

Development and Validation of the Implicit Measure of Distinct Emotional States (IMDES)

BY

Gregory Bartoszek

B.A., University of Illinois at Chicago, 2009

M.A., University of Illinois at Chicago, 2012

THESIS

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Defense Committee:

Daniel Cervone, Chair and Advisor

Evelyn Behar

Jon Kassel

Stewart Shankman

Jennifer Francis, Department of Psychiatry

I dedicate this thesis to my wife for her unwavering support in my academic endeavors and to my parents for having provided an environment that allowed me to develop an inquisitive and determined mind. I also dedicate this work to the Tuchler family who, for many years, provided me a second home and a chance to pursue my dreams while being on my own far away from my home country.

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LIST OF ABBREVIATIONS

2AFC	Two-Alternative Forced-Choice
AAT	Approach-Avoidance Task
AERT	Abstract Expressionism Rating Task
ANOVA	Analysis of Variance
ANS	Autonomic Nervous System
APA	American Psychiatric Association
BAI	Beck Anxiety Inventory
BDI-II	Beck Depression Inventory II
DSM	Diagnostic and Statistical Manual
GAD	Generalized Anxiety Disorder
IDAS	Inventory of Depression and Anxiety Symptoms
IAT	Implicit Association Test
IMDES	Implicit Measure of Distinct Emotional States
IRAP	Implicit Relational Assessment Procedure
IPANAT	Implicit Positive and Negative Affect Test
MDD	Major Depressive Disorder
OCD	Obsessive-Compulsive Disorder
PANAS-X	Positive and Negative Affect Scale – Extended Form
PTSD	Posttraumatic Stress Disorder
SCID	Structured Clinical Interview for DSM

SUMMARY

A major advance in psychological science is the development of implicit measures, which are employed because of their capacity to overcome limitations of self-reports. Despite this trend, well-developed implicit measures of distinct emotions are lacking. Two studies evaluated the validity of a method for indirect assessment of distinct emotions, the Implicit Measure of Distinct Emotional States (IMDES). On the IMDES, respondents rate emotions expressed in a series of ambiguous images. The measure requires respondents to rate each image within five seconds using a forced-choice scale. In Study 1, anger, fear, sadness or a neutral state were induced through autobiographical recall tasks. The IMDES showed that the anger and fear groups differed from the neutral group (controls) only in the target emotions. Although there were no group differences in implicit sadness, the sadness group rated more images as expressing sadness than as expressing fear or anger. By contrast, when explicitly self-reporting their emotional states, participants in anger, fear, or sadness group reported higher levels of all negative emotions (i.e., anger, fear, sadness) compared to controls. Study 2 examined the IMDES responses as a function of well-being/depression. Compared to the high well-being (low depression) group, the low well-being (high depression) group attributed less happiness and more sadness to the IMDES pictures. These two implicitly assessed emotions were correlated with self-reported well-being and depressive symptoms, even when controlling for self-reported emotions. The self-reported measure indicated that the groups differed in happiness, sadness, and fear. Thus in both studies, the IMDES evidenced better specificity than the self-report measures. The studies also supported convergent, discriminant, and incremental validity of the implicit measure.

Keywords: implicit measure, distinct emotion, emotion-induction

I. INTRODUCTION¹

A major advance in psychological science is the development of implicit measures of psychological traits and states (Nosek, Hawkins, & Frazier, 2011). Implicit measures are employed extensively thanks to their capacity to overcome limitations associated with explicit self-reports (Uhlmann et al., 2012). Despite this trend, at least one significant area of study lacks well-developed implicit measures: distinct emotions (Mauss & Robinson, 2009)—phenomenological states that are differentiable from one another on dimensions beyond mere valence and arousal (Russell, 2003). The present research attempts to meet this need through the development and testing of an *Implicit Measure of Distinct Emotional States* (IMDES).

The main limitation of self-reports is that their transparency opens the door to demand characteristics and social desirability concerns (Crowne & Marlowe, 1960; Orne, 1962). Either purposely or inadvertently, individuals may deny their imperfections or enhance their positive qualities when completing self-report measures (Paulhus & Reid, 1995). In addition, some people may be unable to report their emotions accurately even if they are trying to do so (e.g., Lane, Ahern, Schwartz, & Kaszniak, 1997; Weinberger, Kelner, & McClelland, 1997). In general, the use of self-reports of emotion requires making two assumptions that may be unwarranted: People are (a) aware of and able to report their emotional states accurately; and (b) they are willing to do so honestly.

Moreover, self-report measures of emotions sometimes yield theoretically unexpected results. Whereas the unexpected can be informative, some results are *so* unexpected that they suggest the methods are faulty. Consider the relation between emotion theory and explicitly-assessed emotion results. According to circumplex models of emotion (e.g., Posner et al., 2009;

¹ Parts of this chapter appeared previously in Bartoszek, G. (2012). *Implicit measure of emotions: Distinguishing among emotions of the same valance*. (Unpublished master's thesis). University of Illinois at Chicago, Chicago, IL.

Russell & Barrett, 1999), sadness and anger are characterized by different levels of arousal; because one can experience either high or low arousal state, but not both simultaneously, anger and sadness should not co-occur. From the perspective of appraisal theories of emotions, anger and sadness should not co-occur either, as they are set apart on the appraisal dimension of agency (negative outcomes beyond anyone's control elicit sadness whereas negative outcomes for which another person is a responsible agent elicit anger; Ellsworth & Scherer, 2003; Lazarus, 1991; Moors, 2010). Research confirms the appraisal theory's predictions in that induction of sadness or anger blunts the subsequent emotion of anger or sadness, respectively (Winterich, Han, & Lerner, 2010). However, explicit self-reports measures often indicate simultaneous elevation in many negative emotional states (e.g., Polivy, 1981) and high positive correlations among negative emotions (e.g., Watson & Clark, 1994).

A. Extant Indirect Measures of Emotions

Researchers have adopted a variety of strategies designed to assess emotions implicitly. These efforts have been guided by recognition of the fact that emotions are amalgamations of diverse components, including behavioral tendencies, physiological reactions, and/or cognitive patterns (Mauss & Robinson, 2009; Meiselman, 2016; Russell & Barrett, 1999). Thus measuring one or more of these components allows for inferences about emotional experience. In the last three decades, researchers attempted to differentiate emotions by coding facial expressions, measuring autonomic nervous system (ANS) activation, or examining cognitive processes. Following is a brief review of these indirect indices of emotions (see Larsen, Berntson, Poehlmann, Ito, & Cacioppo, 2008; Mauss & Robinson, 2009; Meiselman, 2016; and Quigley, Lindquist, & Barrett, 2014, for more comprehensive reviews).

1. Facial expressions

One strategy for implicit emotion assessment is to record and code facial expressions (e.g. Tian, Kanade, & Cohn, 2005). Findings indicate, however, that emotions are often revealed in facial expression for only a subset of participants, especially when the emotional states are not intense (Bonanno & Keltner, 2004; Ekman, Friesen, & Ancoli, 1980; Rosenberg & Ekman, 1994). Even intense emotions are often not translated into facial expressions because of factors such as cultural norms (e.g., display rules), gender-related beliefs, or presence/absence of an audience (e.g., Fridlund, 1991; Parkinson, 2005; Russell, 1994). Consequently, “not only can there be emotion without expression, there can be what appears to be expression without emotion” (Ekman, 1999, p. 48). Moreover, neither microexpression (i.e., spontaneous expressions lasting less than 500 milliseconds) nor electromyography (EMG) measurement seems to overcome these problems. Research suggests that complete microexpressions are infrequent and often yield false positive information (e.g., Porter & Brinke, 2008), and EMG recordings are cumbersome, inaccurate, and yield findings that are often mixed or even contradictory (cf. Brown & Schwartz, 1980; Hess, Kappas, McHugo, Lanzetta, & Kleck, 1992; also see Meiselman, 2016). Confirming these limitations, reviews find facial expression and electromyography research inadequate for differentiating distinct emotions of the same valence and at best able to discriminate emotions on arousal, valence, or intensity dimension (Larsen et al., 2008; Mauss & Robinson, 2009; Quigley et al., 2014).

2. Autonomic nervous system

Researchers have also attempted to differentiate emotions by measuring their psychophysiological correlates (i.e., ANS activity; e.g., Ekman, Levenson, & Friesen, 1983; Levenson, Ekman, & Friesen, 1990). However, psychophysiological measures of emotional

states have proven to be limited as well. ANS activity varies more strongly as a function of non-emotional artifacts (e.g., physical and/or mental demands) of emotion-induction procedures than as a function of emotions per se (Boiten, 1996; Sinha, 1996; Stemmler, Heldmann, Pauls, and Scherer, 2001). This may be because depending on a situation, the same emotion (e.g., fear) may require different actions (e.g., flight or freeze), which in turn recruit different ANS activity. Hence there may not be one-to-one correspondence between an emotion and its physiological signature (Davidson, 1993; Meiselman, 2016). In addition, the ANS is associated with number of functions (e.g., body's thermoregulation) that are not necessarily related to emotional experience (Quigley et al., 2014). Reviews indicate that ANS activity may be informative about emotional valence or arousal but do not consistently differentiate among emotions (e.g., Mauss & Robinson, 2009; Quigley et al., 2014).

3. Cognitive processes

A third strategy is to assess cognitive processes and contents (e.g., judgment) that are influenced by emotional states. As noted by Quigley and colleagues (2014), “it is [...] possible to assess emotional experiences by measuring how people judge the world around them during an emotional episode” (p. 242). For example, Hass, Katz, Rizzo, Bailey, and Moore (1992) presented nonsense syllables (e.g., LOWN) for 20 milliseconds followed by four response options, some of which were neutral (e.g., GOWN, TOWN, DAWN), but one of which was either affectively positive or negative (e.g., DOWN). Participants were encouraged to guess which word had appeared previously based on their gut feelings. Hass and colleagues found that participants who listened to a story eliciting negative emotions selected relatively more negatively (than positively) valenced response options compared to individuals who listened to a neutral story.

Quirin, Kazén, and Kuhl (2009) developed the Implicit Positive and Negative Affect Test (IPANAT). In the IPANAT, participants view six non-words (e.g., TUNBA) together with each of three positive (e.g., happy) and three negative words (e.g., helpless). Across a series of joint presentations of artificial and real words, they judge the degree to which artificial words convey positive or negative feelings. Participants' state and trait affect predicted their ratings of the non-words. Specifically, people reporting higher levels of positive affect made stronger attribution of positive emotions to the non-words, but those reporting more negative affect rated the non-words as expressing negative emotions more strongly.

Similarly, affective states bias evaluation of pictorial stimuli such as facial expressions (e.g., Bouhuys, Bloem, & Groothuis, 1995). For example, Langens (2002) created an implicit measure of emotions involving pictures of eight faces (four women and four men) with neutral expressions; participants were asked to rate the emotions (anger, elation, surprise, sadness, and fear) displayed in each face. Participants scoring high (versus low) on fear of failure attributed more sadness to the faces after imagining pursuing their goals compared to those who did not imagine a goal pursuit. Self-report measure of mood did not capture any significant changes among experimental conditions.

B. Abstract Expressionism Rating Task

The indirect measures reviewed above assess emotions through mechanisms known as affect-as-information (Schwarz & Clore, 1983; Schwarz, 2011) or affect misattribution (Payne, Hall, Cameron, & Bishara, 2010; Payne & Lundberg, 2014). Specifically, Schwarz and Clore (1983) proposed that when evaluating or judging a situation, individuals often use their mood as information even if the situation has not caused their mood change. More important, different emotions (e.g., anger, fear, sadness) have distinct effects on one's judgment (Keltner, Ellsworth,

& Edwards, 1993; Lench, Flores, & Bench, 2011; Lerner & Keltner, 2000; Schwarz & Clore, 2007), and what started as a mood-as-information hypothesis (Schwarz & Clore, 1983) more recently became the feelings-as-information theory (Schwarz, 2011).

Despite the emotion-specific effects on judgment, the measures described in the previous section are restricted to assessment of positive and negative affect rather than distinct emotions. To my knowledge, there is no published implicit measure capable of assessing an array of emotional states and differentiating emotions of the same valence (but see Krieglmeyer, Wittstadt, & Strack, 2009 or Blaison, Imhoff, Hühnel, Hess, & Banse, 2012 for attempts to assess one or two, respectively, distinct emotional states). However, Bartoszek and Cervone (2016) developed a method—here referred to as the Abstract Expressionism Rating Task (AERT)—which is capable of capturing distinct emotions. The AERT requires participants to indicate, on a forced-choice scale, emotions expressed in a series of ambiguous pictures. Specifically, participants indicate what emotion an artist tried to express in each of 20 pictures of abstract paintings, which are presented individually without a time limit. As soon as a participant rates a painting by choosing one of five response options: anger, fear, happiness, sadness, or none, a new painting is presented with the same set of response options. The cycle is then repeated until all 20 pictures are rated. Scores are then computed for each participant by summing the number of pictures rated as displaying the particular emotional state or no emotion.

Across three studies, Bartoszek and Cervone (2016) examined the validity of the AERT as a tool of an implicit assessment of emotions. Experiment 1 featured emotion inductions designed to induce either sadness or a relaxed state through a guided visualization procedure via audio recording (cf. Cervone, Kopp, Schaumann, & Scott, 1994). The sadness-inducing recording, which focused on an irrevocable loss, presented a story in which a best friend was

dying of cancer. In contrast, the relaxation-inducing recording described walking through a tropical forest toward a beach and enjoying the beach and the ocean. To disguise the research hypotheses, participants were informed that the goal of the experiment was to examine “how visual information interferes with auditory information.” The results provided initial support for the validity of the AERT in implicit assessment of emotions: Participants listening to a sadness-inducing story attributed sadness to more pictures and happiness to fewer pictures than those listening to a relaxation-inducing story. Interestingly, the groups did not differ in attribution of anger or fear. Conversely, the self-report measure suggested that the sadness-induction had a global effect in that people listening to the sadness (versus relaxation) story reported elevated levels of all negative emotions.

In Experiment 2, the participants were exposed to a social encounter likely to induce anger (cf. Pedersen, Gonzales, & Miller, 2000). Specifically, after completing moderately difficult and tedious tasks, the experimenter informed half of the participants (anger condition) that their responses were not recorded and that they could not receive participation credits. All participants were then instructed to complete the remaining tasks including the implicit and self-report measures of emotions. Participants in the anger condition attributed anger to more paintings than did individuals in the control condition, but the two groups did not differ in the attribution of other emotions. On the other hand, on the self-report measure, participants in the anger condition reported being less happy but not angrier than those in the control condition.

