation that the authors could only conclude that high differentiators reported more total regulation of all types.

Some studies have attempted to fill this gap by examining the association between NED and various ER strategies individually. O'Toole and colleagues (2014) found that individuals higher in NED were more likely to report using reappraisal as an ER strategy. This was expected because reappraisal is thought to require some attributional clarity to employ. However, NED did not inversely predict suppression (a strategy requiring less information) as predicted. A later study using a momentary measure of ER found almost the opposite: NED was inversely associated with the use of reappraisal and social sharing and not significantly associated with suppression or distraction, contrary to the authors' hypotheses (Kalokerinos et al., 2019). Finally, in unpublished work by the author (2019), no significant associations were found between NED and suppression, reappraisal, distraction, or acceptance strategies.

Other studies have tested various composites of putatively related regulation strategies. Tong & Keng (2017) found that NED was significantly inversely associated with a composite of "maladaptive" strategies (e.g., venting, self-blame) as expected, but not significantly associated with a composite of "adaptive" strategies like reappraisal and active coping. One study recently used a similar approach, but the "maladaptive" composite (e.g., rumination, avoidance, worry) and the "adaptive" composite (e.g., reflection, distancing, non-reactivity) collapsed a different set of strategies (O'Toole et al., 2021). This study used both self-report measures of dispositional ER and daily ESM measures and did not find any significant associations with NED. Finally, another recent study found positive correlations between NED and daily "engagement" ER strategy use and a negative correlation between NED and "disengagement" strategies, as the authors predicted (Brown et al., 2021). Again however, an entirely different set of strategies was considered, including substance use (disengagement) and problem solving (engagement).

It is difficult to make sense of these mixed results given the perpetual divergence in methodology between studies. Different strategies and combined sets of strategies are used in almost every investigation. Additionally, some studies use momentary measures of ER, while others use participants' self-report about their general behavior. Retrospective self-report measures of momentary processes like emotion-related experiences are fraught with issues, however. They are likely to reflect participants' cognitive biases (Reis & Gable 2000), beliefs, expectations, and schemas (Robinson & Clore, 2002), and recalled emotion experiences are often inconsistent with participants' own in-the-moment reports at the time (Abbott & Rapee, 2004).

Aside from methodological inconsistencies, another proposed explanation for these mixed results is that other features of emotion regulation, not strategy choice, may be related to NED. For example, *variability* in emotion regulation strategy use predicted lower negative affect in one recent study (Wenzel et al., 2021), but no study has examined ER strategy variability and NED. It could also be the case that people with higher NED are more *effectively* using the various regulation strategies (e.g., more appropriate to the situation, or more competently), without using any strategies more or less frequently.

One ESM study (Kalokerinos et al., 2019) examined regulation effectiveness, operationalized as a decrease in negative emotion intensity at the time point after a regulation strategy was employed. NED was not associated with a decrease in negative emotion after regulation as predicted. In fact, an increase in negative affect was seen across participants after regulating, perhaps because a rise in an emotion already underway is what triggered the use of a regulation strategy. More recently, Ottenstein (2021) attempted to test the same hypothesis, but using all self-report measures. Regulatory effectiveness was measured using responses to items such as "It is easy for me to weaken my negative feelings," and self-reported differentiation used

items such as “Each emotion has a very distinct and unique meaning to me.” These variables were positively correlated, but this non-traditional approach to measurement is loaded with the same issues of other self-report measures, discussed above. More research would be needed to come to any confident conclusions regarding NED and regulatory effectiveness, or other characteristics of ER.

In conclusion, the relationship between NED and ER, though frequently cited from the earliest days of differentiation research as a likely mechanism, is riddled with conflicting findings. One reason may be that the studies all measured different ER strategies and even different composites of multiple strategies thought to be related. Additionally, most studies used retrospective reporting on emotion regulation strategy use rather than in-the-moment reports, with a few exceptions. Other factors related to ER (such as variability or effectiveness) have also not yet been shown to be associated with NED.

Reduced Rumination

While proposed less frequently that emotion regulation, reduced rumination has also been suggested in the literature as a possible mechanism for the adaptive benefits of NED (Pond et al., 2012, Kashdan et al., 2010). Rumination may be initiated for a variety of reasons, including attempted problem-solving or strategizing about an unattained goal, and may even be adaptive when focused progress is required to the exclusion of all distractions (Altamirano et al., 2010). However, rumination has been strongly linked to depression in many studies (see Nolen-Hoeksema, et al., 2008 for a review), especially a *brooding* style, in contrast to the less consistently problematic *reflective pondering* (Tryenor et al., 2003). There is some evidence that individuals who tend to engage in rumination believe that it will help them understand and resolve difficult emotions (Watkins & Moulds, 2005). This suggests the possibility that the

additional knowledge about emotions that comes from specific labeling could reduce the perceived need to ruminate.

Three studies have directly tested this. Zaki et al. (2013) examined NED and self-reported baseline brooding rumination in a clinical sample diagnosed with borderline personality disorder. They did not find a significant direct association, but NED attenuated the association between rumination and NSSI (as discussed previously). Starr et al. (2017) found a significant association between NED and momentary rumination among undergraduates and veterans (and did not examine brooding and pondering separately). In the author's unpublished study of undergraduates (2019), momentary reports of rumination (both brooding and pondering), were significantly associated with lower NED.

In summary, only a few studies have empirically tested the link between rumination and NED. Both studies that employed a momentary measure of rumination found a positive association with NED, but the study of participants with BPD found no correlation between NED and a self-report measure at baseline. It may be more valid to assess rumination using self-report measures than it would be for other momentary emotion processes, since it has historically been conceptualized as a trait-like variable or "response style" (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2000, 2008). Either as a trait- or state- variable, further research into the proposed connection between rumination and NED will help to determine if the positive findings above are replicable.

Reduced Overgeneralizing

A third mechanisms that has been suggested is that more specific information about a negative emotion via NED may reduce overgeneralizing from that emotion to evaluations about an unrelated domain (Zaki et al., 2013, Boden et al., 2015). In Beck's cognitive model of

depression, overgeneralization is a type of distorted thinking shown to be associated with depressive symptoms (Beck, 1976; Carver, 1998). Similarly, in the learned helplessness model of depression (Abramson, 1978), overgeneralizing from a single negative incident to broader negative evaluations regarding the self, the future, and the world, is considered a key feature of depressive cognitions.

Support for a protective effect of NED against overgeneralizing from one's current emotion experience to broader situations comes from three sets of findings. In one study (Cameron et al., 2013), researchers elicited disgust in one participant group using unpleasant video clips. When subsequently asked to make moral judgments about cultural practices inconsistent with Western cultural norms, the incidental emotion of disgust influenced the participants to make harsher judgements than those in the control group who did not watch the unpleasant videos, as predicted. However, high differentiators were less influenced by the disgust manipulation, suggesting that they did not overgeneralize as much from their present emotional state to broader judgments. The second study in this paper replicated the results using a manipulation of differentiation. Participants were instructed to either focus on which specific emotions they were experiencing, or simply how good or bad they were feeling. They were given the chance to practice with emotionally evocative pictures, either rating specific emotions or rating good vs. bad. This is, in fact, the only study to date which has attempted to manipulate NED to allow for causal conclusions to be drawn regarding related processes. The moral judgements of the high differentiation group were impacted less by the incidental disgust condition, replicating the initial correlational findings.

In an unpublished study by the author (2019) overgeneralization was measured by participants' momentary endorsement of broad negative statements from the Depressive

Attributions Questionnaire (DAQ), such as "I can't see anything positive in my life," using ESM. Emotion ratings were captured at the same time points. There was an overall correlation between negative emotions and depressive overgeneralization, but the effect was moderated by NED, as predicted. For participants with higher differentiation scores, the was no significant association, suggesting that they were better able to make judgements about their lives with less influence from their current mood.

Finally, in a study of behavior among US stock investors, researchers conducted a four-week stock exchange simulation in which the investors checked simulated data and made investment decisions each day (Seo & Barrett, 2007). They also rated what emotions they were experiencing at each time point. Risk-taking was assessed as a composite index incorporating multiple pieces of information about participants' investment patterns (e.g., amount of diversification, average 1-year return on investments). Higher NED reduced the influence of emotion intensity on risk-taking and predicted better performance outcomes overall. This suggests again that high differentiators were able to prevent current negative mood from negatively impacting their judgements about broader matters.

Overall, a small but consistent set of studies indicate that NED may support individuals' ability to make judgements and behavior choices without as great an influence from their incidental emotion experiences. Notably, all measures were momentary in this set of findings, rather than self-report. This lends support to reduced overgeneralizing as a possible mechanism by which NED promotes positive outcomes in everyday living. However, only one of these studies tested clinically significant processes (depressive overgeneralizing).

Attributional Clarity: The Hidden Mechanism

In all three of the proposed mechanisms discussed above, the ability to identify what caused an emotion, which can be called attributional clarity, is thought to play a role. In fact, it is mentioned in the early description of how "emotion granularity" works, as noted in Chapter II. This connection between attribution clarity and discrete, specific emotion labels has a strong theoretical foundation, as we will discuss in this section. However, it is often left implicit and unmeasured in differentiation research, in part because of difficulties with measurement.

NED and Attributional Clarity

As discussed previously, Feldman Barrett originally held attributional clarity in close connection with differentiation in the early conceptualization of the construct. She discussed the idea that the emotion labels used to interpret a feeling will influence individuals' understanding of their "immediate surroundings" and what is happening in their environment (including the cause of the emotion). She also asserted that this could be an important adaptive aspect of differentiation, because applying discrete labels allows someone to identify the "stimulus event they believe caused the emotion."

Many others in the field have also cited attributional clarity as a possible mechanism for the adaptive benefits of NED (e.g., Erbas et al., 2014; Erbas et al., 2016; Cameron et al., 2013; Kashdan et al., 2015; Mankus et al., 2016; Boden et al., 2015). It logically connects with the three mechanisms discussed above as well. For example, to practice ER strategies that are often cited as adaptive, one must have some idea about the cause of an emotion. For cognitive reappraisal, there must be a situation to appraise in the first place. For acceptance, there must be something to accept. This is true in even less frequently studied means of coping with emotions, such as humor (what to joke about?) and seeking social support (what to ask for help with?).

Rumination, as discussed previously, can be conceptualized as a behavior intended to "figure out" one's experiences. If this is accurate, more *information* about the emotional situation could interrupt this process. Finally, depressive overgeneralizing is, by definition, an inability to attribute a negative emotion to a limited, specific cause and instead considering all the possible sources of the emotion to be implicated.

Attributional Clarity and Models of Affect

In affective science, multiple models of emotion also support the idea that attributional clarity is a key component of precise emotion labeling. For example, Schwarz and Clore, originators of the Affect-as-Information model of emotions, have argued (2003) that a specific emotion word will carry with it, by definition, an attributional story: "whereas we are 'in' a bad mood, we are angry 'about' something in particular." In contrast, undifferentiated affective states are more likely to result in ambiguity about the causes of emotion (Clore & Huntsinger, 2007).

A seminal paper for this model (Schwarz and Clore, 1983) investigated how affect and attributions about the causes of mood, or lack thereof, can impact judgments of personal well-being. In two studies, participants with greater negative mood (because of a lab induction or, memorably, because of rainy weather) reported less happiness and satisfaction with their lives on the whole compared with individuals in neutral or positive moods. However, this effect disappeared when participants were primed to attribute their negative affect to either the lab room in which they were being tested or to the bad weather. This effect was seen whether the attribution was suggested implicitly (e.g., the experimenter asking, "How's the weather today?") or explicitly (e.g., the study being described as an examination of the effects of weather on mood). These findings suggested that individuals tend to use their affective state as information

when asked to make subsequent judgements or evaluations, unless they become aware that the source of the mood may be an irrelevant situational factor (e.g., the room, the weather).

Most models of affect share the principle that one function of emotions and their associated impulses is to encourage adaptive behavior (Izard, 2009). Emotions rapidly provide information about the environment as it relates to the interests of the individual, to many systems in a coordinated way. This information supports action preparation and readiness to respond effectively. This principle also suggests that specific labels which provide more information (i.e., about the environmental source or cause) should support better functioning.

Finally, Russell's (2003) description of the widely accepted psychological constructionist model of emotions also provides a lense for understanding NED and attributional clarity. In this model, the dimensions of valence and arousal are represented as "core affect." Core affect is the general affective "tone" of each moment in this dimensional space, which is generated by a variety of biological factors (e.g., hormonal, digestive) and unconscious cognitive processes (e.g., related to the experiences of the day so far). A low differentiator in this model might be someone who attends only to core affect (consistent with Barrett's early description of low differentiators as individuals for whom a *dimensional* model of affect is most appropriate). The concept of a current emotion would then necessarily remain somewhat vague and diffuse.

Next, the constructionist model explicitly includes the necessity of an *attribution* – an idea about the source of an emotion – to produce the "object-directedness" of an emotion experience. That is, to have an emotion that is "about" something, as Schwarz and Clore also described. Only then can any other appraisal processes begin. This would include cognitive reappraisal as an ER strategy, but also appraisals about the nature of the situation such as who to blame (guilt or anger?), or how much control is possible (determination or grief?).

Ultimately, the subjective experience of an emotion fully crystalizes when the individual *observes* that these processes are taking place and notices a match between these components and some cultural and linguistic construct of emotion, with all the conceptual knowledge and schemas that entails. This would include the conceptual information that Feldman Barrett described as "access to the behavioral repertoire to cope."

In conclusion, many models of emotion explicitly connect attributional clarity to emotion labeling, and attributional clarity is implicitly involved in all the previously discussed proposed mechanisms for NED. Early descriptions of differentiation also incorporated the concept. This important fourth mechanism requires further examination in NED research.