Experiment 3 (conducted online) tested the AERT’s ability to detect fear by recruiting participants high and low in fear of spiders and assigning them to conditions in which they viewed either spider images or neutral images presented for one second before each AERT painting. The results again supported the validity and specificity of the AERT while revealing

inability of the self-report measure to differentiate negative emotions from one another. As predicted, among participants who saw spider images, spider-fearful individuals rated more AERT paintings as expressing fear (and fewer paintings as expressing “no emotion”) compared to controls, but the groups did not differ in any other implicit emotions. Moreover, when viewing neutral images, the spider-fearful participants and controls also did not differ in any emotions captured by the AERT. In contrast, the self-report measure revealed that compared to controls, spider-fearful participants reported elevated levels of all negative emotions regardless of whether they saw spider or neutral images.

In another experiment (similar to Experiment 3 but conducted in a laboratory), spider-fearful participants and controls were exposed to spider images (Bartoszek & Cervone, 2015). In order to examine the criterion validity of the AERT, participants’ avoidance behavior (i.e., time taken to look at spider versus positive images) and physiology (electrodermal activity and heart rates) were measured. Akin to Experiment 3, compared to controls, spider-fearful participants rated more paintings as expressing fear. More important, in comparison to any self-reported emotion, levels of implicit fear ratings were stronger predictors of the number and amplitude of skin conductance responses.

C. Response Times on the Abstract Expressionism Rating Task

Relying on a heuristic strategy (e.g., affect-as-information) should be more likely when responses are provided spontaneously and without much effort. Hence, using heuristic (versus analytic) strategy should yield lower response latencies in judgment (Greifeneder, Bless, & Pham, 2011; Greifeneder & Bless, 2007). Consequently, if the effects obtained by the AERT depend on heuristic processes such as affect-as-information, these effects should be greater for participants who respond relatively quickly compared to those who respond slowly. Although

instructions directed participants not to analyze the abstract paintings and to rate them quickly, some participants did not follow these instructions. Indeed, the time spent on rating abstract paintings varied greatly across participants.

To examine the above possibilities, Bartoszek and Cervone (2016) reanalyzed data from each experiment separately for slow and fast respondents (using the median split of response times). As could be expected, the group differences in attributions of the target emotions to paintings were much greater among fast than slow respondents who, in turn, showed virtually no changes in attributions as a function of the emotion-induction procedures. Furthermore, the AERT evidenced greater convergent (i.e., correlations with corresponding self-report measures) and criterion (i.e., correlations with physiological and behavioral indices) validity when only fast respondents were taken into account. Based on these findings, the goal of the studies proposed here is to develop and validate a new indirect measure of emotions, the Implicit Measure of Distinct Emotional States (IMDES).

D. The Implicit Measure of Distinct Emotional States

The IMDES is built on three assessment strategies, which capitalize on advantages of the AERT while simultaneously overcoming its limitations. First, akin to the AERT, respondents evaluate non-self targets rather than explicitly rating their own affective state. Second, all ratings are made using a forced-choice scale in which respondents must select one emotional state within five seconds – the time limitation is a distinct and crucial feature of the IMDES. Third, the IMDES stimuli² are also pictorial rather than verbal. Unlike the AERT pictures, these were pretested in an online study to eliminate any pictures that evoke disproportionate choice of any

² The AERT stimuli were pictures of abstract paintings found online, whereas the IMDES abstract paintings were created by the author to avoid the copyright violations when disseminating the measure.

one response. My hypothesis is that the combination of these features will yield an assessment of emotional states that overcomes the limits of prior measures reviewed above.

The first feature, the evaluation of non-self-relevant stimuli, has two advantages. One is that this implicit procedure eliminates self-related biases (e.g., self-enhancement, defensiveness) that can distort responses to explicit self-report measures. The second advantage involves the dual-processing distinction between System 1 and System 2 processes: System 1 described as implicit, experiential, intuitive, heuristic, and reflexive and System 2 that is explicit, rational, analytic, systematic, and reflective (Evans, 2008). Specifically, the dual-process theories dictate that (a) emotions are associated with System 1 and that (b) System 2 processes may override and dampen the processes of System 1 (e.g., Lieberman, 2007). This makes the use of self-reports of emotions problematic because self-reports draw primarily upon processes of System 2 whereas the implicit measures have a privileged access to System 1 (e.g., Quirin, Kazén, & Kuhl, 2009). Consequently, because reporting one's emotions inevitably requires focusing on one's emotional state, such self-focus (System 2 activation) is often sufficient to decrease the magnitude of the emotional state (System 1; Lieberman, 2007). In other words, using self-reports of emotions entails the risk of reducing (the intensity of) emotional states before these states are properly assessed (Keltner, Locke, & Audrain, 1993).

The second strategy, the use of a time limit and a forced-choice scale in responding, exploits the fact that affect-as-information (i.e., heuristic processing) is more likely when raters can “produce a response with the least amount of effort” and “the situation does not demand accuracy” (Forgas, 2008, p. 270). The time limit precludes analytic, systematic, and reflective (System 2) ratings and instead encourages intuitive, heuristic, and reflexive (System 1) responding. Similarly, a forced-choice scale allows for more spontaneous and less effortful

ratings (cf. Hass et al., 1992; Payne & Lundberg, 2014) as compared to Likert scales, which require greater precision and cognitive effort in ratings.

The selection of the forced-choice scale is advantageous for other reasons as well. For example, Likert scales (versus forced-choice scales) are more likely to lead to inadvertent response biases as people differ in their interpretations of rating labels and, as a result, may presume different psychological distances between the labels (Friedman & Amoo, 1999). Forced-choice scales are also more resistant to deliberate distortions in responding and are less related to social desirability concerns than their non-forced-choice counterparts (e.g., Christiansen, 2005; Jackson, Wroblewski, & Ashton, 2000). Moreover, in a non-forced-choice task, respondents are free to endorse everything, and this may cause people to *over-endorse* items – this is exemplified by low specificity of the Likert-type self-report scales. Hence a forced-choice scale may also increase specificity in the assessment.

The final strategy in developing the IMDES involved the selection of pictures. Previous studies examining misattribution of positive or negative mood used pictures of faces (e.g., Bouhuys et al., 1995; Langens, 2002), Chinese ideographs (e.g., Payne et al., 2010; Payne & Lundberg, 2014), or words (e.g., Hass et al., 1992; Quirin, Kazén, & Kuhl, 2009; Quirin, Kazén, Rohrmann, & Kuhl, 2009). However, for several reasons, I utilized pictures of abstract expressionism paintings. First, I believed that pictorial stimuli (rather than words) would be more intrinsically related to emotional experience (Glaser & Glaser, 1989). Moreover, Forgas (2001) proposed that heuristic processing (e.g., affect-as-information) is stronger when the stimuli are not only ambiguous but also unfamiliar, novel, and complex. Abstract paintings then may be a more optimal choice because they are more unfamiliar and novel than facial expressions and more complex than Chinese ideographs. The latter characteristic (i.e., complexity) is particularly

important because in contrast to extant implicit measures of positive and negative affect, the IMDES involves ratings of pictures in terms of four specific emotions. Hence it was essential to include stimuli whose complexity allows them to be perceived in a number of different ways.

The IMDES measures emotions indirectly by asking participants to judge emotional content of ambiguous pictures. Specifically, 20 pictures of abstract expressionistic paintings are presented individually for 5 seconds, and a participant indicates what emotion an artist tried to express in each painting by choosing one of five response options (anger, fear, happiness, sadness, or none) during the last 3 seconds. As soon as the participant rates the picture or the time elapses, a new picture is presented with the same set of response options. The cycle is repeated until all 20 pictures are rated.

II. STUDY 1

In prior research, each IMDES study involved manipulation of only one emotional state, and emotion induction methods varied across the studies. The question remains, then, whether prior implicit emotion results are merely due to non-emotional characteristics of emotion-induction procedures rather than due to emotions, per se. This study attempted to answer this question and further examine validity of the IMDES by inducing multiple emotional states with one emotion-induction method.

An autobiographical recall was used as a procedure to induce one of three emotions (i.e., anger, fear, and sadness) or no particular emotion (control condition). In a meta-analysis examining ten types of emotion-elicitation procedures (Lench et al., 2011), only two: films ($g = 0.60 [0.53, 0.66], p < .001$) and pictures ($g = 0.81 [0.58, 1.03], p < .001$) elicited somewhat stronger emotions in comparison to an autobiographical recall ($g = 0.45 [0.39, 0.51], p < .001$). However, when considering effect sizes between distinct emotions of the same valence (e.g., sadness versus anger), an autobiographical recall ($g = 0.36 [0.14, 0.58], p < .01$) proved better than films ($g = 0.16 [-0.01, 0.33], p < .10$) with no extant studies using pictures to induce both anger and sadness.

After the inductions, participants completed implicit or self-report measures of emotion. Previous research showed that, unlike the IMDES, self-report emotion measures lacked specificity. That is, emotion-condition participants reported higher levels of both target and non-target emotions compared to the comparison group. Of note, however, is that the self-report measures relied on a Likert scale whereas the IMDES used a forced-choice scale. Thus specificity of the IMDES may simply be an artifact of its forced-choice scale. To test this possibility, a 20-item forced-choice self-report measure was developed for this study and

administered alongside the Expanded Form of Positive and Negative Affect Schedule (PANAS-X). Specifically, on the forced-choice measure, participants reported their emotions by selecting, for each item, only one of four emotion terms (or no emotion) they experienced during the autobiographical recall task.

I hypothesized that the IMDES would discriminate among negative emotional states in that participants induced to feel anger, fear, or sadness would differ from controls in rating of IMDES images only on the target emotion. I also expected that the PANAS-X would not evidence such specificity. Because of its novelty, no particular predictions were made about the specificity of the forced-choice self-report measure of emotions.

E. Methods

1. Participants

Introductory psychology students ($N = 333$; 116 men and 217 women) participated in exchange for partial course credit. Participants were randomly assigned to one of four conditions: control, anger, fear, or sadness. Approximately half of the participants in each condition were randomly selected to complete the IMDES: control ($n = 44$), anger ($n = 41$), fear ($n = 42$), sadness ($n = 42$), whereas the remaining participants completed self-report measures of emotions: control ($n = 41$), anger ($n = 41$), fear ($n = 40$), or sadness ($n = 42$). With regard to ethnic background, 83 participants self-identified as White, 38 as Black, 97 as Latino, 94 as Asian, and 21 as “other” (e.g., multiracial).

2. Emotion Induction

Emotion of anger, fear, or sadness was induced via an autobiographical recall task (cf. Lench & Levine, 2005; Lerner & Keltner, 2001; Vuoskoski & Eerola, 2012). The following instructions were provided:

“The first part is about memory. Your task is to think back to an event in your life that makes you, or has made you, feel intensely _____ (angry/afraid/sad). Try to remember in detail what happened, and write a description of the events in the text box below. The most important part of the task is to recall what happened as vividly as possible and with all the important details. You will have 8 minutes to complete the task, after which the program will automatically move to the next part. Write the description so that someone reading it could see the event through your eyes and even become _____ (angry/afraid/sad).”

Participants in the control condition received similar instructions but were asked to “think back to the last time you went grocery shopping” and to write “the description so that someone reading it could see the event through your eyes” (cf. Lench & Levine, 2005; Lerner & Keltner, 2001). Sixteen (4.8%) of the participants wrote about events that did not match their corresponding conditions, and thus their data were not included in analyses.

3. Materials and Measures

a. Implicit Measure of Distinct Emotional States

The IMDES stimuli consisted of images (1024×768 pixels) presenting black-and-white abstract expressionist artworks (Appendix A). The images were digitally created using Flame Painter 3 software and pretested in an online study. Of 60 pretested images, 24 images that did not elicit an extremely disproportionate choice of any one response were selected. Specifically, each emotion response option (i.e., anger, fear, sadness, happiness) was attributed to each of the 24 images by at least 11.2 percent but no more than 32.8 percent of people ($N = 189$). On average, across all 24 images, anger was attributed by 19.91 percent of people, fear by 21.10 percent, sadness by 19.79 percent, and happiness by 22.71 percent. Repeated measures analysis

of variance (ANOVA) indicated that there were no significant differences in attributions of the four emotions across the 24 abstract paintings, $F(3, 22) = 1.56, p = .229, \eta_p^2 = .18$.

The initial instructions of the IMDES informed participants (a) that they “will see paintings of *digital abstract expressionism* [...] a style of painting in which artists express their emotions using digital media” and (b) that their “task will be to judge what emotion (if any) the artist tried to express in each painting.” Next, they were briefly informed about the timing of the IMDES items and structure of the test (described in details below).

Each trial of the IMDES was comprised of an abstract painting displayed for 5 seconds and five response options displayed during the last 3 seconds of a trial (see Figure 1). To examine whether the order of response options affects the misattribution findings, participants saw the five response options in one of two orders: (1) anger, fear, happiness, sadness, none *or* (2) happiness, anger, sadness, fear, none. Once the 5 seconds elapsed or the participant chose one of the options, the next IMDES trial was presented and the cycle continued automatically until all 24 trials were presented. If the participant did not select an option during the 3-second time window during which response options were displayed, that trial was coded as missing data. Because the response time window, the IMDES took no more than (24 trials \times 5 seconds) 120 seconds to complete.

The first four IMDES paintings were treated as practice trials³ although, to respondents, they were indistinguishable from the remaining trials with one exception; specifically, after the second, third, and fourth painting, a message requesting to “try to respond faster” was displayed on the screen for 3 seconds if participants did not rate one of these three paintings. The composite scores of the IMDES were derived from the ratings of the subsequently presented

³ Prior studies revealed a disproportionately high number of missing data on the first four items due to the limited time for providing responses.

twenty paintings. The scores were computed by summing the number of pictures rated as displaying the particular emotional state or no emotion. This resulted in five continuous scores representing the magnitude of emotional states. Of note is that by chance alone, each of the five response options would be attributed, on average, to four paintings (20 paintings/5 responses); thus a score of four on the IMDES represents the chance level of responding.

b. Self-report measure of emotions

Emotions were measured explicitly using subscales of the PANAS-X, which has good psychometric properties (Watson & Clark, 1994). Participants were asked to indicate on a 5-point Likert scale (1 = *Not at all* to 5 = *Extremely*) the extent to which each of 25 adjectives described emotions they “experienced when recalling and writing about the past event” (Appendix B). The order of adjectives was randomized.

Emotions were also self-reported on a forced-choice scale developed for this study. Specifically, 80 emotion adjectives were taken from three commonly used self-report measures: the PANAS-X, the Multiple Affect Adjective Check List-Revised (MAACL-R), and the Profile of Mood States (POMS). These 80 adjectives were combined into one 20-item measure such that each item consisted of five response options: four emotion adjectives corresponding to emotions of anger, fear, happiness, and sadness as well as the “none” response option (Appendix C). Similar to the IMDES, participants chose only one of the five response options to indicate the emotion (or no emotion) they “experienced when recalling and writing about the past event.”