Inadequate Exploration in the Literature

Despite these theoretical considerations and frequent mention of the possibility of attributional clarity as a mechanism for the adaptive benefits of NED, there have only been a few studies that have attempted to establish empirical support for this relationship, and the measures used have limited value. In two studies (Boden et al., 2015; Mankus et al., 2016), greater NED was found to be positively associated with self-reported dispositional source knowledge when measured with a six-item Source Awareness Scale (e.g., "I often have to think for a while to figure out what made me sad, angry, or scared"). However, the use of a dispositional self-report measure is a limitation because, as discussed previously, research suggests that when asked retrospective questions about emotion experience, people employ a different kind of processing than they do when answering about the current moment, incorporating their own expectations, self-schemas, and stereotypes (e.g., Robinson & Clore, 2002).

In an unpublished study by the author (2019) aiming to fill this gap in the literature, source knowledge was evaluated in the moment with Likert scale ratings of participants'

agreement with the statement "I think I know what caused me to feel the way I do right now," which was presented after mood ratings. However, no association with NED was observed. Again, the measurement method limits the extent to which we can draw confident conclusions, because it was a single exploratory item.

Aside from the difficulties with measuring attributional clarity, there are also reasons why the current methods of capturing NED may also be missing the links between the two constructs. One problem is that ICC-based indices of differentiation do not provide information about which specific emotion labels participants use, but only the degree of consistent covariation among the labels. According to all of the affective theories discussed above, the precision and specificity of the chosen emotion label itself is the important component when considering attributional clarity. Historically, covariation has been considered an adequate approximation for this specificity, and Feldman Barrett's "co-occurrence index" is the basis for almost all differentiation measurement to date. Individuals who rate many emotion words similarly in a consistent way over time are presumed to be failing to settle on distinct labels to describe different experiences. While this is reasonable, it may be necessary to observe more closely the specificity of each emotion word chosen to explore the role of attributional clarity. Just as Schwarz and Clore observed in their early model of affect as information, the particular feeling word we use can determine whether our emotion is "about something" or not. This aspect of differentiation has not been assessed in any studies to date.

Chapter III Summary

In summary, we have seen that NED has been found to exhibit associations with many adaptive features of experience in both everyday life and in clinical symptoms and diagnoses. While these findings have been largely correlational, theoretical mechanisms have been proposed

and tested which are suggestive of reasons that NED could drive these associations in a causal way. Improved emotion regulation ability is the most commonly proposed mechanism, however mixed methodologies (e.g., collapsed indices of many types, in the moment vs. retrospective reporting) have produced mixed results. Rumination and overgeneralizing have also been tested as possible mechanisms, with limited but promising findings. Finally, an important fourth mechanism which is thought to be closely connected to the theoretical conceptualization of differentiation and to relate to the other three mechanisms mentioned is attributional clarity. This idea has a strong basis in both the overall model of how NED works and in emotion models from affective science. However, this link has not been thoroughly evaluated, in part because of limited methods for assessing attributional clarity, and in part because current approaches to measuring NED do not directly assess the important feature of the precision of specific emotion labels. The next section will explore in further detail these last concerns related to what an ICC measure may be overlooking regarding NED, and even what it may inadvertently misrepresent.

CHAPTER IV: MEASURING NED

The method for assessing NED has remained largely unchanged since the earliest studies (with a few exceptions, which are described in this paper). This section will examine current common practices, methodological and statistical concerns, and future recommendations.

Overview of Common Practice

As discussed, to derive an index of emotion differentiation, researchers typically have participants rate the extent to which they are feeling each of a set of negative emotion words (or positive words for PED), at multiple time points. At each time point, multiple labels may be endorsed by the person, and to different degrees (e.g., rating "angry" as 4 – "quite a bit", and "afraid" as 1 – "very slightly or not at all" on the Positive and Negative Affect Scale, Watson & Clark, 1994) to describe how they are currently feeling. The ICC is then calculated and reversed for ease of interpretation.

The emotion ratings are usually obtained by ESM (e.g., daily diary designs or multiple prompted ratings each day) in which participants report on their current feelings in their ordinary environments. Some studies have induced a series of emotions in the lab using vignettes (Boden et al., 2013; Cameron et al., 2013), personal writing (Fogarty et al, 2015), film clips (Erbas et al., 2015), or photographs (Israelashvili et al., 2019), and used participants' ratings after these exercises to calculate NED.

One benefit of the ratings-to-ICC method is that it is essentially a behavioral measure, derived from observations about how participants choose to label their feelings in different contexts or in response to different prompts. This approach is less susceptible to social desirability biases and lack of self-insight than an approach that relied on individuals' self-ratings of their usual emotion labeling behavior. Despite this strength, there are several concerns

to mention. The following sections will discuss the problematic potential for including confounds, the difficulties of capturing within-person variation, and the lack of ecologically valid ways to detect differences in participants' naturalistic language choices.

Statistical Concerns: Confounds with the ICC

The use of specific (rather than vague or diffuse) emotion labels is a key part of the construct of NED. However, this is not directly assessed with the ratings-to-ICC method, but rather inferred from the consistency of covariation between ratings of multiple emotion words. There are at least three ways that the ICC is vulnerable to confounds that do not represent the use of specific emotion labels: 1) inadvertently capturing overall variability only, 2) the presence of meta-emotions, and 3) the tendency to use one word at a time to label emotion states.

Emotion Variability

The first potential confound is affect variability, or the tendency for one's emotions to generally rise and fall in time rather than remaining stable. Brose et al. (2015) demonstrated that variability can impact other indices of emotion complexity in a confounding way if not accounted for statistically. Variability can be operationalized either as the standard deviation of emotion ratings (usually separately for positive and negative affect), or simply as the proportion of emotion words whose ratings vary over the course of a study (Grühn et al., 2013). Grühn and colleagues (2013) found that whether measured using the standard deviation or by counting the number of words whose ratings varied across both valences, low variability predicted high NED.

These findings raise the question of whether high differentiators in other studies consist of more people with low overall emotion variability, and thus less opportunity for emotions to consistently covary (since they vary less altogether). If so, this opens the possibility of an alternate explanation for the observed correlations between differentiation and clinically relevant

variables. For example, emotional variability was found to be higher in a sample of women with major depressive disorder, social anxiety disorder, or both, compared with healthy controls (Thompson et al., 2017).

Meta-Emotions

Another affective process that may be inadvertently captured by the ICC is meta-emotion. When the experience of one emotion is the object or trigger of another emotion, the latter is called a *meta-emotion*, or secondary emotion. An example would be feeling happy about something bad happening to another person, and then feeling guilty about your own happiness. In the first study to examine meta-emotions at a momentary level, out of 79 adults trained to report on meta-emotions in daily life (by completing the sentence "I feel ____ about feeling ____" during experience sampling), approximately 53 percent reported experiencing meta-emotions at the time of the prompt over the course of one week (Haradhvala et al., 2016). Overall, the participants reported meta-emotion experiences about twice a week on average, and the most common valence combination was negative feelings (most commonly "guilty" and "sad") about other negative feelings.

In the study mentioned above, frequency of meta-emotions positively predicted depression severity, and of the four possible valence combinations, this correlation was driven primarily by negative-negative meta-emotions. These findings are in line with previous research suggesting that depressed individuals experience more critical judgments about their own negative emotions (e.g., Gratz & Roemer, 2004), and feel more embarrassment, shame, and guilt about them (Leahy, 2002). At the trait level, self-reported non-acceptance of negative emotion has also been found to associate with the tendency to misuse substances (i.e., drinking alcohol to cope with difficulties) (Shaver et al., 2013). Similarly, anxiety sensitivity, or the tendency to feel

anxious about feeling anxious, could also be thought of as a negative-negative meta-emotional process, and has been associated most robustly to anxiety-related psychopathology such as panic disorder (McNally, 2002), but also to borderline personality disorder (Gratz et al., 2008), suicidality (Capron et al., 2012), and disordered eating (Anestis et al., 2008). It is also conceivable that negative urgency, or the tendency to behave impulsively to escape negative emotion experiences, which was found to mediate the relationship between NED and alcohol use problems in one study (Emery et al., 2014), could be related to strong secondary reactions to negative affect.

Because the ratings-to-ICC method of measuring emotion differentiation cannot distinguish between meta-emotions and those with more situational causes, a high frequency of negative-negative meta-emotion experiences could directly reduce differentiation scores. That is, if guilt, shame, or anxiety tend to reliably accompany other negative states like anger or sadness for some individuals, the consistency of covariation between negative emotion labels will be high. In this case, a low differentiation score would not necessarily reflect a focus on valence or an inability to generate specific rather than vague labels for emotions, but beliefs about one's own negative emotions that tend to generate negative-negative meta-emotions.

If this were the case, meta-emotions could partially account for associations between low NED and various maladaptive psychological outcomes. For this reason, the presence of negative meta-emotions as a confound with the ICC measure of NED should be considered a significant threat to validity.

Single Word Selection

Nook and colleagues (2018) note that one can achieve a high emotion differentiation score when using an ICC-based index by reporting only a single emotion at a time. This pattern

of single word selection was common among the youngest participants in that study, which examined children ages 5-15 years old (this was the only identified study of NED in children). In some cases, this could be consistent with the concept of emotion differentiation as the distinct use of specific labels; a participant could report only singly occurring emotions, using a variety of emotion words in discrete ways. But this is not necessarily the case. They could also exhibit a low degree of consistent covariation across terms by simply using the same emotion word repeatedly but always alone (e.g., always feeling either sad or not sad, but never angry or nervous). This second emotion labeling pattern would not seem to represent emotion differentiation conceptually but could result in a high NED score.

Methodological Concerns: Missing in Action

Aside from the three constructs discussed above that may be included in the ICC in a confounding way, there are also two features of interest that are notably missing from the ratings-to-ICC method of calculating NED. First, as introduced in Chapter II, the ICC cannot be used to measure NED as a state rather than a trait variable. Second, the scales that are used for obtaining emotion ratings exclude the observation of respondents' everyday use of emotion labels in their own words.

Momentary Fluctuations

As discussed previously, considering NED as a trait variable limits the ability to capture established within-person variability. This poses another difficulty in testing proposed mechanisms because NED may also operate at a momentary level by providing needed affective information about a specific situation at the time when an emotion label is applied. If so, attempts to identify the effects of NED on processes like ER will be limited unless NED can be assessed at that specific time point.

Other researchers have noted this need to develop an appropriate momentary measure of NED. Tomko and colleagues (2015) attempted to address this concern by developing an "occasion-level" NED index, calculated similarly to the trait-level statistic typically used, but separately for each person at each observation. Rather than indicating the degree of consistent covariation between negative emotion ratings over time, their momentary ICC indicated the degree of co-variance between items within subscales (e.g., hostility items with other hostility items) over all three subscales used (fear, hostility, and sadness). In their interpretation of this index, high occasion-level ICCs indicated high momentary differentiation (in contrast with the usual practice of reversing the ICC). For example, someone who is certain they are feeling fear and not sad or hostile in a particular moment would select similar ratings for all the fear items and very different ratings for the items within the other two subscales. Low occasion-level ICCs (indicating that a participant selected high ratings for some hostility items but not others and provided similarly mixed ratings for the other subscales) were interpreted to suggest low momentary differentiation.

It is unclear whether this interpretation corresponds to what the authors describe as their conceptual definition of differentiation. They describe low differentiation in a way that is consistent with the related literature and with our working definition from Chapter II, as "experiencing general feelings of negativity or positivity, rather than discrete emotions (e.g., feeling sad, angry, or anxious)". However, someone who has a very granular conception of how they are currently feeling even beyond the overarching categories of fear, hostility, and sadness (e.g., feeling very irritated but not at all hostile, feeling very worried but not at all nervous), would actually receive a lower ICC using this method, implying less momentary differentiation. Interpreting the index in the opposite way (with high ICCs indicating *low* differentiation) does

not resolve the problem either. Someone receiving a high ICC may indeed be differentiating strongly between fear, hostility, and sadness, but not between more specific states like "nervous" and "irritable". Thus, it would make little sense to label this an instance of low differentiation. It appears that when interpreting this occasion-level calculation, a high ICC conceptually corresponds with something like a moderate degree of differentiation, and a low ICC indicates high differentiation, the opposite of the authors' proposal.

Future research may investigate if there are ways to adapt this innovation to create an index using only momentary emotion ratings that avoids these pitfalls and more closely captures the desired construct of occasion-level or situational differentiation. However, it will also be difficult to rule out the simple presence of mixed emotions at this level of analysis (whereas at the trait level, mixed emotions only contribute to a lower differentiation score if they consistently covary across time).

Erbas and colleagues (2021) recently attempted to examine momentary NED in a different way, by testing a novel statistic derived from the ICC, calculated at each time point rather than as an overall person level variable. The index they developed signifies the difference between the current degree of distinction a participant is making between emotions and their overall trait-like differentiation level. In two studies of undergraduates, this measure of momentary NED was associated with lower rumination and stress, and better average mood. This is a promising step toward statistically accounting for within-person variation.

However, as the authors of the paper explain, because the index indicates *relative* changes (increases or decreases from each individual's overall level), it is not best practice to use it as a predictor for absolute differences in other variables. For example, a researcher could only test whether an individual using more differentiation than they usually do is also ruminating less

than usual. Perhaps more importantly, the statistical method still has the potential to be invalidated by the same confounds discussed for the traditional ICC index.

Naturalistic Language

The use of emotion rating scales to determine differentiation limits the ability to generalize results to everyday labeling processes with whatever naturalistic language participants would use if unprompted. At least one study has shown that individuals use different emotion words, and different numbers of words, to express their feelings when using rating scales than they do when allowed to generate responses freely (Fitness & Fletcher, 1990). This raises the concern that the presentation of the items themselves may alter the very behavior of interest.