4. Procedure

The experimental sessions were conducted individually for each participant. Upon arriving at the laboratory, participants were seated in front of a computer and randomly assigned to one of four conditions: control, anger, fear, or sadness. Half of the participants in each

condition completed the IMDES whereas the other half completed the self-report measures of emotions. To conceal the research hypothesis, all participants signed the same consent form titled, “Effects of Distractions on Recollection of Past Events.” They were told that the study investigated “how distraction during recollection of an event affects later impression of that event” (see the Appendix D for the full script). The consent forms and instructions were the same regardless of whether individuals completed the implicit or self-report measures so as not to differentially influence either group. All remaining instructions and materials were presented and timed via *MediaLab* software (Jarvis, 2004), and the experimenter moved to an adjacent room while participants perform the tasks. First, participants engaged in an 8-minute autobiographical recall task (the emotion manipulation procedure), which was presented as a memory task. Immediately after, they completed the IMDES or the PANAS-X and the forced-choice self-report measure of emotions. They then provided demographic information. All participants were debriefed at the end of the session.

5. Design

There were no significant main effects of the order of the IMDES response options (i.e., anger/fear/happiness/sadness/none *versus* happiness/anger/sadness/fear/none) on implicit emotions scores ($ps > .105$). Likewise, the order variable did not interact with the group variable for any of the implicit emotion scores ($ps > .118$). Consequently, data were collapsed across the two order levels. For the following analyses, the emotions scores obtained via (1) the IMDES, (2) PANAS-X, and (3) forced-choice self-report measure were submitted to separate 4 (Group: control, anger, sadness, fear) \times 4 (Emotion: anger, sadness, fear, happiness) mixed ANOVAs with group variable as a between-subject variable and emotion score as a within-subject variable.

In case of significant interactions, one-way between-subject ANOVAs examined effects of the group variable on each emotion.

F. Results

Examination of the IMDES data revealed that three (1.8%) of the participants did not rate any of the abstract images and thus did not yield useful data. Among the remaining participants, two people failed to respond within the 3-second time window on five of the 20 images, additional two failed to rate four images, three failed to rate three images, 12 failed to rate two images, and 30 failed to rate one image. Overall, participants did not rate 81 (2.6%) of 3,160 IMDES trials that were presented. However, the four emotion-induction groups did not differ in the number of unrated IMDES images, $F(3, 154) = 1.47, p = .225, \eta_p^2 = .03$. To adjust for missing data, the IMDES scores were multiplied by the ratio of the maximum possible number of responses (i.e., 20) to a number of provided responses (this ratio is equal to 1 for those with no missing IMDES data).

Figure 2 depicts the findings obtained via the IMDES. Results indicated a significant Group \times Implicit Emotion interaction, $F(9, 462) = 1.92, p = .048, \eta_p^2 = .04$. The four groups differed in implicitly measured anger, $F(3, 154) = 3.79, p = .012, \eta_p^2 = .07$, and fear, $F(3, 154) = 2.81, p = .041, \eta_p^2 = .05$, but not in implicit sadness, $F(3, 154) = 0.58, p = .627, \eta_p^2 = .01$, or happiness, $F(3, 154) = 0.37, p = .778, \eta_p^2 = .007^4$ (the groups also did not differ in the extent of selecting the “none” response option, $F(3, 154) = 1.87, p = .137, \eta_p^2 = .04$). Planned contrasts revealed that, compared to the control group: the anger group attributed more anger, $t(76) = 2.12, p = .036, d = 0.41$, and the fear group attributed more fear, $t(80) = 2.32, p = .022, d = 0.51$, to the

⁴ Even if including the 16 participants who did not follow the “autobiographical recall” instructions, the pattern of the results remained the same, as the groups differed in anger, $F(3, 161) = 3.49, p = .017, \eta_p^2 = .06$, and fear, $F(3, 161) = 2.71, p = .047, \eta_p^2 = .05$, but not in sadness, $F(3, 161) = 0.44, p = .727, \eta_p^2 = .01$, or happiness, $F(3, 161) = 0.31, p = .816, \eta_p^2 = .01$.

abstract images. However, supporting specificity of the IMDES, the anger group and the fear group did not differ from the control group in non-target emotions ($ps > .31$). Comparisons using LSD *post-hoc* tests additionally revealed that the anger group had higher implicit anger scores than did the sadness group, $t(76) = 3.33, p = .001, d = 0.68$, and tended to have higher implicit anger scores than did the fear group, $t(79) = 1.68, p = .095, d = 0.31$. Similarly, fear group rated more images as expressing fear in comparison to the sadness group, $t(80) = 2.56, p = .011, d = 0.58$, or the anger group, $t(79) = 2.05, p = .042, d = 0.42$. No other group differences were significant ($ps > .20$) although the sadness group had marginally lower levels of implicit anger than did the fear group, $t(80) = 1.72, p = .088, d = 0.48$. The sadness group then did not differ from the other groups in implicit sadness scores. I further explored patterns of emotion *within* the sadness group only and found that the group did differentially attribute negative emotions to the abstract painting images, $F(2, 37) = 4.20, p = .023, \eta_p^2 = .19$. Specifically, the sadness-condition participants rated more images as expressing sadness than as expressing anger, $F(1, 38) = 8.10, p = .007, \eta_p^2 = .18$, or fear, $F(1, 38) = 5.64, p = .023, \eta_p^2 = .13$.

The emotion manipulation procedure also affected levels of self-reported emotions as assessed by the PANAS-X and the forced-choice measure. Because the self-reported emotion data were positively skewed, the data were log-transformed. First, for emotions assessed via the PANAS-X (Figure 3, top), there was a significant Group \times PANAS-X Emotion interaction, $F(9, 456) = 28.96, p < .001, \eta_p^2 = .36$. The groups differed in self-reported anger, $F(3, 152) = 29.51, p < .001, \eta_p^2 = .37$, fear, $F(3, 152) = 19.76, p < .001, \eta_p^2 = .28$, sadness, $F(3, 152) = 22.44, p < .001, \eta_p^2 = .31$, and happiness, $F(3, 152) = 18.10, p < .001, \eta_p^2 = .26$. Planned contrasts indicated that compared to the control group, the anger group reported not only more anger, $t(76) = 9.22, p < .001, d = 2.36$, but also more sadness, $t(76) = 4.78, p < .001, d = 1.08$, fear, $t(76) = 2.42, p =$

.015, $d = 0.61$, and less happiness, $t(76) = 4.94, p < .001, d = 0.93$. Similarly, in comparison to the control group, the sadness group reported more anger, $t(79) = 4.03, p < .001, d = 0.94$, sadness, $t(79) = 8.10, p < .001, d = 2.21$, fear, $t(79) = 3.59, p < .001, d = 0.88$, and less happiness, $t(79) = 6.52, p < .001, d = 1.44$. Finally, the fear group reported higher levels of anger, $t(73) = 2.92, p = .004, d = 0.73$, sadness, $t(73) = 3.88, p < .001, d = 0.99$, fear, $t(73) = 7.65, p < .001, d = 1.78$, and lower levels of happiness, $t(73) = 6.13, p < .001, d = 1.30$, than did the control group. Post-hoc test further showed that the anger group obtained higher levels of self-reported anger than did the sadness, $t(79) = 5.41, p < .001, d = 1.14$, or fear, $t(73) = 6.10, p < .001, d = 1.34$, group. The sadness group reported being more sad than did the anger, $t(79) = 3.35, p = .001, d = 0.68$, or fear, $t(76) = 4.07, p < .001, d = 0.91$, group. Lastly, the fear group reported higher levels of fear compared to the anger, $t(73) = 5.16, p < .001, d = 1.09$, or sadness, $t(76) = 4.18, p < .001, d = 0.87$, group. No other group differences were significant ($ps > .11$).

Figure 3 (bottom) showed the effects of emotion manipulation on emotions reported on the forced-choice scale. There was a significant Group \times Forced-Choice Emotion interaction, $F(9, 456) = 32.78, p < .001, \eta_p^2 = .39$. The groups differed in self-reported anger, $F(3, 152) = 41.55, p < .001, \eta_p^2 = .45$, fear, $F(3, 152) = 19.55, p < .001, \eta_p^2 = .28$, sadness, $F(3, 152) = 22.98, p < .001, \eta_p^2 = .31$, and happiness, $F(3, 152) = 57.39, p < .001, \eta_p^2 = .53$. Planned contrasts indicated that compared to the control group, the anger group reported not only more anger, $t(76) = 10.09, p < .001, d = 2.28$, but also more sadness, $t(76) = 3.82, p < .001, d = 0.89$, fear, $t(76) = 3.06, p = .003, d = 0.77$, and less happiness, $t(76) = 10.45, p < .001, d = 1.97$. Similarly, the sadness group reported more sadness, $t(79) = 8.33, p < .001, d = 1.95$, anger, $t(79) = 2.00, p = .047, d = 0.47$, fear, $t(79) = 3.59, p < .001, d = 0.80$, and less happiness, $t(79) = 11.56, p < .001, d = 2.34$, than did the control group. Finally, in comparison to the control group, the fear group

reported higher levels of fear, $t(73) = 7.59, p < .001, d = 1.66$, sadness, $t(73) = 3.75, p < .001, d = 0.76$, and lower levels of happiness, $t(73) = 9.91, p < .001, d = 2.09$, but the groups did not differ in self-reported anger ($p = .213$). Post-hoc tests further showed that the anger group obtained higher levels of self-reported anger than did the sadness, $t(79) = 8.25, p < .001, d = 1.64$, or fear, $t(73) = 8.61, p < .001, d = 1.89$, group. The sadness group reported being more sad than did the anger, $t(79) = 4.38, p < .001, d = 0.91$, or fear, $t(76) = 4.31, p < .001, d = 0.96$, group. Lastly, the fear group reported higher levels of fear compared to the anger, $t(73) = 4.64, p < .001, d = 1.06$, or sadness, $t(76) = 4.24, p < .001, d = 0.88$, group. No other group differences were significant ($ps > .26$).

G. Discussion

Results of Study 1 mostly confirmed expectations about the assessment capabilities of the IMDES. Participants who wrote about anger-provoking situations had higher implicit anger scores compared to the control or sadness group and tended to have higher implicit anger scores compared to the fear group. Furthermore, those who wrote about fear-provoking events attributed more fear to the abstract paintings than did the control, anger, or sadness group. Although the sadness group did not differ in implicit emotions compared to the other groups, the group did rate more images as expressing sadness than as expressing fear or anger. There were no differences in implicit happiness across the groups.

The self-report measures did not display the same specificity as the IMDES. On the PANAS-X, participants in the anger group reported being more angry than participants in the control group but so did the fear and sadness group participants. Similarly, all three groups reported higher levels of fear and sadness than did the controls. This lower specificity of the PANAS-X (versus the IMDES) could be attributed to a Likert (versus forced-choice) scale.

However, similarly unspecific findings emerged on the forced-choice self-report measure developed for this study: Compared to controls, each emotion group reported higher levels of anger, fear, and sadness even though participants selected only one emotion term per item. Thus the specificity of the IMDES does not appear to be merely a result of a forced-choice response format.

The self-report emotion measures indicated group differences in sadness whereas the IMDES did not reveal such differences. Of note is that the emotion-induction method likely made the cause of emotions salient to some of the participants. That is, participants were overtly asked to write about events that make or have made them feel intensely sad, angry, or afraid. Additionally, participants completing the self-report measures of emotions were instructed to report emotions “experienced when recalling and writing about the past event” (as opposed to, for example, being instructed to report emotions “at the present moment”). These two sets of instructions might have increased demand characteristics and “enhance” findings on self-report measures. In regards to the IMDES, previous research strongly indicates that people do not rely on their affect (and emotions) as information when making judgments if the cause of their affect (emotions) is made salient (e.g., Gasper & Clore, 2000). Moreover, individuals experiencing sadness are particularly likely to engage in systematic processing of information and thus are more likely to become aware of the actual cause of their emotions (Schwarz, 2011; Schwarz & Clore, 2007). Thus, the overt instructions and sadness-prompted systematic processing may explain why, unlike the self-reports, the IMDES did not capture the shift in sadness. This lack of group differences in sadness despite overt instructions also suggests that the IMDES responses are unlikely to be driven by demand characteristics.

Lastly, another limitation of the emotion manipulation involves the instructions provided in the control condition. Participants were instructed to think about the last time they went grocery shopping. Although these instructions were used previously as a neutral condition (e.g., Lench & Levine, 2005), many individuals appear to find trips to a grocery store unpleasant. Of the participants who were excluded from analyses due to writing about an event that did not match the target emotion, 37 percent belonged to the control condition. A better option may be to require participants to write about an event that they consider neutral without specifying the event.

III. STUDY 2

A standard method for establishing the validity of a new psychological test is to determine whether test responses vary, in a theoretically meaningful manner, with previously established measures (Cronbach & Meehl, 1955). In the study of affect assessment, for example, the validity of explicit self-reports of mood was validated by relating them to established measures of clinical symptomatology of anxiety and depression (e.g., Watson, Clark, & Tellegen, 1988). The present study adopted this strategy in an effort to further establish the validity of the IMDES.

To follow the previously used approach, one option would be to select individuals with different severity levels of anxiety. However, anxiety disorders are a heterogeneous group (e.g., Mineka, Watson, & Clark, 1998; Watson, 2009), and different symptoms and emotional patterns are associated with different subgroups of the disorders. For example, social phobia is associated with low positive affect and high levels of anger (e.g., Brown, Chorpita, & Barlow, 1998; Kashdan & Collins, 2010). However, evidence linking it with fear is inconsistent (e.g., Brown et al., 1998; Watson, 2009). Post-traumatic stress disorder (PTSD) features fear, and although previously categorized as an anxiety disorder, its symptoms also include depressive symptoms (e.g., O'Donnell, Creamer, & Pattison, 2004; Simms, Watson, & Doebbeling, 2002). PTSD may be then as strongly associated with depression as with anxiety (e.g., Watson, 2009), and thus, similarly to Obsessive-Compulsive Disorder (OCD), it occupies a separate category in the current Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association [APA], 2013).

Besides heterogeneity of anxiety disorders, emotions linked to a specific disorder often transpire only in the presence of a triggering stimulus. For example, individuals diagnosed with

specific phobias do not generally evidence fear levels outside of the normal range unless exposed to the fear-inducing stimuli (e.g., Bartoszek & Winer, 2015; Brown et al., 1998). Thus, when examining IMDES responses of spider-fearful individuals and non-fearful controls, the two groups differed in implicitly assessed (state) fear if presented with spider images but evidenced no differences in (trait) fear if presented with neutral images (Bartoszek & Cervone, 2016). It is not surprising that the IMDES, which is theorized to operate on the feelings-as-information mechanism, would not capture one's trait emotions. Elevations in any emotion assessed by the IMDES would need to result from the person using their current emotion as information in ratings of the abstract images. Thus a person with high levels of trait fear would obtain a relatively high implicit fear score *only* if he or she was experiencing fear at the time of completing the IMDES.

Examining properties of the IMDES as a function of depressive (rather than anxiety) symptoms may thus prove more optimal. In contrast to, for example, simple phobias, moods and mood disorders (e.g., depression) are often diffuse and objectless (e.g., Russell & Barrett, 1999; Siemer, 2005). Consequently, depressed individuals are likely to chronically experience depression-related emotions, which lead to persistent evaluative biases (e.g., Bourke, Douglas, & Porter, 2010). It would then be expected that depressed and non-depressed groups would evidence different profiles of emotions on the IMDES.

What emotions are associated with depression? Although depression is highly comorbid with anxiety (Kessler, Chiu, & Demler, 2005), it has features uncommon to anxiety. Specifically, research consistently shows that depressed individuals exhibit decreased sensitivity to rewards and diminished approach-related behavior (e.g., Henriques & Davidson, 2000; Shankman, Klein, Tenke, & Bruder, 2007). Consequently, anhedonia and *low positive affect* represent the core

feature and prove useful in differential diagnosis of depression (e.g., Brown et al., 1998; Mineka et al., 1998; Watson, 2009). Depression is also strongly linked to feelings of sadness (e.g., Bondolfi, Mazzola, & Arciero, 2015; Winer, Salem, Bartoszek, & Snodgrass, 2015), which, similarly to anhedonia, is the central feature of depression (APA, 2013). Research has consistently documented that, unlike healthy controls, depressed individuals misjudge neutral and ambiguous stimuli (e.g., facial expressions) as being less happy or more sad (Bourke et al., 2010).

In this study, I explored patterns of responses on the IMDES as a function of depression symptoms. Following is a brief review of previous research examining depression implicitly.

A. Implicit Depression Findings

A few studies examined processes involved in depression using implicit tasks. One such task, the Implicit Association Test (IAT), assesses the strength of associations of different concepts (Greenwald, McGhee, & Schwartz, 1998). In one version of the test: the “Depression IAT,” each of two concepts (e.g., me, not-me) is paired with one of two other concepts (e.g., sad, happy; e.g., Dentale et al., 2016). Participants are then required to categorize words or pictures as belonging to one or the other paired-concept category (e.g., me/happy versus not-me/sad). If the paired concepts are congruent with each other (e.g., me/happy), categorizing the words should be easier and result in lower response times than when they are incongruent (e.g., me/sad). In one IAT study (Meites, Deveney, Steele, Holmes, & Pizzagalli, 2008), both never depressed (controls) and remitted depressed individuals evidenced positive bias. However, compared to controls, positive bias was significantly reduced in remitted depressed people as indicated by weaker associations of self-related words with positive words.

In another implicit task, the Implicit Relational Assessment Procedure (IRAP), participants determine whether a statement comprised of an antecedent (e.g., “When things go badly...”) and an emotional response (e.g., “...I feel happy”) are true or false. Moreover, participants are instructed to provide answers that would be consistent with generally accepted truths (e.g., “When things go badly, I feel happy” - *false*) on some trials and inconsistent (e.g., “When things go badly, I feel happy” - *true*) on other trials. When identifying statements with positive emotional responses as true is faster than identifying them as false, a positive response bias is assumed; and when identifying statements with negative responses as false faster than as true, a negative response bias is assumed. Similarly to the IAT, the IRAP findings indicate that depressed individuals are more likely to experience decreased positive bias than do their non-depressed counterparts (Hussey & Barnes-Holmes, 2012).

Two studies implemented the Two-Alternative Forced-Choice (2AFC) task to examine differences between none, some, and high *loss of interest* symptoms (Winer, 2012). During the 2AFC trials, an initial word (e.g., paper) was presented subliminally (6.4ms) and followed by two response options (e.g., paper and cord), one of which was the same as the initial word. A participant needed to choose which of the two words was presented subliminally. Importantly, because the two response options were matched on valence (i.e., positive, neutral, or negative), the 2AFC task allowed to unambiguously examine people’s processing of each class of stimuli separately. Results revealed that, unlike people reporting only some or no loss of interest, individuals reporting high loss of interest identified the positive words below the chance level (<50%). However, the groups did not differ in identification accuracy of negative or neutral words.

Another procedure, the approach-avoidance task (AAT), investigates motivational tendencies via the embodied cognition mechanism (Niedenthal, Winkielman, Mondillon, & Vermeulen, 2009). Specifically, participants push or pull a joystick lever as accurately and as quickly as possible in response to images. The AAT measures approach-avoidance tendencies indirectly because participants are asked to respond to content-irrelevant aspects of images (e.g., horizontal/vertical orientation, color of a surrounding frame). An avoidance tendency is inferred when participants reaction times of pushing the joystick lever (i.e., arm flexion) are lower to negative or positive pictures than to neutral ones. A recent study also indicated that duration times (rather than reaction times) of joystick movements may be a sensitive index of approach motivation (Bartoszek & Winer, 2015). Specifically, depressed individuals pulled the positive images for a shorter amount of time than neutral images in comparison to controls who pulled the positive images longer than neutral ones.

In sum, implicit procedures consistently indicate impaired or decreased responses to positive information among depressed individuals as compared to non-depressed people. Because of the consistency of these findings, a similar trend may be assumed for the IMDES, and this approach (i.e., recruitment of depressed and non-depressed individuals) was used to further validate this implicit measure of emotions.

B. Assessment of Depression

States of depression can be identified through a variety of methods (First, Spitzer, Gibbon, & Williams, 2002). Due to novelty of and for efficiency in this research endeavor, a self-report method of assessment was used. A recent study of 1977 people showed that even a single self-report item (e.g., “Have you ever suffered from depression?”) can correctly identify 83% of people as depressed or non-depressed as confirmed by the Structured Clinical Interview

for the DSM-IV (SCID; Stuart et al., 2014). An advantage of self-report measures, in contrast to diagnostic interviews, is their ability to assess disorders on a dimensional spectrum. Conversely, a person who experiences only four symptoms of Major Depressive Disorder (MDD) would be deemed non-depressed according to DSM-5 (APA, 2013). Thus, it has been argued that continuous scales provide more reliable and stable means of assessment of disorders than dichotomous ones (Brown & Barlow, 2005) with a number of researchers raising concerns about reliability of the SCID (see Watson, 2009 for discussion).

Because the Well-Being subscale of the Inventory of Depression and Anxiety Symptoms (IDAS; Appendix E) primarily measures positive affect, which as mentioned above, is particularly associated with depression, it was selected as a preselection tool. The Well-Being subscale has excellent reliability and convergent validity in relation to BDI-II and better discriminant validity (Watson et al., 2007, 2008). That is, the Well-Being subscale is significantly more strongly associated with self-report measures of depression (e.g., Beck Depression Inventory II [BDI-II], $r = -.58$) than with corresponding measures of anxiety (e.g., Beck Anxiety Inventory [BAI], $r = -.28$; Watson et al., 2007). Similarly, when comparing groups of individuals who meet and do not meet criteria for a specific disorder using SCID for the DSM-IV, mean-level differences in Well-Being scores between the two groups were large for the MDD ($d = -.89$) but moderate for Generalized Anxiety Disorder (GAD; $d = -.51$), Panic Disorder ($d = -.46$), and small to moderate for the PTSD ($d = -.39$), Social Phobia ($d = -.31$), or OCD ($d = -.37$; Watson et al., 2008). In contrast, the BDI-II and IDAS General Depression subscale evidenced non-specific associations with various disorder such that the group differences were large not only for the MDD (both $ds = 1.25$) but also for Panic Disorder, GAD, and PTSD (ds between 0.82 and 1.18). When controlling for comorbid anxiety, these findings become even

more robust with increased specificity of the Well-Being subscale to MDD and non-specificity of the BDI-II and IDAS General Depression subscale.

C. Overview and Hypotheses

In this (online) study, participants were pre-selected if they obtained high or low scores on the Well-Being subscale. They subsequently completed the IMDES, the forced-choice self-report measure of emotions, and a measure of depressive symptoms: the BDI-II. Participants also completed two additional self-report measures that are particularly related to depressed mood, the Satisfaction with Life Scale (SWLS) and the Life Orientation Test-Revised (LOT-R), which assess life satisfaction and optimism, respectively. In an online study (Shapiro, Chandler, & Mueller, 2013), the SWLS was more strongly correlated with depressive symptoms ($r = -.59, p < .001$) than with generalized anxiety ($r = -.27, p < .001$), social anxiety ($r = -.30, p < .001$), or trauma-related ($r = -.16, p < .01$) symptoms. Similarly, the LOT-R has been found to be more strongly associated with depression ($r = -.31, p < .001$) than with anxiety ($r = -.22, p < .001$) or trauma-related symptoms ($r = -.17, p < .001$; Glaesmer et al., 2012), and it uniquely predicted depression even when controlling for trait anxiety, self-esteem, neuroticism, and self-mastery (Scheier, Carver, & Bridges, 1994). Both LOT-R and SWLS measures are also highly correlated (e.g., $r = .50, p < .001$; Kostka & Jachimowicz, 2010).

I hypothesized that that people reporting low well-being (increased symptoms of depression) would obtain lower happiness and higher sadness scores on the IMDES than would those reporting high well-being (no or minimal depression symptoms). I expected no group differences in implicit anger or fear. Furthermore, I expected to find support for convergent and discriminant validity of the IMDES in that implicit happiness and sadness, but no other emotion,

would correlate with depressive symptoms measured by BDI-II, life satisfaction, and optimism. Conversely, I hypothesized less specific findings on the self-report measure of emotions.

D. Methods

1. Participants

Participants ($N = 118$), recruited via Amazon's Mechanical Turk (MTurk) website, included 57 individuals reporting high well-being (IDAS Well-Being ≥ 4.5 ; $M = 4.77$, $SD = 0.19$) and 61 reporting low well-being (IDAS Well-Being ≤ 2.5 ; $M = 2.03$, $SD = 0.41$). Participants were 44 men and 74 women between 18 and 85 years old ($M = 38.05$, $SD = 13.31$). With regard to ethnic background, 98 participants self-identified as White, seven as Black, five as Latino, seven as Asian, and one as "other."

2. Materials and Measures

Twenty-eight neutral pictures (640×480 pixels), taken from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008), were presented before the main tasks to place participants in a relatively neutral/baseline state. Participants were instructed to click on a square embedded in each image (see Appendix F for an example). The square appeared in a different section of each image to ensure that participants carefully viewed the images.

Emotions were measured implicitly via the IMDES and the forced-choice self-report measure of emotions administered similarly as in Study 1. Clinical symptoms were assessed with the IDAS Well-Being and BDI-II (Appendix G). The IDAS Well-Being is an 8-item subscale assessing positive affect "experienced during the past two weeks" on a 5-point Likert scale (1 = *Not at all* to 5 = *Extremely*). The measure has excellent reliability and convergent validity in relation to BDI-II but better discriminant validity (Watson et al., 2007, 2008). The BDI-II measures symptoms of depression and has good psychometric properties (Beck, Steer, & Brown,

1996). It consists of 21 items each answered on a 4-point Likert scale with higher scores indicating more severe levels of depression. Unlike the IDAS, the BDI-II offers cutoff scores for minimal (0-13), mild (14-19), moderate (20-28), and severe (29-63) levels of depression.

The 5-item SWLS (Diener, Emmons, Larsen, & Griffin, 1985; Appendix H) was used to assess global evaluation of one's satisfaction with life on a 7-point Likert scale (0 = *Strongly Disagree* to 4 = *Strongly Agree*). Scores range from 0 to 30 with higher scores corresponding to greater satisfaction with life. Optimism was assessed with the LOT-R (Scheier et al., 1994; Appendix I), which consists of six items used to derive the optimism score and four filler items used to disguise the purpose of the test. Respondents indicate their agreement or disagreement with each item on a 5-point scale (0 = *Strongly Disagree* to 4 = *Strongly Agree*). Scores range from 0 to 24 with higher scores corresponding to greater optimism levels.

3. Procedure

The experiment was programmed in Qualtrics (Provo, UT) and posted via the MTurk website, with a restriction to only those who had at least an 80% approval rate for their previous tasks. Respondents were presented with a consent form, completed the pre-screening measure, the IDAS Well-Being subscale, and received \$0.05 for its completion. Eligible participants (with IDAS Well-Being scores ≤ 2.5 or ≥ 4.5) were automatically offered participation in the main part of the experiment for an additional \$0.80.

Participants viewed the 28 neutral images. Each image was presented one at a time for three seconds, and participants were instructed to click on a square embedded in each image. They then completed the IMDES and the forced-choice self-report measure of emotions followed by assessment of optimism (LOT-R), life satisfaction (SWLS), and depressive symptomatology (BDI-II). Lastly, they provided demographic information.

E. Results

On the IMDES, all the participants rated at least 15 of the 20 abstract images. However, two people failed to rate five of the 20 images, eight failed to rate four images, six failed to rate three images, 11 failed to rate two images, and 21 failed to rate one image. Overall, participants did not rate 103 (4.4%) of the 2,360 IMDES trials that were presented. The high and low well-being groups did not differ in the number of unrated IMDES images, $t(116) = 0.38, p = .705, d = 0.07$. Moreover, the number of missing IMDES data was not correlated with the self-reported well-being, $r = -.03, p = .726$, depression symptoms, $r = .12, p = .215$, life satisfaction, $r = .00, p = .984$, or optimism, $r = .02, p = .827$. To correct for missing data, the IMDES scores were adjusted in the same manner as in Study 1.

Figure 4 (top) presents implicit emotion scores as a function of the group. Results indicated a significant Group \times Implicit Emotion interaction, $F(3, 114) = 4.92, p = .003, \eta_p^2 = .12$. As predicted, compared to individuals reporting high well-being, those with diminished well-being attributed less happiness, $t(116) = 3.22, p = .002, d = 0.59$, and also more sadness, $t(116) = 2.96, p = .004, d = 0.55$, to the abstract painting images. Importantly, the groups did not differ in attributions of anger, $t(116) = 0.48, p = .633, d = 0.09$, or fear, $t(116) = 0.12, p = .908, d = 0.02$ (the groups also did not differ in the extent of selecting the “none” response option, $t(116) = 0.45, p = .653, d = 0.08$).

The self-reports of emotion data were positively skewed and thus were log-transformed. Figure 4 (bottom) presents self-reported (forced-choice) emotion scores as a function of group. There was a significant Group \times Forced-Choice Emotion interaction, $F(3, 114) = 10.19, p < .001, \eta_p^2 = .21$. In comparison to the high well-being group, the low well-being individuals reported less happiness, $t(116) = 4.65, p < .001, d = 0.85$, more sadness, $t(116) = 3.71, p < .001$,

$d = 0.69$, more fear, $t(116) = 3.68$, $p < .001$, $d = 0.68$, and marginally more anger, $t(116) = 1.69$, $p = .094$, $d = 0.31$.