Additionally, many rating scales were developed with theoretical concerns as the central priority. For example, the PANAS-x (Watson & Clark, 1994) was constructed to reflect a hierarchical model of emotions, with the two basic factors of positive affect and negative affect divisible into content-based subscales (e.g., fear, sadness, hostility). A representative selection of feeling words evenly "fills in" this template of affect. The Profile of Mood States (POMS, McNair et al., 1971) yields a "Total Mood Disruption" score for clinical use, based on stable factors such as Depression-Dejection, Tension-Anxiety, and Confusion-Bewilderment. In other words, these scales are meant to capture particular affective constructs of interest but were not designed to simply capture how respondents naturally name their own emotions.

Qualitative studies of emotion have instead examined emotion words produced spontaneously to open-ended prompts. In a study of workers facing an employment transition, requests for comments about the event generally were then coded for emotion words used (Mossholder et al., 1995). In a study of athletes' emotion experiences during sports events, participant interviews were coded for emotion words which were then extracted to create a list of

the idiosyncratic labels used (Hanin, 2003). The emotion words participants choose has been shown to vary by gender in families (Fivush et al., 2000) and by SES among children (Hoang & Grégoire, 2021).

Free-form responses such as these can be examined using well-established qualitative methods. The most common approach to studying qualitative data is "content analysis"; that is, reading the material and applying tags or codes to note certain themes or other features of interest (Renz et al., 2018). Qualitative analysis can also be "summative" (Hsieh & Shannon, 2005), which involves counting instances of some target and sometimes comparing frequencies of various cases to facilitate interpretation. Also, when using content analysis to review the data and code for themes, two styles are possible – "template coding" and "open coding" (Glasser & Strauss, 1967). Template coding is also called "*a priori* coding," and in this approach, codes are determined in advance and are drawn from theory and the previous literature. Then they are applied to the text in a top-down fashion by multiple raters in order to analyze the body of text. In open coding (also called "grounded coding"), the qualitative data is reviewed without any predetermined coding scheme, and emerging themes are noted. These themes are then considered in context and used to develop an "explanatory concept" that helps make sense of what has been observed, in a bottom-up fashion. These two approaches can also be used together.

Overall, while emotion rating scales are useful for tracking changes in mood or other outcomes of interest, it is doubtful that these scores are an ecologically valid representation of natural labeling behavior. They are therefore not ideal for the purpose of assessing differentiation. Qualitative methods should be considered instead, and several well-established approaches to coding exist in the literature.

Chapter IV Summary

In sum, the current standard measure of NED involves collecting emotion ratings across occasions and calculating the reversed ICC. This index shows the level of covariation between same-valenced emotion words but may be confounded with emotion variability more generally, inadvertently categorizing individuals with fewer fluctuations in emotion states overall as high differentiators, without truly capturing information about their approach to labeling feelings. Importantly, the presence of negative-negative meta-emotions might also be statistically captured in an ICC based index, even though individuals with consistent experiences of meta-emotions could still exhibit precision and specificity when describing those states. This is concerning because meta-emotions have been linked to some of the same constructs which are of interest with regard to NED (e.g., depression symptoms). Additionally, using one emotion word at a time to describe feelings inflates the ICC-based NED score without necessarily demonstrating anything about how clearly an individual is distinguishing between negative states.

Finally, in addition to these statistical concerns, the ICC-based approach is methodologically unable to capture within-person momentary changes in NED, with the exception of two attempts to modify the statistic, each with their limitations. The ICC-based approach also uses rating scales that do not provide ecologically valid information about how respondents name their emotions in their own natural language. An alternative approach with the potential to resolve these issues is the qualitative analysis of free-form descriptions of emotion.

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CHAPTER V: OVERALL CONCLUSIONS AND NEW DIRECTIONS

To summarize, this review has examined important theoretical, empirical, statistical, and methodological ideas relevant to research on the topic of NED. A working definition based on early conceptualizations founded in affective science has been established. The core of the construct is the ability to represent emotion experiences with precise, specific labels, rather than describing emotion experiences in global terms with a focus on valence. Based on later research into additional features of differentiation, treating NED and PED separately and incorporating information about observed within-person variations was recommended.'

The next section reviewed the current literature on NED. Correlations with adaptive outcomes, as well as the mitigation of negative outcomes was described. The evidence for three proposed mechanisms (improved emotion regulation, reduced rumination, and reduced overgeneralizing) was discussed, as well as methodological issues that may contribute to mixed findings in this area (including inconsistent use of momentary versus self-report measures). Attributional clarity was introduced as an implicit but theoretically important fourth mechanism, which has been understudied in the literature, partly because of a lack of established measures.

Finally, the current ICC-based standard measure of NED was explored, a major strength being its use of behavioral rather than retrospective self-reported information. However, several concerns were raised. Possible confounds (overall emotion variability, meta-emotions, and single word usage), lack of adequate momentary assessment tools, and the exclusion of individuals' naturalistic use of language, are all issues that raise doubt about the appropriateness of an ICC-based index of NED.

Recommendations arising from this discussion are as follows (see Table 1 for a list and an evaluation of three studies from the following sections). First, alternative methods for

assessing NED should be explored. An ideal approach will a) retain the behavioral and observational quality of the ratings-to-ICC approach (rather than attempt a self-report approach as in Ottenstein, 2020), b) avoid the pitfalls of potential confounds with the ICC, c) incorporate ecologically valid information about natural language use for labeling feelings, and d) provide a way to capture momentary NED, accounting for within-person variation and allowing for an examination of situational effects of NED on other emotion processes. Second, relationships between NED and proposed mechanisms should be further clarified. Investigations should a) focus on the gap in the literature regarding momentary associations, b) include attributional clarity explicitly as an important potential driver of observed effects, and c) maintain methodological consistency across studies to reduce mixed findings (for example, measuring single emotion regulation strategies or using the same indices if they are combined).

A Qualitative Approach

The qualitative analysis of freely produced participant descriptions of their emotions is one promising approach that may help achieve the recommendations proposed above, by directly examining participants' language without rating scales or an ICC. Qualitative measurement of NED was suggested by Kashdan et al. (2015) and attempted recently by Ottenstein and Lischetzke (2019) and by Williams and Uliaszek (2021). The goal of the first paper (Ottenstein & Lischetzke, 2019) was to develop a novel "specificity index" of NED by coding open-ended descriptions of emotion. The second study (Williams & Uliaszek, 2021) aimed to code open-ended responses using a similar specificity index, and to also introduce a novel "nuance score" to capture levels of nuance or complexity in participant emotion labels.

Ottenstein and Lischetzke (2019) conducted two daily diary studies with German adults recruited through online groups and forums (with *n* of 115 and 209, respectively). Participants

were asked to list positive and negative events that had occurred during each day and then to "use adjectives to describe how you felt during this event." The adjectives participants provided in response to negative events were coded by two independent raters as either *specific* or *general*, with any rater disagreements resolved by discussion.

After coding, Ottenstein and Lischetzke calculated an individual's specificity index as the proportion of *specific* adjectives used over the entire study period. In the first study, the researchers also measured self-reported dispositional use of reappraisal and suppression at baseline, and daily surveys assessed for life satisfaction and pleasant versus unpleasant mood.

Their results showed that the specificity index was positively associated with daily life satisfaction and positive mood, but no relationship to self-reported dispositional reappraisal or suppression use was observed. In the second study, researchers added a day-level measure of reappraisal and suppression, but again no association was observed.

Williams and Uliaszek (2021) built upon Ottenstien and Lischetzke's method by attempting to utilize their specificity index in an English-speaking sample. Additionally, their study introduced an alternative coding scheme that they used to produce a "nuance score" for each participant. This investigation was part of a larger study of 121 undergratuates and 186 members of the public recruited from MTurk online marketplace. The study utilized an online mood induction paradigm in which participants were asked to recall an experience of social rejection, followed by an experience of personal failure, and to write about both how they remember feeling at the time and how they currently felt while describing the event. Therefore, each participant provided four responses – past and present emotion for social rejection and past and present emotion for personal failure. Emotion words were extracted from these responses (which could be of any length) using a predetermined list of possible emotion words derived

from a paper by Johnson-Laird and Oatley (1989). Then the first author manually searched for any additional emotion words that could be interpreted as variations of "bad" (e.g., awful, bad, horrible) or "feeling emotional" without a feeling word.

The specificity score attempted to replicate Ottenstein and Lischetzke's method, using the codes *specific* and *general.* The final score was a proportion of specific words used across the four responses. Rather than a binary code, the nuance score was created using a hierarchical coding system with three levels. A *level 1* code was equivalent to the *general* code in the specificity index. Words coded as *specific* in the specificity index could receive one of two codes for the nuance score: a *level 2* code indicated the use of a "basic" emotion (i.e., sad, fear, anger, or disgust) and a *level 3* code indicated the use of a more nuanced term within one of these basic families (e.g., frustrated, depressed). The scores for all participant emotion words were summed, then divided by the number of total emotion words provided across the four responses, yielding a nuance score. All coding was conducted by the first author, and 10% were also coded by a second coder to check for interrater consistency (ICCs were high).

The researchers measured three outcome variables at baseline using self-report: difficulties with emotion regulation, depression and anxiety symptoms, and borderline personality disorder (BPD) symptoms. Their results showed no association between specificity index or nuance score with any of the outcome variables except BPD symptoms, and this effect disappeared when controlling for negative emotion intensity. Additionally, the traditional ICC-based measure of NED was calculated, and this had no association with the qualitative indices.

One strength of both these recent studies is that the use of a qualitative coding system eliminated the concerns raised above regarding the confounds introduced by the ICC-based method and attempted to assess the core features of differentiation more directly. As with the

traditional ICC-based method, no self-report of differentiation was used, allowing conclusions to be drawn based on observations of participants' actual emotion labeling behavior. This circumvents a reliance on participants' insight and reporting accuracy. Additionally, these two studies were able to capture more naturalistic language than has previously been used.

The main limitation of both investigations is that neither were able to capture momentary or situational fluctuations in specificity or nuance, instead using a person level proportion-based score. Similarly, hypothesized mechanisms were only examined at the day level in one study (Ottenstein and Lischetzke's study 2). This largely restricted the researchers to only understand the constructs of interest as trait-like variables. Neither study was able to consider the role of attributional clarity, since by definition, all the emotion labels they elicited from participants were in response to a specific situation (for Ottenstein and Lischetzke, a "negative event" from the day, and for Williams and Uliaszek, the two mood induction prompts).

A few concerns can be raised about the methods used in the Williams and Uliaszek study. First, a mood induction using a computer at home may not be as representative of participants' natural emotion processes as an experience sampling approach. Relatedly, responses to only two very specific recall-based prompts (social rejection and personal failure) may not align with the majority of participant's everyday experiences. It is also a limitation that in-the-moment emotion labeling was collapsed together with retrospective reports of past emotion, though these two ratings may rely on different processes, and retrospective reporting introduces concerns about memory and bias, as has been discussed. These weaknesses make sense considering that this exploration was part of a larger study conceived with goals unrelated to differentiation research.

Another area that warrants attention is the coding methods used. A great deal of the process depended on only the first author's conception of the codes. Specifically, all the words

included outside the original list were hand-selected based on the first author's understanding of whether they were variations on the labels "bad" or "emotional." Arguably, these are the very words of the most interest when determining low differentiation, as they are clearly general and lack nuance. The list itself does not include "bad", "awful," "terrible," or "horrible," for instance.

Additionally, the only emotion words retained (other than the categories just mentioned) were those that existed on a predetermined list. While this is an improvement over rating scales in that participants were allowed to respond in their own words without being primed by a set of options, it still limits the ecological validity of the language examined, because the participants' own preferred terms could have been excluded and the range of responses restricted. The list is extensive (590 words) but is itself is created from an integration of three older collections of emotion words, and often sounds outdated and overly formal. It contains "ill-humoured," "merry," "rancorous," "doleful," "exultant," and many more proper, old-fashioned words. The corpus is also founded on basic emotion theory, and Johnson-Laird and Oatley removed words from the three older lists that could not be broken down into the five "basic emotions" (happiness, sadness, fear, anger, and disgust). The list of excluded words includes feeling "vulnerable," "stubborn," "weak," "alone," or "confused."

In conclusion, the studies discussed above have established the feasibility of analyzing free-form descriptions of emotion for differentiation, with some limitations. The remainder of this paper will describe the details of the present study, which aims to build on this foundation. The present study assesses for emotion differentiation in a qualitative way, while addressing the limitations described above and exploring additional factors as recommended in the previous section. Specifically, this study expands upon the attempt to capture naturalistic language and momentary emotion regulation. The additional theoretical mechanisms of rumination and

overgeneralizing are also considered. For the first time, attributional clarity is captured qualitatively, also at a momentary level. And importantly, this study incorporates a qualitative momentary assessment of differentiation for the first time.

CHAPTER VI: THE PRESENT STUDY

Introduction

The present study used an existing dataset from previously conducted research on emotion differentiation that used a two-week daily diary method. The dataset included an emotion rating scale for traditionally calculating NED as well as momentary measures of emotion regulation, brooding rumination, and depressive overgeneralizing. Person level depression (a primary outcome of interest) and rumination were also measured at baseline. Additionally, the dataset included participants' answers to open-ended prompts describing their momentary emotion experiences. These responses were qualitatively coded and analyzed for the first time as part of the present study. The study tackles the recommendations outlined earlier in the paper and addresses some of the limitations of the previous two studies that examined open-ended emotion descriptions (see Table 1 for a list).