1. Secondary Analyses

Independent t-tests revealed that compared to individuals reporting high levels of well-being, those with low well-being scores reported more severe depressive symptoms (BDI-II), $t(116) = 8.42$, $p < .001$, $d = 1.56$, lower satisfaction with life (SWLS), $t(116) = 12.63$, $p < .001$, $d = 2.33$, and lower optimism levels (LOT-R), $t(116) = 9.45$, $p < .001$, $d = 1.75$. Table 1 presents means and standard deviations of these variables in each group.

Importantly, as evident in Table 2, correlations between the implicit emotion scores and the other self-reported measures supported the convergent and discriminant validity of the IMDES. Specifically, results indicated support for convergent validity of the implicit measure in that implicit happiness was negatively correlated with self-reported depression symptoms and positively correlated with self-reported well-being, life satisfaction, and optimism. Moreover, implicit sadness was positively correlated with self-reported depression and negatively correlated with self-reported well-being and life satisfaction. However, neither anger nor fear correlated significantly with any of the self-reported responses supporting discriminant validity of the IMDES.

Results also supported incremental validity of the IMDES in that even when controlling for self-reported happiness, implicit happiness continued to correlate with reported well-being ($r = .20$, $p = .028$). Similarly, when controlling for self-reported sadness, implicit sadness remained with reported well-being ($r = -.23$, $p = .014$) and depression symptoms ($r = .24$, $p = .009$).

Correlations of the self-reported emotions with other self-report measures evidenced little to no specificity. That is, except for non-significant correlation between self-reported anger and

well-being, *all* reported emotions correlated with reported well-being, depression symptoms, life satisfaction, and optimism.

F. Discussion

Findings of Study 2 supported the sensitivity of the implicit measure in that low well-being participants obtained lower implicit happiness scores and higher implicit sadness scores than did high well-being individuals. Results also supported the specificity of the IMDES in that the two groups did not differ in levels of implicitly assessed anger or fear. Conversely, the self-report measure evidenced much lower specificity such that the low (versus high) well-being group reported lower happiness, higher sadness, higher fear levels, and marginally higher anger. This lower specificity was found even though, similarly to the IMDES, the self-report measure employed a forced-choice scale.

Correlational analyses showed a similar pattern of results. The IMDES demonstrated specificity in that neither implicit anger nor implicit fear correlated with any of the measures. However, both implicit happiness and sadness were correlated with self-reported well-being, depressive symptoms, and life satisfaction in the expected direction. Higher implicit happiness scores were also linked to higher optimism levels. Moreover, implicit happiness correlated with well-being scores, and implicit sadness was associated with well-being and depression scores even when controlling for the corresponding self-reported emotions. Such support for incremental validity of the IMDES demonstrates its value in emotion research. In contrast to the IMDES findings, the self-report measure evidenced little specificity. Specifically, 15 of the 16 correlations among the four self-reported emotions and the four measures of dispositional affective tendencies were significant.

The study had limitations. Participants were pre-selected based on self-reported levels of well-being/depression. Future study could utilize clinician-administered measures of clinical symptomatology (e.g., SCID). Nonetheless, there was a large effect size in BDI-II scores ($d = 1.56$) between the two well-being groups in the current study, with one group reporting no to minimal symptoms of depression and the other falling within the moderate range. It is, then, likely that there would be meaningful differences in clinical presentation of depression between the two groups.

IV. GENERAL DISCUSSION

The findings of the two studies support capability of the IMDES to assess momentary and dispositional emotions. In Study 1, those induced to feel angry or afraid attributed more anger or fear, respectively, to the IMDES images than did control condition participants. Although the experimental groups did not differ in implicit sadness, the sadness group rated more images as expressing sadness than as expressing anger or fear. In Study 2, individuals reporting low (versus high) levels of well-being inferred less happiness and more sadness in the IMDES images. Moreover, data provided support for convergent and discriminant validity of the IMDES in that implicit happiness and sadness, but not anger or fear, correlated with self-reported depression, life satisfaction, and/or optimism. Some of these correlations remained significant even when controlling for self-reported happiness or sadness providing support for the incremental validity of the implicit measure.

Results on the self-report measures were much less specific. In Study 1, participants in each emotion-induction condition (i.e., anger, fear, sadness) reported elevated levels of *all* negative emotions compared to the control condition participants. In Study 2, the low (versus high) well-being group reported feeling less happy as well as sadder, more fearful, and (marginally) angrier. Correlational data also revealed that self-report measures lacked specificity in that *all* self-reported emotions were associated with self-reported measures of well-being, depression, optimism, and life satisfaction—constructs that are primarily linked to depression and thus feelings of happiness and sadness (e.g., Glaesmer et al., 2012; Shapiro et al., 2013). These findings indicate that although self-report emotion measures can index people's positive and negative affect, they are inadequate in differentiating distinct emotional states (cf. Mauss & Robinson, 2009; Quigley et al., 2014). These non-specific results of self-reports are consistent

with previous research (e.g., Bartoszek & Cervone, 2015, 2016; Dukalski, Quirin, Kersting, Suslow, & Donges, 2017). However, unlike in prior research, in which participants reported their emotions primarily on Likert scales, the studies presented here employed a self-report emotion measure with a forced-choice scale resembling that of the IMDES. Thus results of the current studies preclude the possibility that weak specificity of the self-report emotion measures is merely a result of the scale type (i.e., Likert versus forced-choice).

As argued previously (e.g., Bartoszek & Cervone, 2016; Quirin, Kazén, & Kuhl, 2009), the discrepancies between the two types of measures may be related to the fact that processes utilized in self-reporting are different from processes underlying responses to implicit measures (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009). That is, self-report measures rely on controlled, deliberate, reflective processes whereas implicit measures tap into automatic, heuristic, reflexive processes (Nosek et al., 2011). Consequently, when self-reporting emotions, a respondent relies not only on experiential knowledge but also on semantic knowledge including situation-specific and idiosyncratic-related beliefs (Robinson & Clore, 2002). Rather than answering the “how am I feeling right now?” question, the respondent may instead be answering the question of “how would/should I feel in this situation?” or “how do I usually feel?” generating a number of conceivable emotional reactions (e.g., anger, fear, sadness). In contrast, on the implicit emotion measures, the respondent answers the heuristic question of “how do I feel about this (e.g., the abstract painting)?” requiring one to rely on his or her *current* emotional state as information (Schwarz & Clore, 1983; Schwarz, 2011).

That self-report and implicit measures employ different processes has important implications for predictive validity of these measures. Although self-reported emotions often predict self-reports of various affective experiences, implicit emotion measures are comparatively

more robust in predicting other emotion-laden phenomena including psychophysiological responses (e.g., Abercrombie, Kalin, & Davidson, 2005; Bartoszek & Cervone, 2015; Quirin, Kazén, Rohrmann, et al., 2009), behavioral tendencies (Winkielman & Berridge, 2004), or responses to subliminally presented stimuli (Weinberger et al., 1997). This differential predictive capability of the two measures highlights the utility of an implicit emotion measure such as the IMDES in affective science.

Akin to failures of self-report measures to capture certain aspects of affective phenomena, the implicit measures are not without their limits. As exemplified by findings of Study 2, the IMDES can fall short of capturing emotions (e.g., sadness) under certain conditions (e.g., when respondents are purposely or inadvertently prompted to focus their attention on the actual cause of their emotions; Schwarz, 2011). Thus the IMDES, like any other type of emotion measure, would ideally be used together with other measures of affective experiences including subjective self-reports, behavioral observations, and/or psychophysiological recordings. Affective experiences are multicomponent phenomena and no single measure may be able to fully capture them (Bland et al., 2016). Although the IMDES can be used as a stand-alone assessment method, a multi-method measurement could offer a much more comprehensive insight into one's emotional experiences than would any one method alone.

It is important to consider here whether demand characteristics, rather than actual emotions, could have led to the IMDES findings. This possibility seems unlikely for a couple of reasons. If participants in Study 1 were merely responding according to demand characteristics, those in the sadness condition should have attributed more sadness to the abstract images, but that was not the case. Moreover, in both studies, demand characteristics would have yielded a similar pattern of responses on the implicit and self-report measures. Yet, the two measures

indicated somewhat different levels of emotions. Similarly, self-reported and implicitly assessed emotions were differentially correlated with certain affective constructs.

Future research examining psychometric properties of the IMDES should take a number of considerations into account. It would be useful to investigate the extent to which the IMDES responses correspond to non-self-report responses including clinical interviews data, neuroimaging, action tendencies, psychophysiological activity, facial expressions, and others. Implementing a number of measures that capture a range of affective experiences within a single study would accomplish this goal. Furthermore, longitudinal studies could provide additional information about the validity of the IMDES over time. In one study, Jordan and colleagues (2016) showed that happiness—indexed by an implicit measure similar to the AERT—was inversely correlated with fear of happiness one year later. Future studies should test the predictive validity of the IMDES.

It is conceivable that modifying some of features of the IMDES could further enhance its validity. For example, on the AMP, simply asking participants (in addition to the standard instructions) to “rely on their intuition or first feeling” when judging the Chinese ideographs more than doubled the effect size (De Houwer & Smith, 2013, p. 302). It would also be interesting to test IMDES responses to stimuli other than abstract paintings (e.g., artificial words; cf. Quirin, Kazén, & Kuhl, 2009). Moreover, the IMDES currently uses linguistic emotion terms even though the process of labeling emotions may be sufficient to alter one’s emotional states (Lieberman et al., 2007). One solution could be replacing the emotion labels (i.e., anger, fear, sadness, happiness, and none) with schematic faces (cf. Bouhuys et al., 1995; Hamlin, 2002). Lastly, the measure’s “none” option may be, at the least, unnecessary (cf. Payne et al., 2010; Payne & Lundberg, 2014). Removing this option could improve sensitivity of the IMDES by

increasing the frequency with which other response options—that corresponds to the respondents' emotional states—are chosen. Future research should test these possibilities.

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Table 1
Means (and Standard Deviations) of Self-Reported Depression, Life Satisfaction, and Optimism

Measures	Well-Being Group	
	Low	High
BDI-II	25.20 (13.34)	7.05 (9.56)
SWLS	9.21 (6.68)	23.72 (5.72)
LOT-R	8.13 (6.02)	17.86 (5.08)

Note. BDI-II = Beck Depression Inventory; SWLS = Satisfaction with Life Scale; LOT-R = Life Orientation Test-Revised (optimism).

Table 2
Correlations of Self-Reported and Implicit Emotions with Self-Reported Well-Being, Depression, Life Satisfaction, and Optimism

Measure	Well-Being	BDI-II	SWLS	LOT-R
Implicit				
Anger	-.06	.03	-.04	-.04
Fear	.05	.01	.07	.07
Sadness	-.26^{**}	.28^{**}	-.20[*]	-.15 [†]
Happiness	.27^{**}	-.26^{**}	.19[*]	.20[*]
Self-Reported				
Anger	-.15	.29^{**}	-.25^{**}	-.27^{**}
Fear	-.32^{***}	.41^{***}	-.36^{***}	-.40^{***}
Sadness	-.37^{***}	.61^{***}	-.43^{***}	-.49^{***}
Happiness	.42^{***}	-.51^{***}	.51^{***}	.51^{***}

Note. BDI-II = Beck Depression Inventory; SWLS = Satisfaction with Life Scale; LOT-R = Life Orientation Test-Revised.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

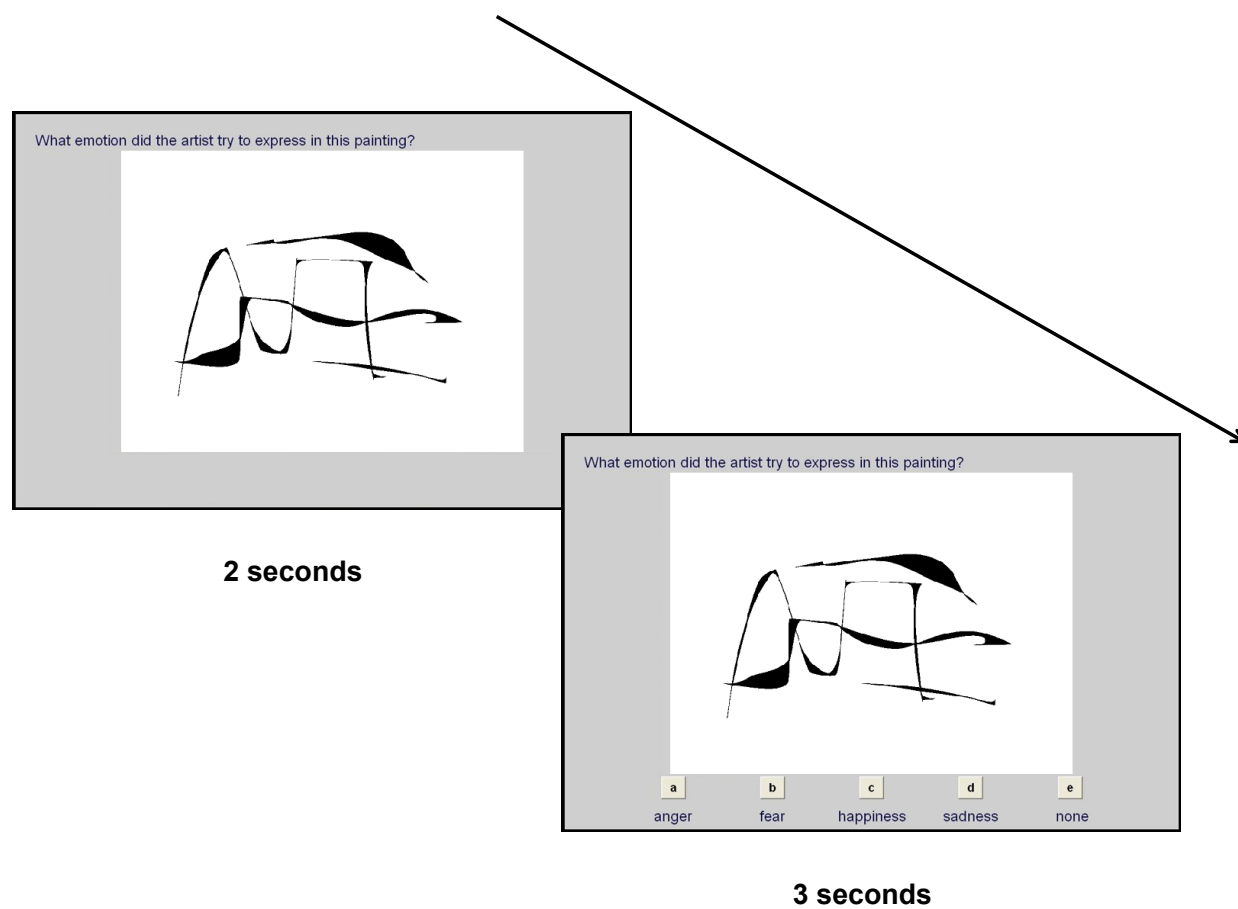


Figure 1. Illustration of an IMDES trial.

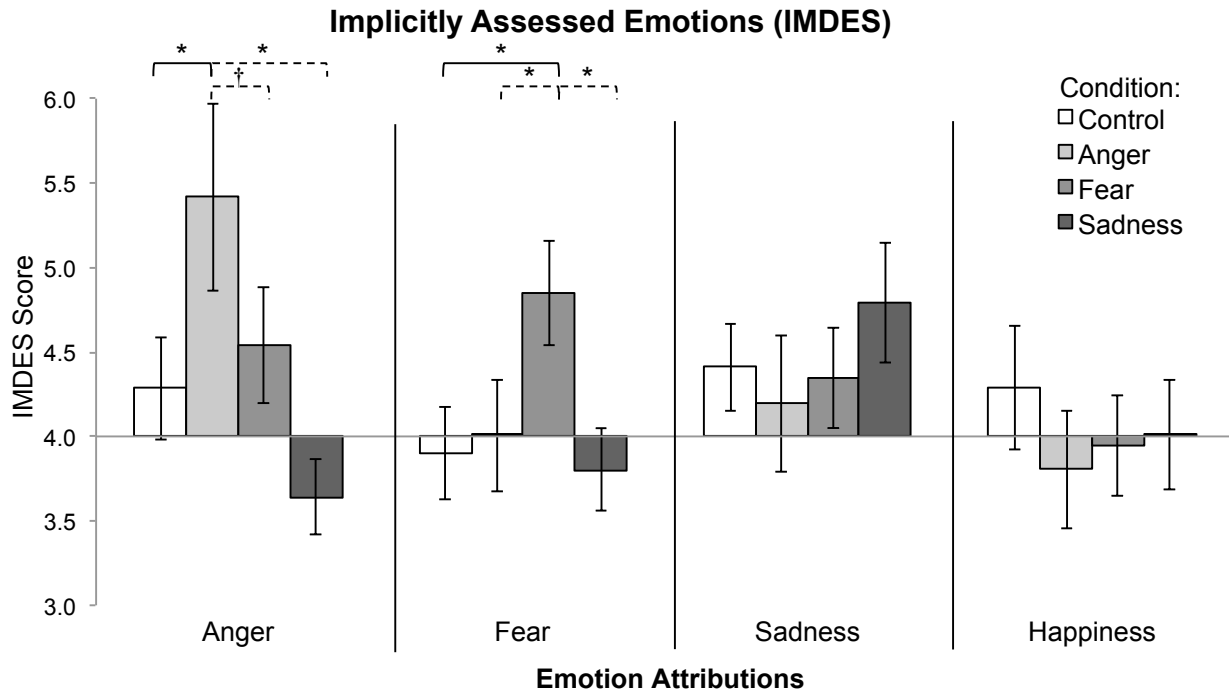


Figure 2. Emotions assessed via the Implicit Measure of Distinct Emotional States (IMDES) as a function of the emotion-induction condition. Error bars represent standard errors of the means. Solid lines represent planned contrasts; dashed lines represent host-hoc comparisons. By chance alone, each response of the IMDES would be attributed on average to 4 paintings; thus the horizontal axes crosses the vertical axes at 4.

* $p < .05$. † $p < .10$.

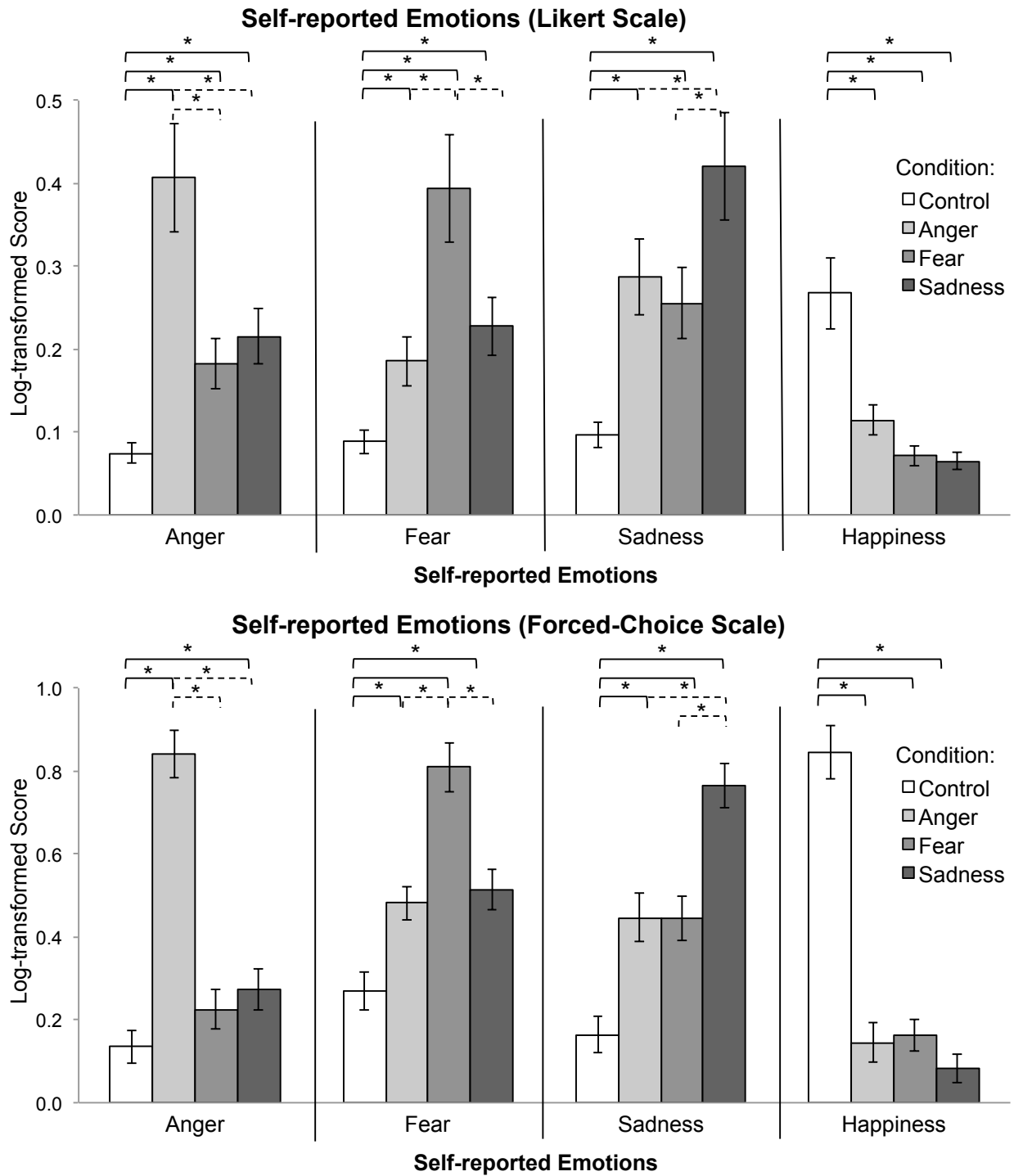


Figure 3. Emotions assessed via the Positive and Negative Affect Schedule (PANAS-X; top) and via the forced-choice self-report emotion scale (bottom) as a function of the emotion-induction conditions. Error bars represent standard errors of the means. Solid lines represent planned contrasts; dashed lines represent host-hoc comparisons.

* $p < .05$.

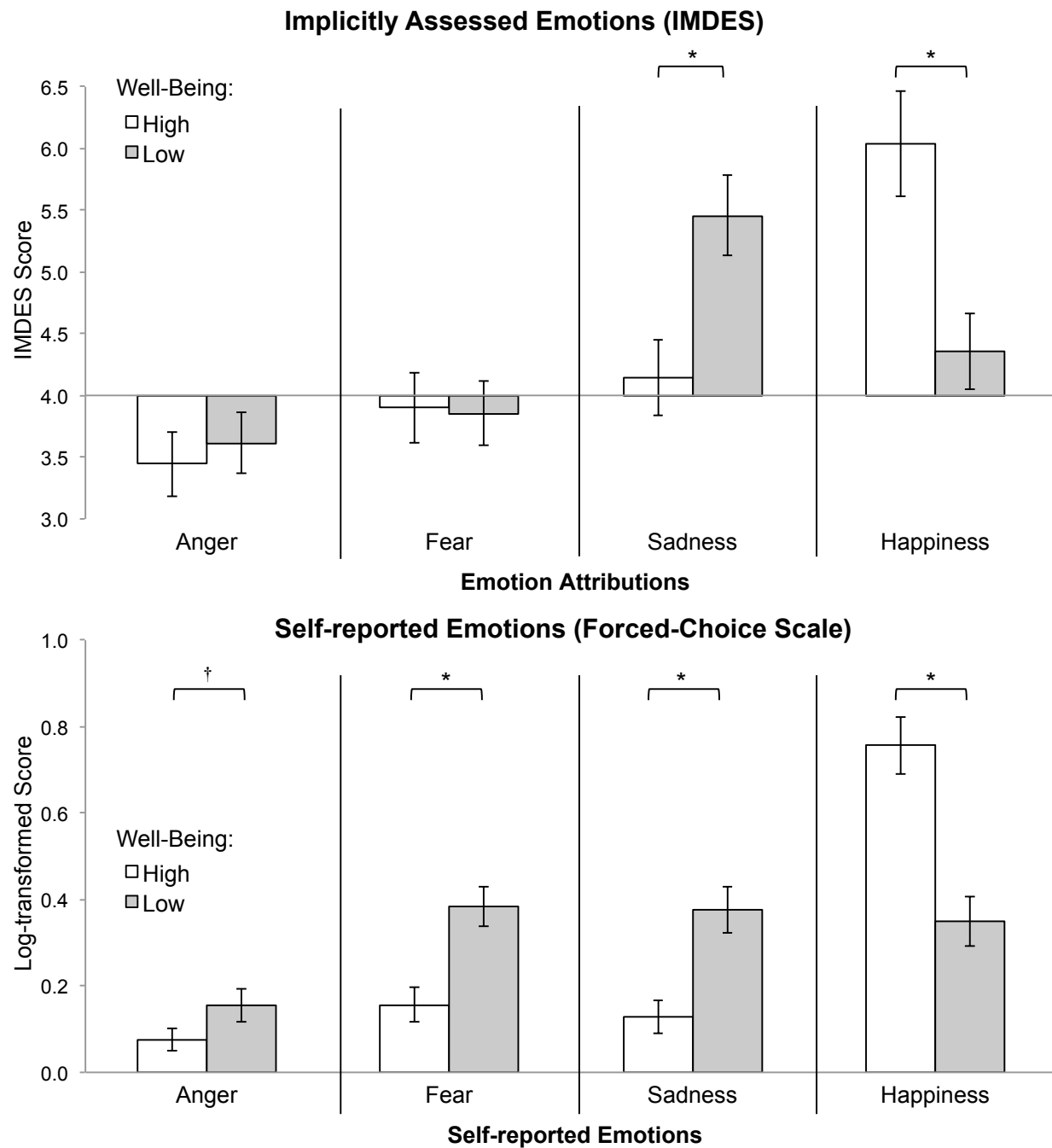


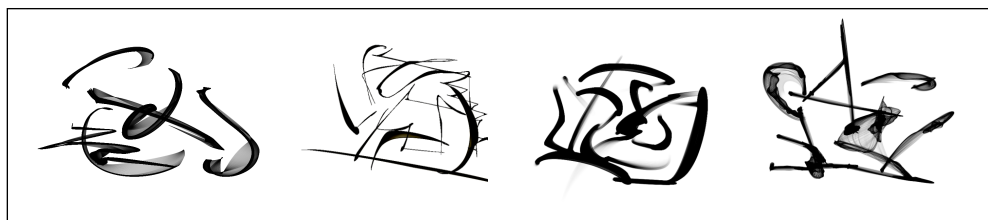
Figure 4. Emotions assessed via the IMDES (top) and the forced-choice self-report emotion scale (bottom) as a function of the well-being group. Error bars represent standard errors of the means. By chance alone, each response of the IMDES would be attributed on average to 4 paintings; thus the horizontal axes crosses the vertical axes at 4.

* $p < .05$. † $p < .10$.

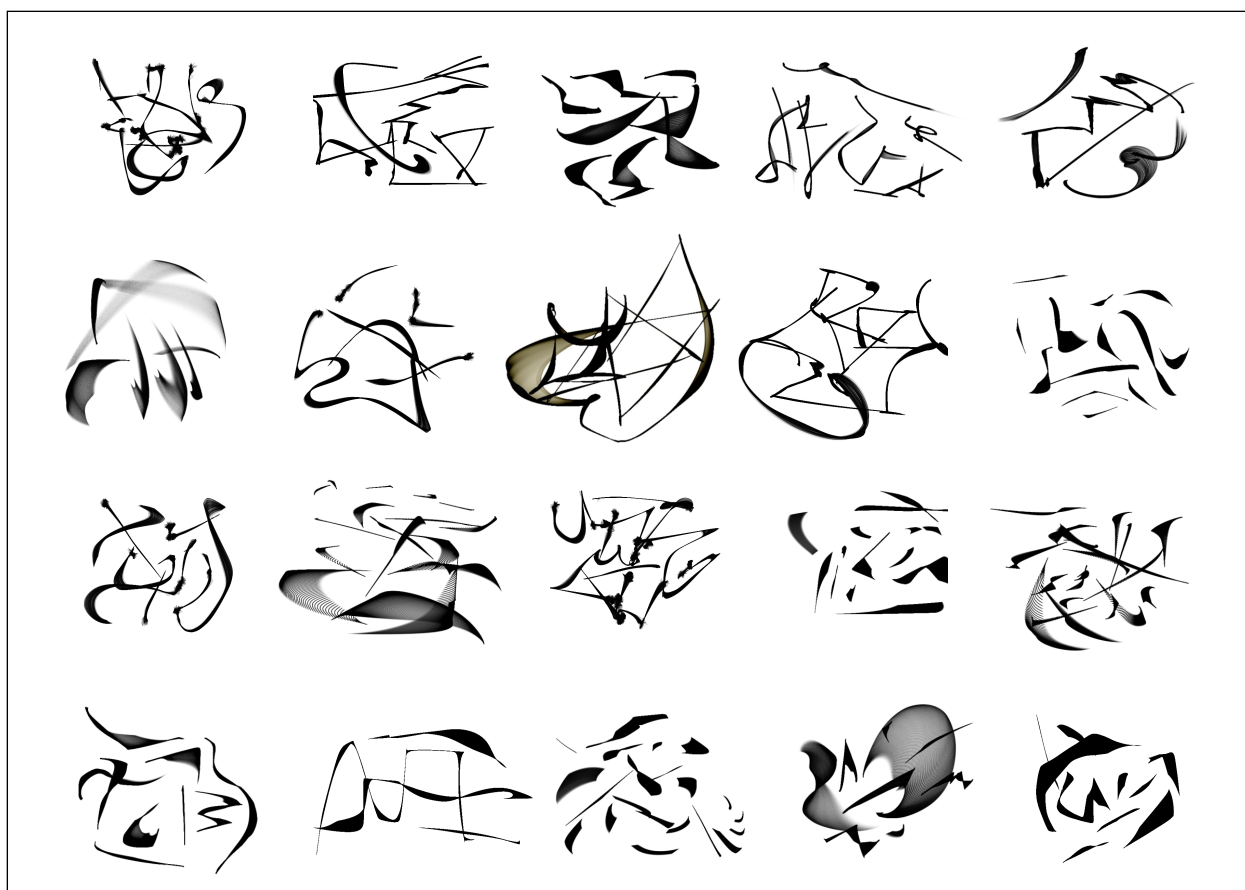
Appendix A

IMDES images:

- Practice Trials



- Actual Trials



Appendix B

Subscales of the Expanded Form of Positive and Negative Affect Schedule (PANAS-X)

1	2	3	4	5
Not at All	A little	Moderately	Quite a bit	Extremely

<u>Subscale</u>	<u>Items</u>
Hostility/Anger	angry, hostile, irritable, scornful, disgusted, loathing
Fear	afraid, scared, frightened, nervous, jittery, shaky
Sadness	sad, blue, downhearted, alone, lonely
Joviality/Happiness	happy, joyful, delighted, cheerful, excited, enthusiastic, lively, energetic

Appendix C

The Forced-Choice Self-Report Measure of Emotions

1. Angry Fearful Happy Sad None
2. Irritated Afraid Delighted Blue None
3. Disgusted Scared Cheerful Downhearted None
4. Loathing Worrying Relaxed Discouraged None
5. Peeved Frightened Joyful Lonely None
6. Grouchy Nervous Carefree Alone None
7. Annoyed Timid Lively Unhappy None
8. Spiteful Impatient Pleased Miserable None
9. Resentful On Edge Friendly Hopeless None
10. Bitter Restless Enthusiastic Helpless None
11. Rebellious Jittery Affectionate Worthless None
12. Furious Terrified Excited Desperate None
13. Bad-Tempered Shaky Steady Unworthy None
14. Cross Tense Peaceful Gloomy None
15. Enraged Petrified Glad Destroyed None
16. Mad Anxious Satisfied Low None
17. Outraged Horrified Good-Natured Terrible None
18. Incensed Upset Good Sunk None
19. Hostile Panicky Secure Awful None
20. Scornful Uneasy Pleasant Forlorn None

Appendix D

Deception script presented verbally at the beginning of Study 1:

“I will tell you now about the purpose of the study and the tasks you will be involved in. While thinking of an event from the past, people are often distracted by everyday activities – text messages, phone calls, or school- and job-related tasks. Later on, they may think of the same event differently because their impression of it might have been changed by the distracting tasks. In this study, we are trying to investigate how distraction during recollection of an event affects later impression of that event.

You will be asked to complete three main tasks. First, you will be asked to recall an event from the past and write a detailed description of it for 8 minutes. Second, after 8 minutes, you will complete a distracter task – that is, you will see and rate some pictures. At the end, you will be asked about your impression of the event you recalled earlier. In different conditions we show participants different sets of pictures to see how these pictures interfere with people’s later impression of the event.”

Appendix E

The Well-Being subscale of the Inventory of Depression and Anxiety Symptoms (IDAS)

Below is a list of feelings, sensations, problems, and experiences that people sometimes have.

Read each item to determine how well it describes your recent feelings and experiences. Then

select the option that best describes **how much** you have felt or experienced things this way

during the past two weeks, including today. Use this scale when answering:

1	2	3	4	5
Not at all	A little bit	Moderately	Quite a bit	Extremely

1. I was proud of myself
2. I felt optimistic
3. I felt that I had accomplished a lot
4. I looked forward to things with enjoyment
5. I felt hopeful about the future
6. I felt that I had a lot to look forward to
7. I felt like I had a lot of interesting things to do
8. I felt like I had a lot of energy

Appendix F

An example of a neutral image in study 2.



Appendix G

Beck Depression Inventory II (BDI-II)

Please read each group of statements carefully, and then pick out the **one statement** in each group that describes the way you have been feeling during **the past two weeks, including today**.

If several statements in the group seem to apply equally well, select the highest number for that group. Be sure that you do not choose more than one statement for any group.

1. Sadness

- 0 I do not feel sad
- 1 I feel sad much of the time
- 2 I am sad all the time
- 3 I am so sad or unhappy that I can't stand it

2. Pessimism

- 0 I am not discouraged about my future
- 1 I feel more discouraged about my future than I used to be
- 2 I do not expect things to work out for me
- 3 I feel my future is hopeless and will only get worse

3. Past Failure

- 0 I do not feel like a failure
- 1 I feel I have failed more than I should have
- 2 As I look back, I see a lot of failures
- 3 I feel I am a total failure as a person

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy

- 1 I don't enjoy things as much as I used to
- 2 I get very little pleasure from the things I used to enjoy
- 3 I can't get any pleasure from the things I used to enjoy

5. Guilty Feelings

- 0 I don't feel particularly guilty
- 1 I feel guilty over many things I have done or should have done
- 2 I feel quite guilty most of the time
- 3 I feel guilty all of the time

6. Punishment Feelings

- 0 I don't feel I am being punished
- 1 I feel I may be punished
- 2 I expect to be punished
- 3 I feel I am being punished

7. Self-Dislike

- 0 I feel the same about myself as ever
- 1 I have lost confidence in myself
- 2 I am disappointed in myself
- 3 I dislike myself

8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual
- 1 I am more critical of myself than I used to be
- 2 I criticize myself for all of my faults
- 3 I blame myself for everything bad that happens

9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself
- 1 I have thoughts of killing myself, but I would not carry them out
- 2 I would like to kill myself
- 3 I would kill myself if I had the chance

10. Crying

- 0 I don't cry any more than I used to
- 1 I cry more than I used to
- 2 I cry over every little thing
- 3 I feel like crying, but I can't

11. Agitation

- 0 I am no more restless or would up than usual
- 1 I feel more restless or would up than usual
- 2 I am so restless or agitated that it's hard to stay still
- 3 I am so restless or agitated that I have to keep moving or doing something

12. Loss of Interest

- 0 I have not lost interest in other people or activities
- 1 I am less interested in other people or things than before
- 2 I have lost most of my interest in other people and things
- 3 It's hard to get interested in anything

13. Indecisiveness

- 0 I make decisions about as well as ever
- 1 I find it more difficult to make decisions than usual

- 2 I have much greater difficulty in making decisions than I used to
- 3 I have trouble making any decisions

14. Worthlessness

- 0 I do not feel I am worthless
- 1 I don't consider myself as worthwhile and useful as I used to
- 2 I feel more worthless as compared to other people
- 3 I feel utterly worthless

15. Loss of Energy

- 0 I have as much energy as ever
- 1 I have less energy than I used to have
- 2 I don't have enough energy to do very much
- 3 I don't have enough energy to do anything

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern
- 1a I sleep somewhat more than usual
- 1b I sleep somewhat less than usual
- 2a I sleep a lot more than usual
- 2b I sleep a lot less than usual
- 3a I sleep most of the day
- 3b I wake up 1-2 hours early and can't get back to sleep

17. Irritability

- 0 I am no more irritable than usual
- 1 I am more irritable than usual

2 I am much more irritable than usual

3 I am irritable all the time

18. Changes in Appetite

0 I have not experienced any change in my appetite

1a My appetite is somewhat less than usual

1b My appetite is somewhat greater than usual

2a My appetite is much less than before

2b My appetite is much greater than usual

3a I have no appetite at all

3b I crave food all the time

19. Concentration Difficulty

0 I can concentrate as well as ever

1 I can't concentrate as well as usual

2 It's hard to keep my mind on anything for very long

3 I find I can't concentrate on anything

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual

1 I get more tired or fatigued more easily than usual

2 I am too tired or fatigued to do a lot of the things I used to do

3 I am too tired or fatigued to do most of the things I used to do

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex

1 I am less interested in sex than I used to be

- 2 I am much less interested in sex now
- 3 I have lost interest in sex completely

Appendix H

Satisfaction with Life Scale (SWLS)

Indicate your agreement or disagreement with each of the five statements below. Please be open and honest in your responding.

0	1	2	3	4	5	6
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree

1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am not satisfied with my life.
4. So far I have gotten the important things I want in my life.
5. If I could live my time over, I would change almost nothing.

Appendix I

Life Orientation Test (LOT-R)

Indicate how much you agree or disagree with each statement. Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no "correct" or "incorrect" answers. Answer according to your own feelings, rather than how you think "most people" would answer.

0	1	2	3	4
I disagree a lot	I disagree a little	I neither agree nor disagree	I agree a little	I agree a lot

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax. (filler)
3. If something can go wrong for me, it will. (reverse-scored)
4. I'm always optimistic about my future.
5. I enjoy my friends a lot. (filler)
6. It's important for me to keep busy. (filler)
7. I hardly ever expect things to go my way. (reverse-scored)
8. I don't get upset too easily. (filler)
9. I rarely count on good things happening to me. (reverse-scored)
10. Overall, I expect more good things to happen to me than bad.

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

**Approval Notice
Initial Review (Response to Modifications)**

July 23, 2012

Grzegorz Bartoszek, BA
Psychology
1007 W Harrison
M/C 285
Chicago, IL 60612
Phone: (847) 322-8430 / Fax: (312) 413-7856

**RE: Protocol # 2012-0582
"Perception and behavior"**

Dear Mr. Bartoszek:

Your Initial Review (Response to Modifications) was reviewed and approved by the Expedited review process on July 23, 2012. You may now begin your research

Please note the following information about your approved research protocol:

Protocol Approval Period: July 23, 2012 - July 22, 2013

Approved Subject Enrollment #: 350

Additional Determinations for Research Involving Minors: The Board determined that this research satisfies 45CFR46.404, research not involving greater than minimal risk. Wards of the State may not be enrolled unless the IRB grants specific approval and assures inclusion of additional protections in the research required under 45CFR46.409. If you wish to enroll Wards of the State contact OPRS and refer to the tip sheet.

Performance Sites: UIC

Sponsor: None

PAF#: Not Applicable

Research Protocol(s):

- a) Perception and Behavior; Version 1; 07/05/2012

Recruitment Material(s):

- a) UIC Psych Subject Pool recruitment procedures will be followed

Informed Consent(s):

- a) Agreement to Participate in Perception and Behavior Study; Version 2; 07/11/2012
- b) Debriefing Statement; Version 1; 07/23/2012

Parental Permission(s):

- a) A waiver of parental permission has been granted under 45 CFR 46.116(d) and 45 CFR

46.408(c); however, as per UIC Psychology Subject Pool policy, at least one parent must sign the Blanket Parental Permission document prior to the minor subject's participation in the UIC Psychology Subject Pool.

Your research meets the criteria for expedited review as defined in 45 CFR 46.110(b)(1) under the following specific category:

(7) Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
07/09/2012	Initial Review	Expedited	07/10/2012	Modifications Required
07/18/2012	Response to Modifications	Expedited	07/23/2012	Approved

Please remember to:

→ Use your **research protocol number** (2012-0582) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the enclosure,
"UIC Investigator Responsibilities, Protection of Human Research Subjects"

Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 996-9299. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Marissa Benni, M.S.
 IRB Coordinator, IRB # 2
 Office for the Protection of Research Subjects

Enclosure(s):

1. **UIC Investigator Responsibilities, Protection of Human Research Subjects**
2. **Informed Consent Document(s):**

- a) Agreement to Participate in Perception and Behavior Study; Version 2; 07/11/2012
- b) Debriefing Statement; Version 1; 07/23/2012

cc: Jon D. Kassel, Psychology, M/C 285
 Daniel P. Cervone, Psychology, M/C 285

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

**Approval Notice
Initial Review (Response To Modifications)**

July 16, 2008

Daniel P. Cervone, PhD
Psychology
1007 W. Harrison St.
1018-D B.S.B., M/C 285
Chicago, IL 60607-7137
Phone: (312) 413-2632 / Fax: (312) 413-4122

RE: **Protocol # 2008-0491**
"Thinking and Feeling"

Dear Dr. Cervone:

Your Initial Review application (Response To Modifications) was reviewed and approved by the Expedited review process on July 9, 2008. You may now begin your research.

Please note the following information about your approved research protocol:

Protocol Approval Period: July 9, 2008 - July 8, 2009

Approved Subject Enrollment #: 200

Additional Determinations for Research Involving Minors: The Board determined that this research satisfies 45CFR46.404, research not involving greater than minimal risk. Therefore, in accordance with 45CFR46.408, the IRB determined that only one parent's/legal guardian's permission/signature is needed. Please see Parental Permission below.

Performance Site: UIC

Sponsor: None

Research Protocol:

- b) Thinking and Feeling, Protocol; Version 1; 06/03/2008

Recruitment Material:

- b) UIC Psychology Student Subject Pool recruitment procedures will be followed

Informed Consent:

- c) Thinking and Feeling; 05/30/2008

Parental Permission:

- b) A waiver of parental permission has been granted under 45 CFR 46.116(d) and 45 CFR 46.408(c); however, as per UIC Psychology Subject Pool policy, at least one parent must sign the Blanket Parental Permission document prior to the minor subject's participation in the UIC

Psychology Subject Pool.