Table 1. Recommendations and Evaluation of Three Qualitative Studies

Recommendation	Ottenstein & Lischetzke 2019	Williams & Uliaszek 2021	Present Study
Develop Alternate Methods of Assessment			
Behavioral/Observational	Yes	Yes	Yes
Avoid ICC Confounds	Yes	Yes	Yes
Naturalistic Language	Yes, allows any adjectives about event from the day	No, only words from list, computer-based vignette task	Yes, allows any words about current emotion experience
Momentary	No	No	Yes

Clarify Proposed Mechanisms			
Momentary Measures	Study 1: No Study 2: Yes, ER	No	Yes, ER, rumination, overgeneralizing, attributional clarity
Attributional Clarity	No	No	Yes
Methodological Consistency	No	N/A	N/A

The first open-ended prompt presented to participants was "Describe how you are feeling right now in a single word." The second prompt allowed for longer responses with the instruction "Describe how you are feeling right now in a few sentences." There was no word limit or other restrictions for this item. The phrasing of these prompts allows maximal choice in label selection, as it does not restrict participants to adjectives as in Ottenstein and Lischetzke's approach, instead permitting all word forms as well as multi-word descriptions of emotions. All feeling words from the first prompt were retained for subsequent coding, rather than excluding any words outside a predetermined list as in Williams and Uliaszek's study. This allowed for comparisons to be made between participant word choices and standard emotion word lists found in rating scales, quantifying the overall frequency of participants' use of slang or other non-standard emotion terms. This provides useful observational information about exactly what naturalistic labeling choices would not have been captured using established questionnaires. Additionally, the responses captured in the moment emotion reports during participants' everyday lives in their natural settings, rather than responses to an online vignette task. These methods therefore expand on the goal of using more ecologically valid language sources.

The present study also further develops the aim of capturing momentary ER. Similarly to Ottenstein and Lischetzke's second study, the use of suppression and reappraisal were assessed in the moment. Two additional emotion regulation strategies theoretically related to NED, acceptance and distraction, were also assessed.

The present study examined NED using a similar method to Ottenstein and Lischetzky, using a template coding approach to content analysis (Glasser & Strauss, 1967). The single-word responses to the first prompt, "Describe how you are feeling right now in a single word," were used for assessing differentiation. First, two trained raters coded all words as *positive, negative, neutral, physical* (e.g., "sleepy", "hungry"), or *other* (e.g., foreign language words, non-words). To measure only NED, the words coded as *negative* were retained for further coding. The same raters then categorized each negative emotion word as either *vague* (indicating less differentiation) or *specific* (indicating more differentiation). (Coding manuals and rater training materials can be seen in Appendix B, and coding examples in Appendix C).

One advantage of the present study over previous qualitative investigations is that the prompt captured current, rather than recalled emotion experiences. The approach used by Ottenstein and Lischetzke asked about an event earlier in the day, and Williams and Uliaszek collapsed current emotions with remembered emotions about a situation that could have occurred at any time in the past. The *vague* vs. *specific* codes were also treated individually as day-level variables rather than being converted into a proportion and used as a person-level index, making this study the first to use a qualitative measure of emotion differentiation that is examined at a situational level. This bridges a major gap in previous studies by accounting for evidence of within-person fluctuations rather than maintaining the implicit assumption that differentiation is a trait-like variable.

In addition to specificity of single-word labels, attributional clarity was coded in this study for the first time, using participant responses to the prompt "Describe how you are feeling right now in a few sentences." Raters were trained to identify whether and how participants expressed attributions (e.g., described the cause of their current feeling). Some responses were classified as reports of emotion states without any mention of the cause (e.g., "I just feel down") - *no attribution.* Others ascribed the emotion to some vague cause that cuts across time or domains (e.g., "I feel hopeless because nothing in life ever works out for me") – which was coded as a *generalized attribution.* The final category was for responses that identified a specific event or circumstance believed to have caused the emotion (e.g., "I feel frustrated because I have to work on the weekend again tomorrow") – *situational attribution*. Continuing the focus on NED, raters only coded responses from the same occasions that were retained for the *specific* vs. *vague* coding of single-word descriptions. Thus, occasions on which participants reported a positive emotion experience were not evaluated for specificity or attributional clarity.

For the multi-word responses, a combination of open coding and template coding was used to develop this procedure. First, a subset of the multi-word responses was reviewed by the author without any *a priori* hypotheses about their content. Rather than simply describing the emotion state further, many participants were observed to add information about the reason for their reported emotion when provided with the space to add extra details. This unexpected theme and the connection to the theoretically important construct of attributional clarity was noted. This observation was then used to develop the template codes that were applied by trained raters to describe the entire body of text.

Assessing this component provided information that is critical to the theoretical understanding of how differentiation works. An embedded attribution about the source of an

emotion is believed to be key to the possible adaptiveness of NED, but it has been difficult to capture individual differences in this construct using self-report and quantitative methods in the past. Additionally, until now, attributional clarity has never been successfully measured at a situational or momentary level, which is the time-scale at which it might be expected to function.

Finally, to allow for direct comparisons with the two previous qualitative studies of NED, and to determine if their effects are replicated in this sample, person-level variables were also calculated for specificity and attributional clarity, using a proportion across time for each participant. This also made it possible to compare the traditional ratings-to-ICC version of NED with the novel qualitative measure at the person level.

The study hypotheses were as follows. First, hypotheses regarding the qualitative specificity index of NED:

1. It was predicted that occasions with a negative emotion word coded as *vague* would be characterized by significantly greater momentary brooding rumination than occasions coded as *specific.*
2. It was also predicted that occasions with emotion words coded as *vague* would be accompanied by more momentary overgeneralizing than those coded *specific*.

Next, hypotheses regarding attributional clarity:

3. It was hypothesized that attribution code would significantly predict momentary brooding rumination, such that occasions when *no attribution* was endorsed would be characterized by the highest rumination and those with a *situational attribution* would be the lowest. *Generalized attribution* days were expected to fall in between.

4. Similarly, it was hypothesized that attribution code would significantly predict momentary overgeneralizing cognitions, with *no attribution* predicting the highest levels, *situational attribution* the lowest, with *generalized attribution* in between.

Hypotheses at the person level:

5. It was predicted that individuals who more frequently used *specific* negative emotion labels would exhibit fewer depression symptoms (mirroring the negative association between depression and traditionally measured emotion differentiation).
6. Similarly, it was predicted that frequency of *situational* attributions would be inversely associated with depression symptoms.

Planned exploratory questions:

1. Analyses were also planned to determine whether momentary emotion regulation strategy use (i.e., suppression, distractions, reappraisal, acceptance) would be differentially predicted by *specific* labels. Due to the contradictory nature of past findings, no *a priori* hypotheses were proposed regarding associations with emotion regulation strategy use.
2. Similarly, analyses were planned to evaluate whether any association existed between emotion regulation strategies and *situational* attributions.
3. Finally, an exploratory analysis was also planned at the person level to determine if a traditional ICC-based index of NED predicted greater use of specific emotion labels and situational attributions.

Method

Participants

Two hundred fifteen undergraduate students aged 18 or older were recruited from the research pool at the University of North Carolina at Greensboro (UNCG). The study was approved by the UNCG Institutional Review Board. Informed consent was obtained from each participant, and course credit was granted for participation. Of this initial pool, 24 (11%) were removed due to failure to complete the minimum number of surveys (5 of 14). The 5 survey minimum was chosen in an attempt to capture most of the data without including participants who did not complete enough responses to provide a representative sample of day-to-day variation over time. Additionally, of 2,314 surveys submitted, 14 (<1%) contained skipped items on critical daily measures and were removed, leaving 2,300 complete surveys for analysis. Even one skipped item was considered sufficient to warrant exclusion, since many of the daily measures were quite brief.

The final sample with complete data (N = 191) was 74% female, with an average age of 19 (SD = 2.63). The sample was racially diverse and representative of the larger student body, with 34% of students identifying as Caucasian/White, 32% as African-American/Black, 11% as Asian, 10% as Hispanic/Latino, and 1% as American Indian, and 0.5% as Middle Eastern. Additionally, 11% selected multiple races or "other".

Materials

Demographics Questionnaire

Participants completed a brief demographics survey at intake, which included items for age, gender, race/ethnicity, and GPA. See Appendix A for all survey items.

Anhedonic Depression (AD) Subscale of the Brief Mood and Anxiety Symptom Questionnaire (Mini-MASQ, Casillas & Clark, 2000)

The AD subscale of the Mini-MASQ consists of eight items related to low mood and reduced enjoyment and pleasure, symptoms which distinguish depression from anxiety alone. At intake, respondents were asked to rate the extent to which they have felt the way each item describes over the past week, on a scale from 1 (not at all) to 5 (extremely), and the ratings are summed to yield a total score. The subscale exhibited good internal validity in the present sample (alpha = 0.88).

Modified Ruminative Response Scale (RRS, Treynor et al., 2003)

This modified version of the RRS was developed by Treynor and colleagues by removing items on the original that directly overlapped with diagnostic symptoms of major depressive disorder. The Brooding and Pondering subscales (five items each) were then distinguished through principal components analysis and were found to show convergent and divergent validity with related measures. This measure was administered at intake, and slightly reworded items were also administered each day to ask about how much the participant has been engaging in ruminative thinking *today*. Scores from each subscale were then summed to yield a brooding score and a pondering score. Both subscales exhibited good internal validity in the current sample (with Cronbach's alpha of 0.89 and 0.86 for daily brooding and pondering, respectively).

Expanded Positive and Negative Affect Scale (PANAS-x; Watson & Clark, 1994)

Current mood was assessed daily using 41 items from the PANAS-x. All subscales belonging to the negative affect dimensions (sadness, fear, hostility, and guilt items) and the positive affect dimensions (joviality, self-assurance, serenity, and attentiveness items) were

included, but not subscales categorized as "other affect" (surprise, shyness, and fatigue items). These ratings were also used to calculate the negative emotion differentiation index.

Situational Version of the Brief COPE Inventory (Monzani et al., 2015)

Three of the four emotion regulation strategies of interest were assessed using their corresponding subscales from this measure: positive reframing (i.e., reappraisal), self-distraction (i.e., distraction), and acceptance. Each subscale contains two items. Respondents were asked to rate the extent to which they had just been engaging in the described behavior to cope with their current feelings, from a scale of 1 (I haven't been doing this at all) to 4 (I've been doing this a lot) (e.g., "I've been turning to work or other activities to take my mind off things" - distraction). The subscale ratings were then summed such that each strategy yielded one total score per day. Because the scale was originally developed to assess responses to a recent stressful situation, items were reworded slightly to assess responses to any current difficult emotions.

Emotion Regulation Questionnaire (ERQ; Gross & John, 2003)

The final emotion regulation strategy of interest (suppression) was assessed using items from the corresponding subscale of this 10-item measure. The two highest contributing items to the suppression subscale were used, as identified by two independent studies of the psychometric properties for this instrument in a U.S (Melka et al., 2011) and a German population (Wiltink et al., 2011). As with the Brief COPE strategies, the sum of these ratings was used as the total suppression score. For the purposes of the present study, the wording was changed to assess the extent to which the respondent is currently employing the strategy of suppression (instead of to what extent they usually do so). Finally, for continuity, the same response scale was used as in the Brief COPE, from 1 (I haven't been doing this at all) to 4 (I've been doing this a lot); for example, "Right now, I'm controlling my emotions by not expressing them".

Depressive Attributions Questionnaire (DAQ; Kleim et al., 2011)

The DAQ consists of 16 statements expressing negative overgeneralizations across life domains (e.g., “I think my life will never get better”, and “I can’t see anything positive in my life”), and the respondent is asked to rate how much they agree with each item on a scale ranging from 0 (not at all) to 4 (very strongly). This measure has been found to possess convergent and divergent validity with related measures. The four items with the highest factor loadings were used for the daily surveys, and the wording was adapted to focus on current experience. The total of all four ratings was summed to generate the participant’s daily overgeneralizing score. Though the scale was developed with multiple subscales in mind, factor analysis showed a single factor model to be the best fit, so the present study did not differentiate between subscales. The four daily items had good internal reliability in the current sample (alpha = 0.90).

Free-Response Mood Items

Participants were asked to type their free-form responses to two prompts. The first was a single-word item: “Describe how you are feeling right now in a single word.” Negative emotion word responses to this prompt were coded for labeling specificity (NED). The second was a multi-word item: “Describe how you are feeling right now in a few sentences.” Responses to this item (on “negative days” - occasions when a negative emotion word was provided to the first prompt) were coded for attributional clarity.

Procedures

Data Collection

First, participants visited a lecture hall on campus where they completed the intake measures on desktop computers through Qualtrics. After the intake visit, participants received emailed links to the daily surveys every evening at 5:00 pm for 14 days. The links expired at

midnight, ensuring that all surveys were completed at the end of the appropriate day. Within the surveys, participants were asked about their current mood using a standard scale (rating items from the PANAS-x in randomized order) as well as the two free-response mood items. Then they completed the emotion regulation items from the COPE and ERQ, rumination items from the RRS, and overgeneralization items from the DAQ.

Coding for Specificity and Attributional Clarity

Two trained undergraduate research assistants conducted qualitative coding (see Appendix B for the coding manual used by the research assistants, and Appendix C for coding examples). Single word responses were coded as *positive*, *negative*, *neutral*, *physical* (e.g., "sleepy", "hungry"), or *other* (e.g., foreign language words, non-words). Words coded as *negative* were then coded as either *vague* or *specific*. On days when negative emotion words were used, the corresponding multi-word responses were coded as either *no attribution*, *generalized attribution*, or *situational attribution* to describe the degree of attributional clarity indicated by the participant.

Disagreements between coders were resolved as follows. The author independently coded any items that yielded disagreements before viewing the others raters' codes. Disagreements were then resolved by discussion unless consensus could not be reached, in which case the author's code was used as a tie-breaker.

Cohen's Kappa was moderate and comparable to previous qualitative studies of NED (K=0.68 for specificity and K=0.63 for attributional clarity). Percent agreement was somewhat higher at 84% for specificity and 76% for attributional clarity. Current guidance suggests that both be taken into account when assessing interrater reliability, and that percent agreement is

more accurate than Kappa when coders are trained and engage in little guessing (McHugh, 2012) and when nominal rather than continuous ratings are used (Rau & Shih, 2021), as in this study.

Creating Person Level Proportion Variables

Proportions were calculated for specific labels, situational attributions, and generalized attributions, ranging from 0 (none of the days) to 1 (all of the days). Only participants who reported negative emotion words on at least three occasions were included, since a proportion would be difficult to interpret with fewer than three observations. Since some participants completed surveys on only or mostly positive emotion days, this reduced the sample size for person-level hypothesis testing to N=88 participants; however, this still allowed for 80% power to detect an effect size (R^2) of 0.3 or higher.

Results

All multilevel modeling analyses were conducted using the *lme4* and *lmetest* packages in RStudio statistical software. Level 1 variables (day level) were daily brooding rumination (RRS), overgeneralizing cognitions (DAQ), emotion regulation strategies (from the ERQ and the COPE inventory), and the specificity and attribution codes for participants' responses to mood items. Traditionally calculated negative emotion differentiation (NED), anhedonic depression (Mini-MASQ), and baseline brooding rumination (RRS) were level 2 (person level) variables. A step-by-step approach to model building was taken, following the suggestion of Robson and Pevalin (2016), to keep all models as parsimonious as possible and add levels of complexity only where required. For analyses that included day level variables, all ANOVA model comparisons revealed that allowing slopes to vary randomly did not improve model fit above and beyond allowing intercepts to vary, therefore random intercept models (not random coefficient models) were used for all day level analyses.

Descriptive Results

At the person level, depression scores in the sample had a mean of 21.72 (*SD* = 6.74) and varied across the range of the scale (i.e., scores from 8 to 39). This suggests that this sample of students was somewhat distressed on average, as 23 has been suggested as a cutoff score for clinically significant symptoms. Traditionally calculated NED was comparable to undergraduate samples in other studies, with a mean of 0.30 (*SD* = 0.28).

Means, standard deviations, and ICCs for day level variables (as well as reliabilities for those that are continuous rating scales) are presented in Table 2. The ICC indicates the proportion of the total variance associated with between-person differences and can be interpreted in the same way for categorical and continuous variables without transforming the data (DeLong & Lokhnygina, 2014). An ICC below 0.1 or 0.2 (Vajargah & Nikbakht, 2015) would suggest that analyses could be carried out using standard statistical approaches to examine variation between days only. ICCs for most variables were well above this cutoff, indicating that multilevel modeling was necessary to account for the clustering of observations by person. However, the ICC for attribution type was below the proposed cutoff (0.07), suggesting that nearly all the variance in attribution type was between days rather than between persons. To further investigate whether a general linear model would be appropriate for analyses involving attribution type, an ANOVA was conducted between two null models (with no predictors), the first assuming independence of day level observations (general linear model) and the second allowing intercepts to vary randomly between person (multilevel model). Results showed significant improvement in model fit when accounting for nesting between persons ($p = 0.02$), so multilevel models were used for day level analyses involving attribution type.

Table 2. Means, Standard Deviations, ICCs, and Reliabilities for Day Level Variables

	M	SD	ICC	α
RRS-brooding	7.52	3.57	.62	.89
DAQ	5.57	3.06	.71	.90
ERQ-suppression	7.59	3.31	.49	.84
COPE-distraction	7.54	3.23	.49	.76
COPE-reappraisal	8.32	3.17	.47	.86
COPE-acceptance	9.02	2.92	.45	.80
Specificity	.75	.44	.32	--
Attribution Type	1.87	.70	.07	--

Note. Continuous variables are above the divider, and categorical variables are below (in gray).

Table 3 reports the correlations between continuous day level variables. Values below the diagonal are between the aggregated variables (averaged across days) and indicate patterns at the person level only. Values above the diagonal represent the relationships between disaggregated variables (between days, within persons) and indicate patterns at the day level.

Table 3. Correlations Among Day Level Variables

	1	*2*	*3*	*4*	*5*	*6*
1. RRS-brooding		.41	.22	.18	.15	.16
2. DAQ	.74		.18	.10	.07	.09
3. ERQ-suppression	.54	.43		.45	.38	.35
4. COPE-distraction	.44	.27	.82		.47	.33

5. COPE-reappraisal	.24	.05	.64	.74		.51
6. COPE-acceptance	.23	.11	.57	.59	.71	

Note. Within person estimates are above the diagonal, and between person estimates are below.

Summative qualitative analysis was completed with the responses to the two open-ended emotion prompts to compare frequencies between codes (for a full list, see Table 4). Words were coded as *specific* (80.5%) more often than *vague* (19.5%), in proportions similar to those reported by Ottenstein and Lischetzke (2019). Multi-word responses contained an attribution of some kind 68.5% of the time, and *no attribution* 31.5% of the time. Of the attributions, 72.8% were *situational* (49.9% of all responses) and 27.2% were *generalized* (18.6% of all responses).

Table 4. Descriptive Results of Qualitative Data Codes

Code Type		
Valence	Percent of All Days	Percent of All Words
Positive	49.0	33.6
Negative	23.3	42.7
Neutral	11.3	16.4
Specificity	Percent of Negative Days	Percent of Negative Words
Specific	80.5	71.3
Vague	19.5	28.7
Attribution	Percent of Negative Days	Percent of Attributions
No Attribution	31.5	--
Situational Attribution	49.9	72.8

Generalized Attribution	18.6	27.2

Note. 16.4% of days (7.3% of words) contained a physical non-emotion word (e.g., hungry, sleepy) or an unreadable word (e.g., nonwords, foreign language words) and these were not coded for valence.

Hypothesis Testing

Days with negative emotion words were used for all the following multilevel analyses (day level *N*=533 surveys, person level *N*=191 participants). Sex was found to be significantly associated with specificity, with females using more specific labels than males ($\chi^2 = 23.5$, $p < 0.01$) and was therefore included as a covariate in all analyses. Daily negative emotion intensity (the sum of negative mood ratings on the PANAS-x) was also included, because it significantly predicted daily rumination ($\beta = 0.09$, $p < 0.01$) and overgeneralizing cognition ($\beta = 0.07$, $p < 0.01$), though it was not significantly associated with specificity or attribution type.

Specificity Hypotheses

Hypothesis 1 was that days with *vague* emotion labels would be accompanied by more brooding rumination than days with *specific* emotion labels. To test this, a dummy variable was created for specificity, with *vague* label days serving as the reference group (1 = specific label, 0 = vague label). This binary predictor variable was entered into the multilevel regression equation uncentered, such that a significant negative coefficient would be considered confirmation of the hypothesis, and the intercept (α) would represent the difference in means between the categories. Hypothesis 1 was not supported because the difference in daily brooding rumination between *vague* and *specific* emotion label days was not significant ($\beta = 0.17$, $p = 0.71$, $\alpha = 8.55$).

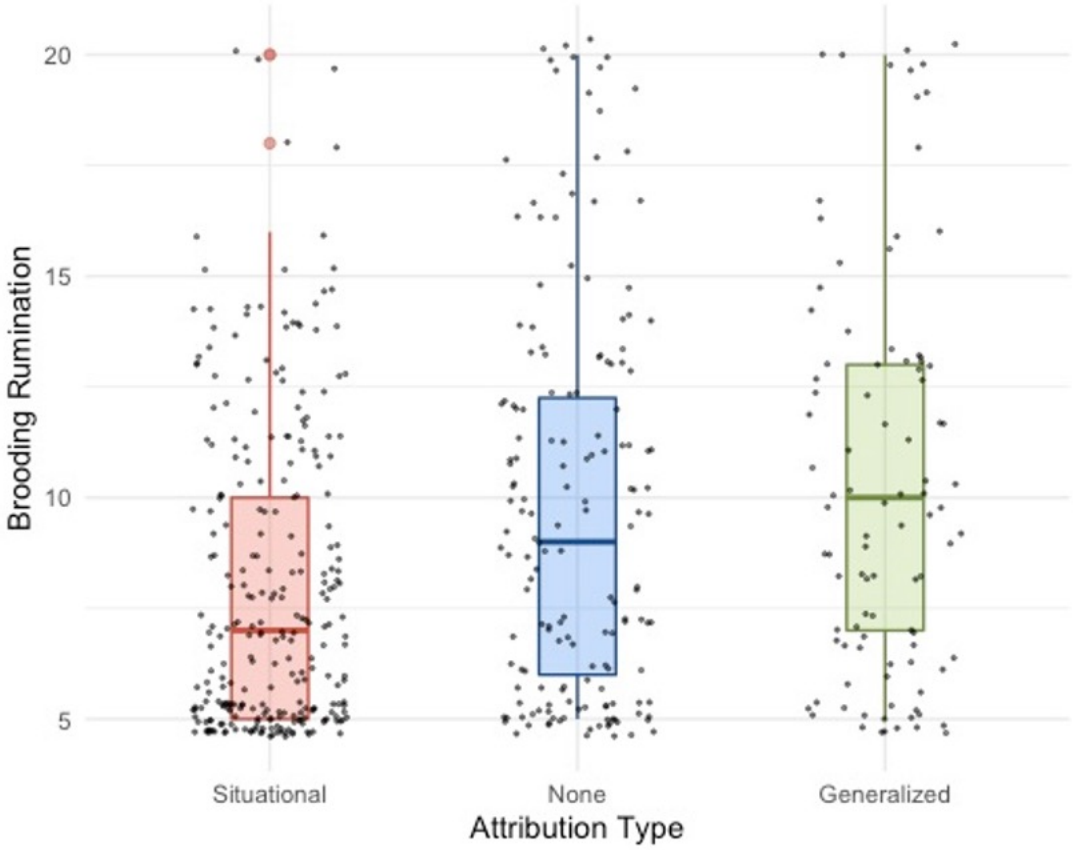
Hypothesis 2 was that days with *vague* emotion labels would be accompanied by more overgeneralizing cognition than days with *specific* emotion labels. A similar analysis to that

described above revealed that there was no significant difference in daily overgeneralizing cognition between vague and specific emotion label days (β = -0.26, p = 0.42, α = 6.98). Hypothesis 2 was therefore also unsupported.

Attributional Clarity Hypotheses

Hypothesis 3 was that the type of attributions participants used on negative days would predict how much brooding rumination they engaged in. Specifically, days with *situational attributions* were expected to be the days with the least rumination, and *no attribution* days were expected to have the most, with *generalized attributions* falling in between. Two dummy variables were created to represent the three categories, such that the intercept (α) would represent the mean of the reference group. In the first analysis, the *no attribution* days were the reference group. *Generalized attribution* days were shown to be significantly higher in brooding rumination than *no attribution* days (β = 1.02, p < 0.01, α = 4.46), and there was no significant difference between *situational attribution* days and *no attribution* days (β = 0.11, p = 0.71). An additional multilevel regression with the *generalized attribution* days as the reference group revealed significantly less rumination on *situational attribution* days than *generalized attribution* days (β = -0.91, p < 0.01, α = 5.48). Hypothesis 3 was therefore considered partially supported, with *situational attribution* days showing the least amount of rumination (as predicted) but *generalized attribution* days showing the greatest amount of rumination, rather than *no attribution* days (see Figure 1).

Figure 1. Attribution Type and Brooding Rumination

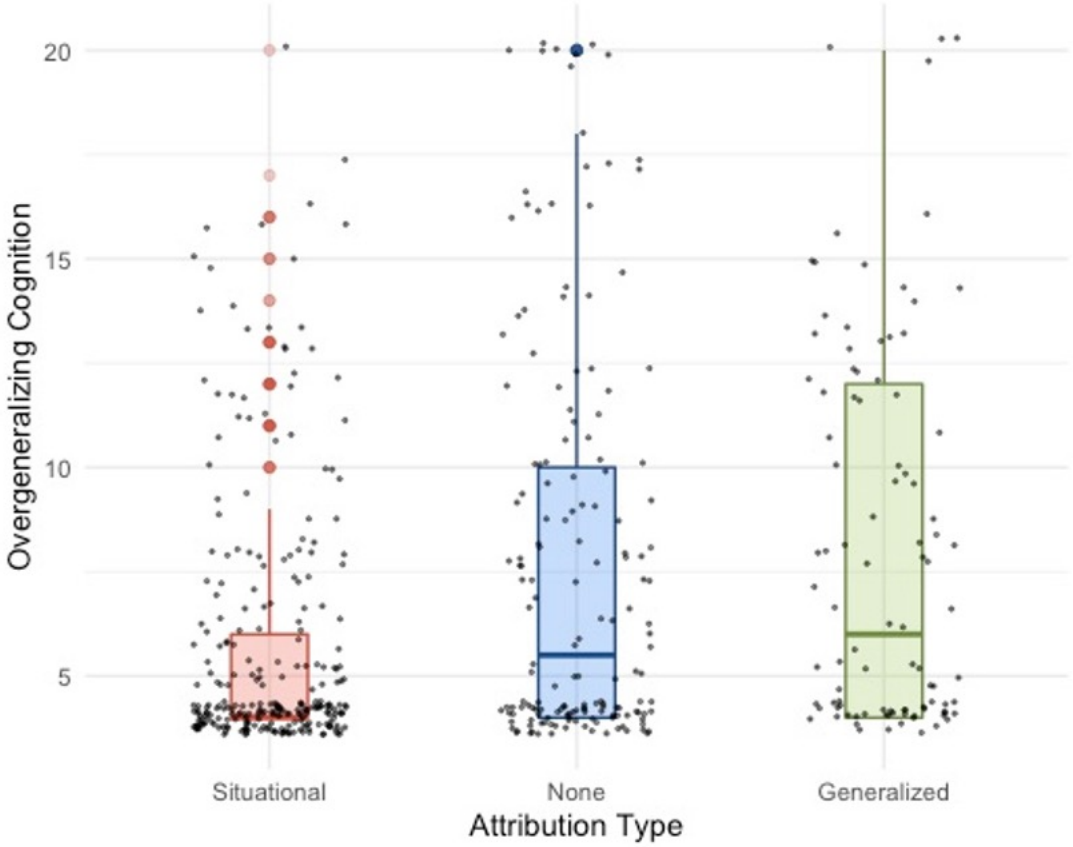


Note. Differences between *generalized* and *none* and between *generalized* and *situational* are significant.

Hypothesis 4 was identical to hypothesis 3, but with daily overgeneralizing cognitions as the outcome variable. In the first contrast with *no attribution* days as the reference group, *generalized attribution* days were shown to be higher in cognitive overgeneralizing than *no attribution* days at a trend level, but not to the level required for statistical significance ($\beta = 0.54$, $p = 0.07$, $\alpha = 3.47$), and there was no significant difference between *situational attribution* days and *no attribution* days ($\beta = -0.34$, $p = 0.17$). An additional regression with the *generalized attribution* days as the reference group revealed significantly less overgeneralizing on *situational attribution* days than on *generalized attribution* days ($\beta = -0.88$, $p < 0.01$, $\alpha = 4.01$). Hypothesis

4 was therefore also considered partially supported, with *situational attribution* days showing the least amount of rumination (as predicted) but *generalized attribution* days showing the greatest amount of rumination, rather than *no attribution* days (see Figure 2).

Figure 2. Attribution Type and Overgeneralizing Cognition



Note. Differences between *situational* and *generalized* are significant.

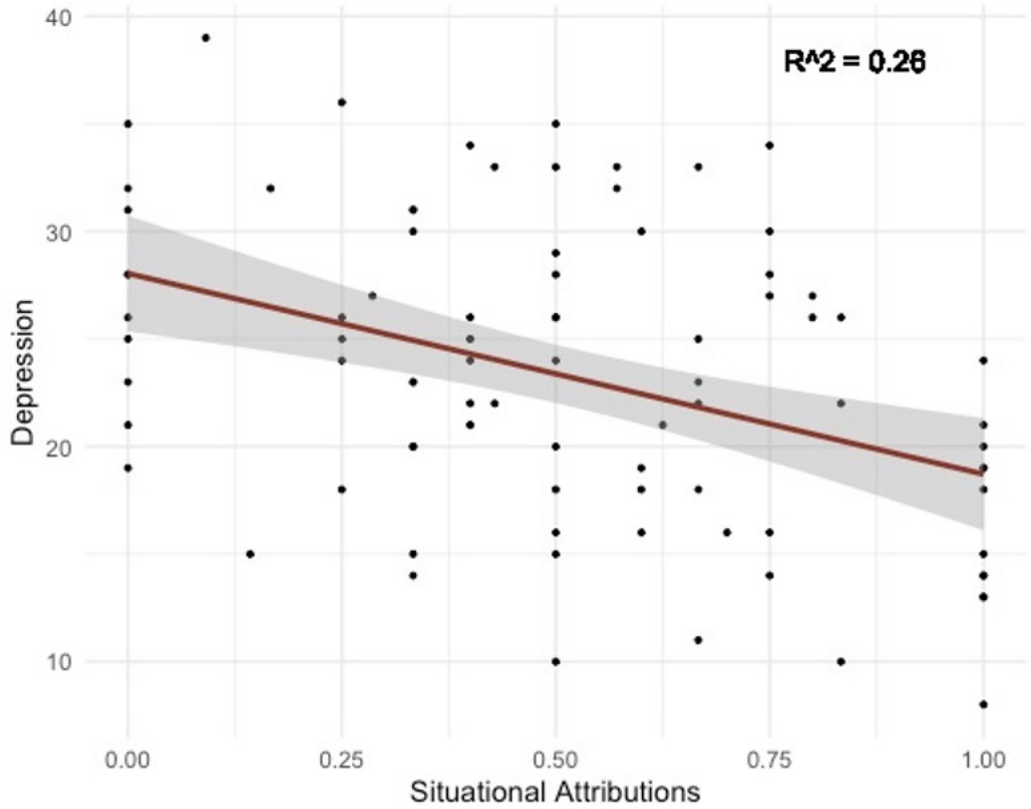
Person-Level Hypotheses

Hypothesis 5 was that individuals who used specific emotion labels a greater proportion of the time (on negative emotion days) would exhibit fewer depression symptoms. Hypothesis 6 was that using situational attributions a greater proportion of the time would also be inversely related to depression symptoms. Since generalized attributions predicted significant differences in rumination and overgeneralizing in day level analyses (Hypotheses 3 and 4), the proportion of

generalized attributions was also examined at the person level in connection with depression symptoms in an exploratory fashion.

No significant association was found between depression symptoms and the proportion of specific emotion labels (β = -0.80, p = 0.81), failing to support hypothesis 5. More frequent use of situational attributions did predict significantly fewer depression symptoms, and this relationship held when controlling for variation due to sex, baseline brooding rumination, and use of generalized attributions and specific labels (β = -6.39, p = 0.02), confirming hypothesis 6 (see Figure 3). Generalized attributions predicted significantly more depression symptoms when considered alone (β = 9.57, p < 0.01), but the relationship was no longer significant when controlling for the covariates listed above (β = 4.36, p = 0.26).

Figure 3. Proportion of Situational Attributions and Baseline Depression

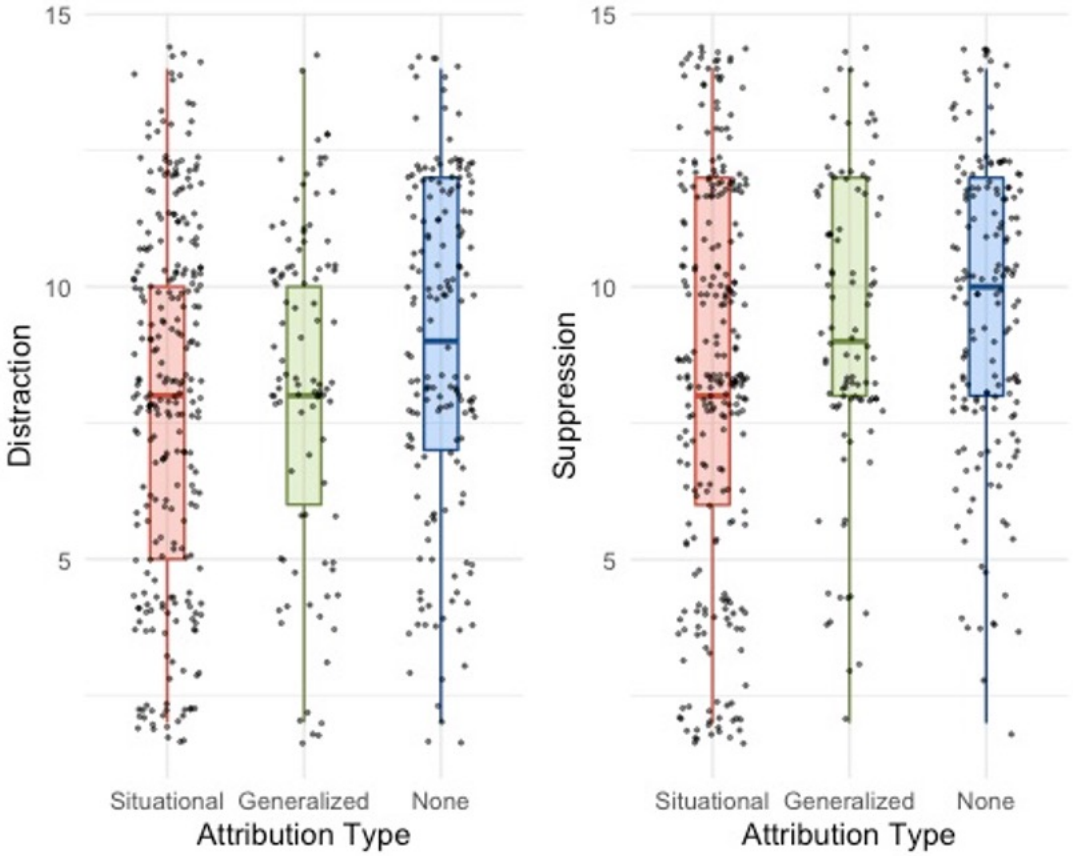


Exploratory Analyses

To investigate whether specificity predicted daily emotion regulation strategy selection (question 1), multilevel regression analyses similar to those described for the day level hypotheses above were tested. Specificity was not found to predict significant differences in the daily use of suppression ($\beta = 0.03$, $p = 0.93$), distraction ($\beta = -0.35$, $p = 0.32$), reappraisal ($\beta = 0.50$, $p = 0.14$), or acceptance strategies ($\beta = 0.59$, $p = 0.08$).

With regard to attribution type and emotion regulation (question 2), neither reappraisal nor acceptance were significantly different between days with situational, generalized, or no attributions. However, situational attributions did predict significantly less distraction ($\beta = -0.62$, $p = 0.03$) and suppression ($\beta = -0.59$, $p = 0.04$) than days with no attributions (see Figure 4). There were no significant differences in distraction or suppression between generalized and no attribution days. Overall, situational attributions predicted the least distraction and suppression, no attribution predicted the greatest, and generalized attributions fell in between.

Figure 4. Attribution Type and Maladaptive Emotion Regulation Strategies



Note. Differences between *situational* and *none* are significant.

Additionally, the relationship between the coded qualitative items and traditionally calculated NED was examined (question 3). NED was calculated as the reversed ICC (consistency version) between each participant's negative emotion ratings across days. Positive emotion ratings were not considered. Negative ICCs were assumed to be zero, following the recommendations of Searle and colleagues (2006) for interpreting negative variance components due to artifacts in estimation procedures. Analyses were also repeated with these participants' data removed, since some concerns have been raised regarding the interpretability of negative ICCs (Erbas et al., 2019), with no change in results. Traditionally calculated NED did not

significantly predict specificity ($\beta = 0.13$, $p = 0.11$), use of situational attributions ($\beta = 0.10$, $p = 0.13$), or use of generalized attributions ($\beta = 0.06$, $p = 0.54$). These models used proportion variables and general linear regression, as described for previous person level analyses.

Finally, an unplanned chi-square test for independence was conducted to determine whether attribution type varied significantly with the use of vague versus specific labels. The results showed no significant relationship ($\chi^2 = 2.95$, $p = 0.23$).

Overall Discussion

Emotion differentiation was first conceptualized (as the ability to label emotion experiences with precise, specific language) over two decades ago, with a basis in foundational theories of emotion (Feldman Barrett, 1998). Since that time NED has been consistently linked to adaptive outcomes (Thompson et al., 2021). This includes greater levels of well-being and mindfulness (e.g., Boden & Thompson, 2015) and fewer symptoms of psychopathology, especially depression (e.g., Demiralp et al., 2012; Starr et al., 2017; Willroth et al., 2020). There is even emerging evidence that higher NED can improve therapy response for depressed and anxious individuals (Lazarus & Fisher, 2021).

NED is theorized to function by improving ER, and this has been tested in several studies (e.g., Brown et al., 2021; O'Toole et al., 2014; Tong & Keng, 2017). However, the empirical evidence has been mixed, possibly due to important methodological differences between studies. A small but more consistent set of findings support the hypothesized mechanisms of reduced rumination (e.g., Starr et al., 2017) and overgeneralizing (e.g., Cameron et al., 2013). All three of these mechanisms are thought to be facilitated by attributional clarity. This concept has a strong theoretical basis in multiple models of affect (e.g., Izard, 2009; Russell, 2003; Schwarz & Clore,

2003), but the link between NED and attributional clarity has been rarely studied and only with a dispositional self-report measure (Boden et al., 2015; Mankus et al., 2016).

NED has been found to fluctuate within individuals in response to interventions (e.g., Mikkelsen et al., 2021; Van der Gucht et al., 2019) as well as day-to-day depending on stress levels (Erbas et al., 2018). However, the standard measurement (a reversed ICC) cannot provide information about in-the-moment fluctuations of NED. The ICC method also allows for potential confounds such as overall emotion variability (Grün et al., 2013), meta-emotions (Haradhvala 2016), and single label selection (Nook et al., 2018) to influence scores. It also cannot capture the natural language that individuals would ordinarily use to label their own emotions. Free-form emotion words have been shown to differ from individuals' selections on rating scales (Fitness & Fletcher 1990), and can also vary by gender (Fivush et al., 2000) and SES (Hoang & Grégoire, 2021). This casts doubt on the ecological validity of a ratings-to-ICC method of assessing NED.

To address these issues, the present paper proposed two main recommendations for NED research. First, it was recommended that researchers develop alternate methods of NED assessment. Ideal methods would be behavioral rather than self-report, avoid the potential confounds discussed, capture ecologically valid language use, and account for momentary variation in NED. Second, clarifying proposed mechanisms was recommended, by using momentary measures, in a consistent way across studies, and by assessing for the important process of attributional clarity.

This study addressed the first main set of recommendations by coding participants' free-form descriptions of their emotions in the moment. This built upon the two previous qualitative studies of NED to date (Ottenstein & Lischetzke, 2019; Williams & Uliaszek, 2021), and expanded upon them to account for momentary fluctuations and allow an even broader range of

naturalistic language. Regarding the second set of recommendations, this study measured three main proposed mechanisms (ER, rumination, overgeneralizing) in the moment. Further, this study assessed for momentary attributional clarity for the first time, using qualitative methods.

Findings

With regard to the novel method of assessing attributional clarity, participant attributions significantly predicted multiple variables of interest in the expected directions. On days when participants were able to attribute their negative emotion to a specific situation, they engaged in significantly less brooding rumination and overgeneralizing cognitions than on days when they used generalized attributions. Some of participants' emotion regulation strategies on negative emotion days varied depending on attributions as well, with significantly less distraction and suppression reported on days with situational attributions compared to days with no attribution. At the person level, individuals who used situational attributions more frequently on negative emotion days exhibited fewer depression symptoms, as predicted.

While all hypotheses about the function of situational attributions were confirmed, generalized attribution days and no attribution days did not always predict the outcome variable in the order expected. That is, generalized attributions predicted the most rumination and overgeneralizing, while no attribution days fell in the middle. Because of the study design, it cannot be ruled out that perhaps participants mentioning no attribution did not feel confused about the causes of their emotions, they simply did not provide them because they were not specifically requested.

Regarding ER, having no attribution predicted the greatest levels of distraction and suppression. This is in line with the idea that these forms of regulation, in contrast with acceptance and reappraisal, require no clear sense of what situation a negative emotion is related

to. However, no association was found between attribution type and reappraisal or acceptance strategies, failing to provide full support for this paradigm. There were also no associations between ER and specificity. This study therefore adds to the list of research that has *not* supported hypothesized links between ER and NED.

Importantly, none of the hypotheses related to emotion word specificity, the main qualitative measure of NED, were supported. Despite the attempt to better capture momentary fluctuations and naturalistic language, this is consistent with the previous two qualitative studies of NED, which did not find associations between specificity and ER (Ottenstein & Lischetzke, 2019) or between specificity and depressive symptoms or self-reported emotion regulation difficulties (Williams & Uliaszek, 2021). Though Ottenstein & Lischetzke (2019) did not measure depressive symptoms, they did find a direct association between their person-level specificity index and daily life satisfaction and positive mood. It is possible that their sample was more well-adapted than the present sample, since the average depression score among these undergraduates was higher than expected. However, NED has been theorized to potentially be even more impactful for individuals who experience higher frequencies of negative affect (Thompson et al., 2021), so the distress levels in our sample should not have been a hinderance to observing an effect.

In an unplanned test, it was shown that specificity also did not significantly predict attribution type, so even greater attributional clarity was not related to less vague emotion labels. One likely reason for this lack of associations between specificity and any other variables is that the construct was not adequately captured by the novel coding system. Possible reasons for this will be discussed in the strengths and limitations section.

Clinical Implications

On the whole, the present findings regarding situational attributions suggest that the process of assigning a specific cause to current emotions is of clinical importance, particularly in the treatment of depression. Depression scores were lower among participants who used situational attributions more frequently, and rumination and overgeneralizing cognitions, which are known to be hallmarks of depression, were also lower on situational attribution days. Therefore, it is possible that training individuals to generate situational attributions in response to difficult emotions could be a useful component of treatment.

This is consistent with treatment approaches such as Rumination Focused CBT for Depression (RF-CBT, Watkins, 2018), in which moving clients from vague to concrete thinking is one method used to reduce rumination. For example, when engaging in problem-solving, a client might be coached to define the problem in a concrete way (e.g., "My car needs to be repaired"), rather than vaguely (e.g., "I can't get anywhere I need to go"). Given the link between situational attributions and reduced rumination in this sample, it might be important to also clearly include emotion-related attributions in such a treatment approach. Outside of concrete problem-solving as in RF-CBT, emotions with deeper or more complex causes are of course also commonly explored in therapy of all types. As shown in the overall introduction to this paper, descriptions of participant emotions are elicited by therapists practicing from cognitive modalities (Beck, 1995) to psychodynamic approaches (Frederickson, 2016). The present findings about attributions underline the importance of exploring these feelings with an eye for identifying their specific causes whatever the scale.

It is also interesting that *no attribution* days predicted less rumination and overgeneralizing than *generalized attribution* days, contrary to expectations. It is possible that

having no attribution is protective against rumination and overgeneralizing if there is no clear situational attribution to focus on. For example, when experiencing anxiety in the absence of an obvious cause, it may be more adaptive to simply label the emotion and remain aware of it without attaching any particular explanation to the experience (e.g., "I'm feeling anxious, I just don't know why"). Searching for an explanation when one is not available may be problematic if it leads to generalizing to broad life domains (e.g., "I guess I'm anxious because everything is so stressful"). This is consistent with the many psychologically adaptive benefits of mindfulness (see Keng et al., 2011, for a review). Mindfulness has been conceptualized as the ability to be aware of and describe experiences without reactivity or judgement (Baer et al., 2006). Perhaps in the domain of attributions, mindful awareness of an emotion without evaluating or analyzing it further can be adaptive as well.

Strengths and Limitations

One main strength of the present study is the valuable qualitative information it yielded about participants' naturalistic momentary labeling of their own emotion states. It is notable that 87% of the words selected by participants to label their emotions (250 words) were not in the 60-item PANAS-x scale and thus would not have been captured by standard quantitative methods. In fact, 24 of the PANAS-x items were never used by any participants to describe their mood when provided with an open-ended format. However, the remaining 36 items were used by participants frequently, and all fall within the top 50 most commonly appearing words. This pattern can be summarized by observing that, first, participants were able to use a relatively small number of standard emotion labels (13% of words) to describe their emotions a sizable portion of the time (42% of days). However, more than half the time (58% of days), participants made use of many non-standard labels (87% of words) to describe their emotions, and these

would not have been captured using a common measure like the PANAS-x. These observations confirm the value of allowing participants to label their emotions in a qualitative format.

Second, this study was also the first to assess for momentary NED using qualitative methods. Qualitative measurement of NED was first recommended on theoretical grounds several years ago (Kashdan et al. 2015), and momentary assessment has been attempted on at least two occasions (Erbas et al., 2021; Tomko et al., 2015), with statistical limitations. The present method allows for naturalistic language to be examined qualitatively and also accounts for the within-person fluctuations of NED that have been observed by using a momentary appraoch. This allowed results to be free of any confounds related to the ICC and to be interpreted at the level of state, rather than only trait, differentiation. This is an important step in the field toward exploring possible alternate methods of assessing NED.

Limitations in the coding process may explain the lack of significant associations between specificity and other variables. Interrater reliability was adequate but not high, so it may be that additional work is still needed to consolidate the specificity construct. The goal was to adhere closely to the original definition of low differentiation provided by Feldman Barrett (1998), specifically, focusing on the quality of one's experience only along the single dimension of valence (feeling good or bad to varying degrees of intensity). When participants used labels showing only valence (e.g., "bad," "horrible," "blah," "not well"*)*, these were coded as vague. When participants used labels that suggested additional information such as arousal (e.g., "angry," "agitated"), direction of responsibility (e.g., "betrayed," "guilty"), or level of certainty (e.g., "hopeless," "worried"), they were coded as specific.

However, it is possible that the binary structure used (as in Ottenstein & Lischetzke, 2019) is a limitation. A dichotomy may not accurately represent the nature of differentiation in

the moment if specificity is better considered as falling along a continuum. This could be particularly true of edge cases which fall very close to the boundary between *specific* and *vague*. For example, the words "sad" and "pissed" were categorized as specific based on the current coding system, because they both indicate arousal level (low and high, respectively). However, they provide little additional information on any other dimension, unlike a more complex word that seems to tell a complete story, like "jealous." It is possible that "barely specific" words like these did not function as would be expected for a differentiated label because they did not provide enough information to be helpful.

Another limitation of the specificity coding is related to the data collection method. Unlike Ottenstein and Lischetzke (2019), this study used a single word at each occasion for the specificity codes, while the multi-word responses were used to code for attributional clarity. This prevents our results from taking into account mixed emotions. A participant could conceivably be experiencing a high degree of clarity about several mixed emotions (e.g., feeling "angry," "hurt," and "overwhelmed"), but then use a less clear word in an attempt to combine the feelings into a single word response. For instance, "moody," "emotional," "mixed-up," and "everywhere," were coded as *vague*. Ottenstein and Lischetzke found that when permitted to select multiple adjectives, participants used an average of 2.6 words to describe their feelings about each recalled negative event. Future studies should not place a word limit on either prompt, or search the responses to the long-form prompt for additional emotion words, to allow participants to report on mixed emotions at the momentary level.

Finally, this study was the first to assess for attributional clarity using qualitative methods. This momentary variable exhibited significant associations with rumination, overgeneralizing, and baseline depression symptoms, demonstrating the importance of this

construct for future studies of clinically relevant emotion processes. It is striking that even though participants were never explicitly instructed to provide emotion attributions, they did so spontaneously 68.5% of the time, confirming the relevance of this process in participants' everyday lives and emotional well-being. This also validates the utility of open or "grounded" coding to uncover relevant themes in individuals' free-form responses. If the text had not been reviewed with an eye for theoretically important features aside from the *a priori* hypotheses, this aspect of the data would not have emerged.

Conclusions and Future Directions

Overall, this novel method of examining qualitative emotion labeling provided a way to capture of a variety of non-standard naturalistic language, account for within-person fluctuations, and observe participants' emotion attributions, an important variable often cited as a possible mechanism but rarely measured.

Significant findings regarding attributional clarity are promising and have important clinical implications. This construct should continue to be investigated by future researchers, and qualitative momentary approaches should be repeated to determine whether the present findings are replicable. In general, it is recommended that qualitative methods including open coding be more widely adopted in the domain of emotion research.

Challenges in coding for specificity, the construct most closely aligned with NED, still need to be addressed. Future studies may attempt to improve upon the system introduced here in various ways. One possibility is to add an intermediate code for "barely specific" words like "sad," which provide more information than only valence, but likely do not contribute as much to adaptive emotion processes as labels with additional complexity. Williams & Uliaszek (2021) attempted to incorporate more layers of detail by using a three-level nuance code. They did not

find significant associations to their variables of interest, but they limited participant responses and their method was person-level rather than momentary. Another way to improve the present system would be to allow multiple single-word responses to account for mixed emotions.

Regarding ER strategy selection, the continued findings of mixed results and partially supported hypotheses suggests that this model requires adjustment. Despite ER being the most cited mechanism for NED, the evidence for strategy use as an associated variable is weak. Future research should consider building upon initial steps by Kalokerinos and colleagues (2019) toward operationalizing other aspects of emotion regulation, such as effectiveness, rather than only putatively adaptive and maladaptive strategies. Using consistent methodologies to establish replicability will continue to be important for making results more intelligible.

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APPENDIX A: QUESTIONNAIRE ITEMS

Anhedonic Depression Subscale of Mini-MASQ (Casillas & Clark 2000)

Instructions: Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item and then select the number that best describes how much you have felt or experienced things this way during the past week, including today.

Response Scale: 1 (not at all), 2 (a little bit), 3 (moderately), 4 (quite a bit), 5 (extremely)

Number on full Mini-MASQ	**Item**
1 (reversed)	Felt really happy
5	Felt withdrawn from other people
9 (reversed)	Felt like I had a lot to look forward to
11	Felt like nothing was very enjoyable
15 (reversed)	Felt like I had a lot of interesting things to do
19 (reversed)	Felt really lively, "up"
23 (reversed)	Felt like I had a lot of energy
25 (reversed)	Felt like I was having a lot of fun

PANAS-x Items (Watson & Clark, 1994)

Instructions: This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then select an answer, indicating how much you are feeling this way right now.

Response Scale: 1 (very slightly or not at all), 2 (a little), 3 (moderately), 4 (quite a bit), 5 (extremely)

Items	**Subscale**
afraid, scared, frightened, nervous, jittery, shaky	Fear
sad, blue, downhearted, alone, lonely	Sadness
guilty, ashamed, blameworthy, angry at self, disgusted with self, dissatisfied with self	Guilt
angry, irritable, hostile, scornful, disgusted, loathing	Hostility
cheerful, happy, joyful, delighted, enthusiastic, excited, lively, energetic	Joviality
proud, strong, confident, bold, fearless, daring	Self-Assurance
alert, attentive, concentrating, determined	Attentiveness
calm, relaxed, at ease	Serenity

Emotion Regulation Items

Emotion Regulation Questionnaire (ERQ, Gross & John, 2003)

Situational Version of the Brief COPE Inventory (Monzani et al., 2015)

Instructions: The next set of items are statements that describe various strategies that people use to cope, or deal with their feelings. Please select the response that describes how much you have been using each strategy in response to the emotions you are feeling right now. If an item doesn't seem to apply to you, just select 0 (I haven't been doing this at all).

Response Scale: 0 (I haven't been doing this at all), 1, 2, 3 (I've been doing this a lot)

Original Item	**Reworded Item**	**Scale (subscale)**	**Factor Loading**
I control my emotions by not expressing them.	Right now, I'm controlling my emotions by not expressing them.	ERQ (Suppression)	0.72[1], 0.89[2]
I keep my emotions to myself.	I'm keeping my emotions to myself right now.		0.68[1], 0.70[2]
I've been trying to see it in a different light, to make it seem more positive.	I'm trying to see things in a different light, to make them seem more positive right now.	COPE (Positive Reframing)	0.77[3]

I've been looking for something good in what is happening.	Right now, I'm looking for something good in what is happening.		0.72[3]
I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	Right now, I'm doing things to think less about how I'm feeling, such as watching movies or TV, reading, daydreaming, sleeping, or shopping.	COPE (Self-Distraction)	0.82[3]
I've been turning to work or other activities to keep my mind off things.	Right now, I'm turning to work or other activities to keep my mind off how I'm feeling.		0.54[3]
I've been learning to live with it.	I'm learning to live with the emotions I'm having right now.	COPE (Acceptance)	0.80[3]
I've been accepting the reality of the fact that it has happened.	I'm accepting the reality of the way I feel right now.		0.55[3]

[1]From Melka et al., 2011

[2]From Wiltink et al., 2011

[3]From Monzani et al., 2015

Modified RRS (Treynor et al., 2003)

Instructions: The next questions are about some of the many things people may do or think about when they are feeling down or sad. Please select the answer that shows how much you've been doing each item today.

Response Scale: 0 (I haven't been doing this at all), 1, 2, 3 (I've been doing this a lot)

Number on Full RRS	**Item** (all verbs changed to the present continuous tense from the original)	**Subscale**
5	Thinking "What am I doing to deserve this?"	Brooding
10	Thinking "Why do I always react this way?"	
13	Thinking about a recent situation, wishing it had gone better	
15	Thinking "Why do I have problems other people don't have?"	
16	Thinking "Why can't I handle things better?"	
7	Analyzing recent events to try to understand why I'm feeling the way I am.	Reflection
11	Going away by myself to think about why I feel this way.	
12	Writing down what I am thinking and analyzing it.	
20	Analyzing my personality to try to understand why I'm feeling this way.	
21	Going someplace alone to think about my feelings.	

Depressive Attributions Questionnaire (DAQ) Items (Kleim et al., 2011)

Instructions: For this last set of items, please indicate how much you agree with each statement.

Response Scale: 0 (not at all), 1, 2, 3, 4 (very strongly)

Original Item	**Reworded Item**	**Factor Loading**
When bad things happen to me, I can't see anything positive in my life.	Right now, I can't see anything positive in my life.	0.87
When bad things happen to me, I think my life will never get better.	Right now, I think my life will never get better.	0.86
When bad things happen, nothing seems to be in place anymore.	Right now, I feel like nothing seems to be in place anymore.	0.82
When bad things happen to me, I am sure it will happen again.	I am sure that the bad things that have been happening to me will only happen again.	0.82

APPENDIX B: CODING MANUAL

Valence and Specificity Coding Instructions (Single Word Responses)

1. **Valence Codes** (does the word describe a positive, negative, or neutral feeling?)
   Examples:

   Positive: relaxed, hyped, motivated

   Negative: angry, isolated, awful

   Neutral: ok, fine, nothing

2. **Specificity Codes** (does the word just show valence, or does it give more information?)

   Vague

   Definition: Only describes feeling good vs. bad

   When to use this code: When the word only conveys valence (good/bad), and maybe intensity (e.g., terrible ~ very, very bad).

   When NOT to use: If the word gives more information than just valence – implies something about the situation or reason for the emotion (e.g., disappointed), something about arousal level (e.g., chill ~ relaxed), or other information.

   Examples: fine, good, bad, awful, okay, terrible, wonderful, great, rough, super

   Specific

   Definition: Describes a distinct emotional state, not just valence.

   When to use this code: When the response describes an emotion using either a standard English feeling word, a slang word, or metaphorical language that gives more information than just describing valence.

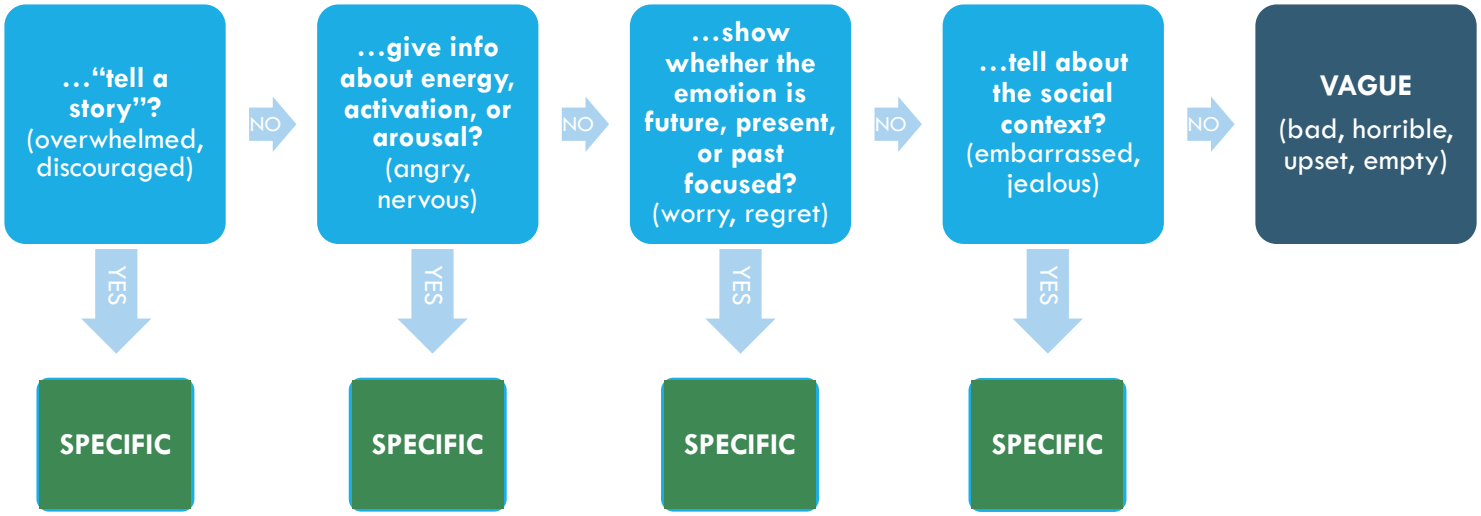
   When NOT to use: If the word is vague.

Examples: sad, angry, worried, nervous, overwhelmed, jealous, irritable, disappointed, guilty, lonely, pissed, hyped, stoked, crushed, abandoned, forgotten, betrayed

3. **Notes:**
    a. If you're not sure about a word, or it's just really tricky to decide, do your best and then "flag" it for us to discuss later.
    b. Also flag a response if you're not sure it belongs in any of these categories (if it's not a decipherable word at all, or if it's a physical word like sleepy or hot).
    c. Remember, we are not trying to understand how the participant was truly feeling at the time, we are trying to describe how they chose to label their feeling. For example, a participant might have intended a word to mean something positive or negative in that moment, but if you can't really tell from the label they chose, or you could see it going either way, it might just be a neutral label.

Single-Word Coding Flow Chart

Does the emotion word…



Attribution Coding Instructions (Multi-Word Responses)

1. **Attribution Codes** (does the response describe the cause or source of the emotion?)

   No Attribution

   Definition: The participant doesn't mention any reason why they are feeling how they are right now (even if you can think of a possible reason).

   Basic example: I have a headache.

   Emotion example: I am feeling frustrated and overwhelmed.

   Situational

   Definition: The participant does mention a reason why they are feeling how they are right now, and it seems like a specific situation or event (even if they don't provide details, and even if they don't restate the feeling – see second emotion example).

   Basic example: I have a headache from being in the sun all day.

   Emotion example: I am feeling frustrated and overwhelmed because I don't know how I will study for this exam coming up while I also have to cover someone's shift at work.

   Second emotion example: I know I shouldn't have acted that way earlier.

   Generalized

   Definition: The participant does mention a reason why they are feeling how they are right now, and it seems like a broad domain that could include many things.

   Basic example: I have a headache, which is always happens because of my poor health.

   Emotion example: I am feeling frustrated and overwhelmed with life right now.

   Second emotion example: I'm lonely because none of my relationships ever work out.

2. **Notes**

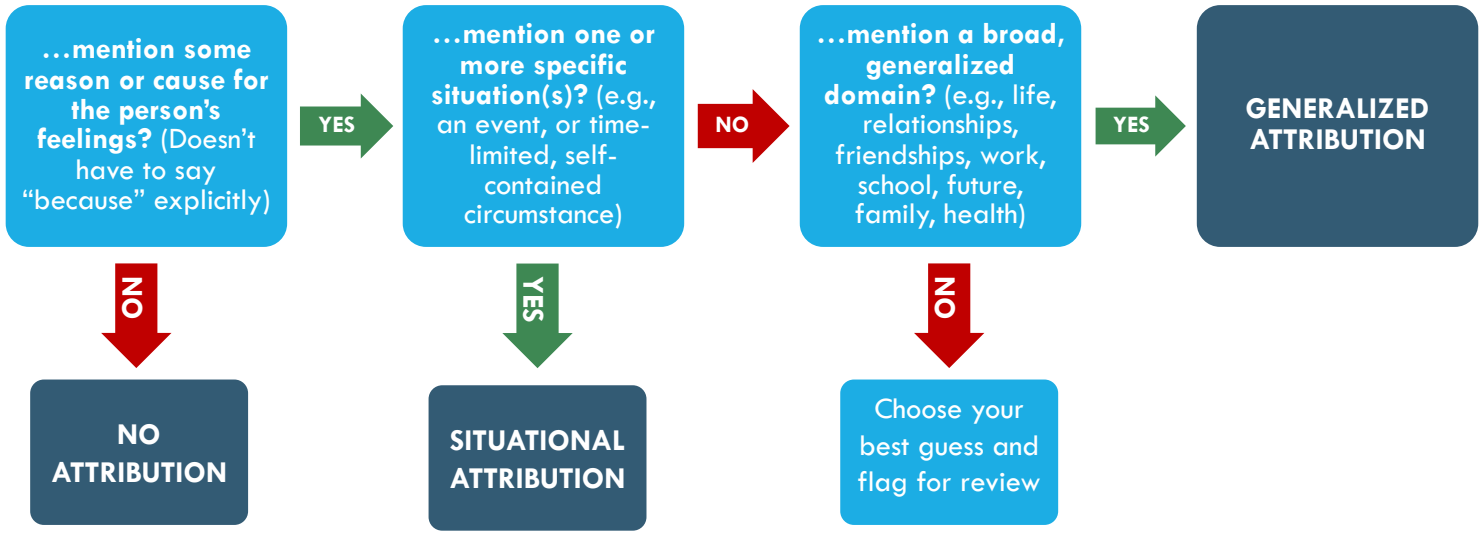
a. The participant doesn't have to use the word "because" or specifically say that they are giving an attribution for it to count, as long as what they mention seems to be explaining the source or cause of their emotion.
b. Even if the participant mentions many reasons for their emotion, if each reason is situational, the code will be situational.

Attribution Coding: Additional Guidelines (from coding meetings)

1. **Only code the attribution part of the response as situational or generalized.** Ignore whether the description of their emotion is specific or not; ignore any extra unrelated information, e.g., about what they're doing or thinking.
2. **Don't count phrases that are worded as restatements of how they're feeling ("I feel like _____") as attributions.** (Examples: "I feel like I could be left alone for days" "I feel like I'm on autopilot to hide my true emotions" - restatements of feelings, but not attributions).
    a. **UNLESS they explicitly say the feeling is a reason** for their other feelings (e.g., "I'm upset BECAUSE I feel like I can't live up to everyone's expectations.").
3. **If both situational and generalized attributions are present, code as situational.**
4. **Code as situational statements about having a lot to do, a lot of work, or a lot on their plate.** Code as generalized any overarching statements about "always" being too busy, or this semester or year being too much overall.
5. **If the response doesn't say how the participant is feeling, still just code the attribution part of the statement as situational or generalized based on the content.**

Multi-Word Coding Flow Chart

Does the multi-word response…



APPENDIX C. CODING EXAMPLES

Single Word Responses: *Vague* and *Specific*

Participant Response(s)	**Code**	**Notes**
"Complicated" "Moody" "Weird" "Mixed Up" "Everywhere"	Vague	Describes mixed or complex mood states
"Horrible" "Bad" "Upset" "Terrible" "Shitty"		Describes negative valence
"So-So" "Okay" "Blank" "Meh" "Emotionless" "Indifferent"		Coding decision to retain items that express lack of emotion when multiple raters view the label as communicating unpleasantness
"Angry/Pissed/Mad/Grumpy" "Anxious/Uptight/Uneasy" "Sad/Blue/Downbeat"	Specific	Standard emotion words and the nonstandard or slang words that were judged to be synonyms
"Precarious" "Shattered" "Weary" "Alone"		Words that metaphorically describe a feeling
"Rejected" "Betrayed" "Unaccomplished" "Rushed" "Homesick" "Argumentative"		Words that "tell a story" about the situation

Multi-Word Responses: ***No Attribution***

Participant Response	**Example of:**
"Down, no specific reason" "Feeling irritable but I'm not sure why, just grumpy."	The participant chooses to specify that there is no identified cause
"I'm just frustrated and annoyed." "Feeling a little down and empty. I'm overwhelmed and a little sad."	The participant doesn't name a cause.
"I am very aggravated. I don't want to talk to anyone right now." "Don't really feel like doing my school work or anything. Just wanna lay in bed, watch T.V., and sleep."	Coding decision to interpret statements about desires or plans (don't want to talk to anyone/do anything) as results of the emotion rather than attributions unless a causal word like "because" is explicitly used
"I feel unimportant and unwanted. I am very sad."	Decision to interpret any statement of the form "I feel __" as restatement of the feeling (sad *and* unimportant *and* unwanted) rather than a possible reason for another emotion (sad *because of* feeling unimportant and unwanted) unless a causal word like "because" is explicitly used.

Multi-Word Responses: ***Generalized Attribution***

Participant Response	**Example of:**
"All the good things that were happening completely turned around. I feel terrible again, and I don't feel like I'll ever feel better."	Fully depressive overgeneralizing cognitions
"At the time, I am a little stressed out and displeased at myself for always putting off everything, when I actually have a lot of things to do."	Frequent pattern: while there may have been an initial situational trigger, the participant choses to use generalized descriptions such as "always" "never" "nothing" "everything"
"I am clueless as I don't know what to do with my life."	Entire life domain as a cause
"I wish things would go better for me." "my heart rate is elevated and i'm tense. I feel very overwhelmed with the things occurring in my life"	Broad cause that seems to cut across life domains

Multi-Word Responses: *Situational Attribution*

Participant Response	**Example of:**
"The gym I go to to work out was closed." "My chemistry homework work is stressing me out and I only have 3 problems left!"	Specific, clearly defined circumstance of lower importance
"I feel discouraged because I graduate in a month and I haven't received any job offers." "My grandmother just passed away"	Specific, clearly defined circumstance of higher importance
"I'm irritated about work and having to do this survey again" "Scared about doctor appointment and some future things."	Coding decision to count as situational when both situational ("survey" "doctor appointment") and generalized ("work" "future things") attributions are present
"I am so busy and overwhelmed with everything. Just want to pop in a movie with some friends and not think about my responsibilities."	Coding decision to interpret "being busy" "having a lot on my plate," etc. as situational because it usually appeared to describe a time-limited state of things, particularly in this student sample.