Your research meets the criteria for expedited review as defined in 45 CFR 46.110(b)(1) under the following specific category:

(7) Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
06/03/2008	Initial Review	Expedited	06/18/2008	Modifications Required
07/01/2008	Response To Modifications	Expedited	07/09/2008	Approved

Please remember to:

→ Use your **research protocol number** (2008-0491) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the enclosure,
"UIC Investigator Responsibilities, Protection of Human Research Subjects"

Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 996-2014. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Sandra Costello
 Assistant Director, IRB # 2
 Office for the Protection of Research Subjects

Enclosures:

- 3. UIC Investigator Responsibilities, Protection of Human Research Subjects**
- 4. Informed Consent Document:**
 - c) Thinking and Feeling;05/30/2008

cc: Gary E. Raney, Psychology, M/C 285

Gregory Bartoszek
 University of Illinois at Chicago (UIC)
 Psychology Department (M/C 285)
 1007 W. Harrison Street
 Chicago, IL 60607-7137

EDUCATION

- 2017 **University of Illinois at Chicago, Chicago, Illinois**
 Ph.D., APA-Accredited Clinical Psychology Program
Dissertation Thesis: Development and Validation of the Implicit Measure of Distinct Emotional States (IMDES)
 Advisor: Daniel Cervone, Ph.D.
- 2009 **University of Illinois at Chicago, Chicago, Illinois**
 B.A. in Psychology, *magna cum laude*
- 2002 **Kolegium Nauczycielskie, University of Silesia, Bytom, Poland**
 Major: Resocialization

AWARDS AND DISTINCTIONS

- 2015-2016 **Chancellor's Graduate Research Fellowship**, Graduate College, UIC
 – A merit-based award given to students who “show exceptional promise for future multidisciplinary research and creative activity in their fields of interest”
 Funding: \$8000
- 2015 **Provost's Award for Graduate Research**, Graduate College, UIC
 – A merit-based award given to students who “make an original, important, and novel contribution to the field of study”
 Funding: \$1250
- 2015 **Summer Research Fellowship**, Department of Psychology, UIC
 – A merit-based award given each year to one clinical Ph.D. student in the department
 Funding: \$3700
- 2013-2015 **Travel Award**, Liberal Arts and Sciences, University of Illinois at Chicago
 Funding: \$1000 total
- 2011-2015 **Presenter Award**, Graduate College, University of Illinois at Chicago
 Funding: \$800 total
- 2011-2015 **Travel Award**, Graduate Student Council, University of Illinois at Chicago
 Funding: \$825 total
- 2011-2015 **Travel Award**, Department of Psychology, University of Illinois at Chicago
 Funding: \$1300 total

RESEARCH INTERESTS

Psychopathology, affect, and cognition; implicit measurement of emotions; psychophysiology of emotions and emotion-based psychopathology; approach and avoidance motivation; PTSD, anxiety, and depression; comorbidity; treatment protocols and outcomes

PUBLICATIONS

* indicates an undergraduate mentee

- Bartoszek, G., Hannan, S. M., Kamm, J., Pamp, B., & Maieritsch, K. P.** (2017). Trauma-related pain, re-experiencing symptoms, and treatment of posttraumatic stress disorder: A longitudinal study of veterans. *Journal of Traumatic Stress, 30*, 288-295. doi:10.1002/jts.22183
- Winer, E. S., Swinea, J., **Bartoszek, G.**, & *Rojas, E., Nadorff, R., & Kilgore, J. (2017). Mapping the relationship between anxiety, anhedonia, and depression. *Journal of Affective Disorders, 221*, 289-296. doi:10.1016/j.jad.2017.06.006
- Bartoszek, G.** & Cervone, D. (2016). Toward an implicit measure of emotions: Ratings of abstract images reveal distinct emotional states. *Cognition and Emotion, 7*, 1-15. doi:10.1080/02699931.2016.1225004
- Bartoszek, G.**, & Winer, E. S. (2015). Spider-fearful individuals hesitantly approach threat, whereas depressed individuals do not persistently approach reward. *Journal of Behavior Therapy and Experimental Psychology, 46*, 1-7. doi:10.1016/j.jbtep.2014.07.012
- Winer, E.S., Salem, T., **Bartoszek, G.**, & Snodgrass, M. (2015). Major Depressive Disorder. In R. Cautin & S. Lilienfeld (Eds.), *The Encyclopedia of Clinical Psychology* (pp. 2252-2257). Hoboken, NJ: Wiley-Blackwell. doi: 10.1002/9781118625392.wbecp433
- Cervone, D. & **Bartoszek, G.** (2013). Knowledge, Appraisals, and Personality Dynamics. In D. Cervone, M. W. Eysenck, M. Fajkowska, & T. Maruszewski (Eds.), *Personality dynamics: Embodiment, meaning construction, and the social world* (Vol. 3, pp. 11-32). New York, NY: Eliot Werner Publications.
- Hannan, S., Wiedeman, L., **Bartoszek, G.**, Robinson, C., & Maieritsch, K. P. (invited resubmission). The role of substance use in treatment preferences and outcomes for veterans with posttraumatic stress symptoms.
- Ranney, R. M., Behar, E., & **Bartoszek, G.** (submitted). Information seeking in individuals intolerant of uncertainty: The maintenance of worry and distress despite reduced uncertainty.
- Jordan, D. G., Winer, E. S., Kilgore, J., **Bartoszek, G.**, Majors, K., & Wallace, A. (submitted). Reduced implicit happiness predicts explicit fear of happiness one year in the future.
- Cervone, D., Mercurio, L., **Bartoszek, G.**, & Mayer, N. D. (submitted). From blank slates to the Big Five?: A computer simulation.
- Bartoszek, G.** & Cervone, D. (in preparation). Implicitly measured fear predicts psychophysiological and behavioral responses to spider images.
- Bartoszek, G.** & Cervone, D. (in preparation). An implicit measure of emotions differentiate between depressed and anxious individuals.

CHAired CONFERENCE SYMPOSIA

Veilleux, J. C. & **Bartoszek, G.** (2014, May). *Emotions extended: Innovative methods assessing specific emotional processes*. Symposium conducted at the annual meeting of the Association for Psychological Science, San Francisco, CA.

CONFERENCE PRESENTATIONS

* indicates an undergraduate mentee

Azizoddin, D., Feeley, S., **Bartoszek, G.**, Hilton, B., Tan, A., Martin, J., ... Lehman, K. (2017, May). *The prevalence of cancer-related distress among urban-dwelling veterans: A pilot study*. Poster presented at the annual meeting of the International Society for Pharmacoeconomics and Outcomes Research, Boston, MA.

*Gallas, B., **Bartoszek, G.**, & Cervone, D. (2017, May). *Implicit emotion profiles associated with depression and trauma-related symptoms*. Poster presented at the annual meeting of the Midwestern Psychological Association, Chicago, IL.

Jordan, D. G., Majors, K., Wallace, A., **Bartoszek, G.**, Kilgore, J., & Winer, E. S. (2017, March). *Predicting fear of happiness via an implicit measure of emotion states over approximately one year*. Poster presented at the International Convention of Psychological Science, Vienna, Austria.

Bartoszek, G. & Cervone, D. (2016, May). Ratings of ambiguous images uniquely reflect and differentiate emotional states. In M. Quirin & D. Cervone (Chairs), *Implicit Affect: Elicitation, Measurement, and Effects on Behavior and Physiology*. Paper presented at the annual meeting of the Association for Psychological Science, Chicago, IL.

*Rojas, E., **Bartoszek, G.**, & Winer, E. S. (2016, May). *Avoidance-related relinquishment of enjoyability explains comorbidity between anxiety and depression*. Poster presented at the annual meeting of the Midwestern Psychological Association, Chicago, IL.

*Curtin, M. R., *Payne, J., *Ross, T., & **Bartoszek, G.** (2016, May). *Differential effects of perceived controllability on pessimism*. Poster presented at the annual meeting of the Midwestern Psychological Association, Chicago, IL.

*Garcia, J., *Gonzalez, J., & **Bartoszek, G.** (2016, May). *Emotional attention as a moderator of the relationship between perceived predictability and risk choices*. Poster presented at the annual meeting of the Midwestern Psychological Association, Chicago, IL.

Ranney, R. M., **Bartoszek, G.**, Fortune, M. R., Jendrusina, A. A., Stevens, E. S., & Behar, E. (2015, November). *Information-seeking in individuals intolerant of uncertainty: The maintenance of worry through attempts to limit uncertainty*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, IL.

Jordan, D. G., Kilgore, J., Salem, T., Swinea, J., **Bartoszek, G.**, Nadorff, M. R., & Winer, E. S. (2015, November). *Examining test-retest reliability of a novel implicit measure of distinct emotion*. Poster presented at the Neurocognitive Therapies/Translational Research Special Interest Group of the Association for Behavioral and Cognitive Therapies, Chicago, IL.

*Curtin, M. R., *Rojas, E., *Issa, Z., & **Bartoszek, G.** (2015, April). *Pessimistic outlooks and risk*

- estimates in depression and anxiety*. Poster presented at the annual meeting of the Midwestern Psychological Association, Chicago, IL.
- Bartoszek, G.** & Cervone, D. (2015, March). *Feelings as information: A new approach to emotion assessment*. Poster presented at the International Convention of Psychological Science, Amsterdam, Netherlands.
- Kamm, J., Hannan, S., **Bartoszek, G.**, & Pamp, B (2014, November). *Chronic pain and PTSD re-experiencing symptoms as a predictor of treatment outcome in a large Veteran sample*. Poster presented at the annual meeting of the International Society for Traumatic Stress Studies, Miami, FL.
- Bartoszek, G.** & Cervone, D. (2014, May). Development and validation of the Implicit Measure of Distinct Emotional States (IMDES). In J. C. Veilleux & **G. Bartoszek** (Chairs), *Emotions extended: Innovative methods assessing specific emotional processes*. Paper presented at the annual meeting of the Association for Psychological Science, San Francisco, CA.
- *Hajdini, R. & **Bartoszek, G.** (2014, May). *The relation between implicit anger and suicidality*. Poster presented at the annual meeting of the Midwestern Psychological Association, Chicago, IL.
- Bartoszek, G.**, Winer, E. S., & *Hajdini, R. (2014, March). *Revealing motivational aspects of specific phobia and depression via the modified Approach-Avoidance Task (AAT)*. Poster presented at the annual meeting of the Anxiety and Depression Association of America, Chicago, IL.
- Mercurio, L. D., Cervone, D., **Bartoszek, G.**, & Mayer, N. D. (2014, February). *Factor-analytic investigations of personality structure: Do data take the shape of your measure?* Poster presented at the annual meeting of the Society for Personality and Social Psychology, Austin, TX.
- Winer, E. S., Cervone, D., Ginger, E. J., **Bartoszek, G.**, Snodgrass, M., & Newman, L. S. (2013, May). Implicit emotion regulation, substance perception, and distress. In E. S. Winer & C. Veilleux (Chairs), *Feeling Bad but Not Knowing Why: Implicit Emotion Regulation and Emotional Distress*. Paper presented at the annual meeting of the Association for Psychological Science, Washington DC.
- Bartoszek, G.**, & Cervone, D. (2013, January). *Validation of the Implicit Measure of Emotional States (IMES)*. Poster presented at the annual meeting of the Society for Personality and Social Psychology, New Orleans, LA.
- Mercurio, L. D., **Bartoszek, G.**, Mayer, N.D., & Cervone, C. (2013, January). *Personality trait structure emerges from causal linkages among cognitive, behavioral, and affective components: A computer simulation on random input*. Poster presented at the annual meeting of Social Dynamics Pre-Conference of the Society for Personality and Social Psychology, New Orleans, LA.
- Bartoszek, G.**, & Cervone, D. (2012, January). *Beyond valence: Emotion specificity in the perception of situational outcome*. Poster presented at the Emotion Pre-Conference of the Society for Personality and Social Psychology annual conference, San Diego, CA.
- Bartoszek, G.**, & Cervone, D. (2011, January). *Measuring discrete emotions implicitly*. Poster presented at the annual meeting of Society for Personality and Social Psychology, San Antonio, TX.

Bartoszek, G., & Cervone, D. (2009, July). *An implicit measure of discrete emotional states: A preliminary investigation.* Poster presented at the annual meeting of Association for Research in Personality, Evanston, IL.

RESEARCH EXPERIENCE:

- 6/2014-Present Co-Investigator, **Laboratory for Anxiety and Research on Emotions**, Department of Psychology, UIC
 Supervisor and Co-Investigator: Evelyn Behar, Ph.D.
- Developed and conducted an experimental study examining emotional reactions and behavioral tendencies (e.g., risk-taking, avoidance) of individuals characterized by high and low intolerance of uncertainty
- 8/2009-Present Primary Investigator, **Cervone Laboratory**, Department of Psychology, UIC
 Mentor: Daniel Cervone, Ph.D.
- Examined effects of everyday emotions and emotional disorders (e.g., anxiety, depression) on: (a) psychophysiological indices (e.g., electrodermal activity, heart rate), (b) behavioral tendencies (e.g., approach-avoidance motivation), and (c) cognitive processes (e.g., evaluative judgment, risk estimates)
 - Based on the feelings-as-information theory, created and examined the validity of the Implicit Measure of Distinct Emotional States (IMDES)
- 6/2014-6/2016 Research Extern/Co-Investigator, **Trauma Services Program**, Edward Hines, Jr. VA Hospital
 Supervisor and Co-Investigator: Barbara Pamp, Ph.D.
- Helped formulate and develop a research idea examining detrimental effects of pain on re-experiencing symptoms and PTSD treatment outcomes in a Veteran sample
 - Conducted statistical analyses and drafted sections of the manuscript
- Supervisor and Co-Investigator: Laura Wiedeman, Psy.D.
- Contributed to conceptual development and statistical analyses of a research project examining (a) treatment choices in Veterans with co-occurring traumatic stress and substance use, and (b) the effectiveness of a DBT-related skills group therapy as preparation for trauma-focus treatment
- 9/2013-5/2015 Primary Investigator, **Substance Use Research Laboratory**, Department of Psychology, UIC
 Supervisor and Co-Investigator: Jon Kassel, Ph.D.
- Developed and conducted an experimental study examining attenuating effects of state anger on psychophysiological activity including startle eye blink reactions
 - Processed psychophysiological data and conducted statistical analyses
- 1/2008-8/2009 Undergraduate Research Assistant, **Cervone Laboratory**, Department of Psychology, UIC
 Supervisor: Daniel Cervone, Ph.D.
- Helped design and conduct an experimental study investigating cognitive antecedents of emotions
- 5/2007-12/2007 Undergraduate Research Assistant, **Center for Cognitive Medicine**, Department of

Psychiatry, UIC

Supervisor: Pauline Maki, Ph.D.

- Assisted with research projects investigating the effects of hormones on memory; responsibilities included: data processing, scoring neuropsychological tests, screening and scheduling participants, acting as a confederate during experiments

INVITED RESEARCH TALKS

- | | |
|---------|---|
| 3/2016 | Emotion-specific effects on ratings of ambiguous stimuli
University of Illinois at Chicago, Clinical Division Colloquium (Chicago, IL) |
| 2/2016 | Ratings of ambiguous images uniquely reflect and differentiate emotional states
University of Illinois at Chicago, Social Division Colloquium (Chicago, IL) |
| 5/2014 | Cognitive and physiological indices of anger: Implications for treatment of veterans with PTSD
Edward Hines, Jr. VA Hospital, Trauma Services Program (Hines, IL) |
| 9/2013 | Development and validation of the Implicit Measure of Distinct Emotional States (IMDES)
University of Illinois at Chicago, Social Division Colloquium (Chicago, IL) |
| 4/2012 | An implicit measure of emotions: Distinguishing among emotions of the same valence
University of Illinois at Chicago, Clinical Division Colloquium (Chicago, IL) |
| 10/2010 | Measuring emotions implicitly
University of Illinois at Chicago, Social Division Colloquium (Chicago, IL) |

CLINICAL EXPERIENCE

- | | |
|--------------|--|
| 2016-present | Jesse Brown, VA Medical Center – APA-Accredited Clinical Internship
Substance Abuse Residential Rehabilitation Treatment Program (SARRTP) and
Psychosocial Residential Rehabilitation Treatment Program (PRRTP) <ul style="list-style-type: none"> • Provided Cognitive Behavioral Therapy (CBT) for Substance Use Disorders (SUD) in individual and group formats • Developed and facilitated <i>Coping with Emotions</i> group therapy based on Dialectical Behavior Therapy (DBT) • Facilitated <i>Seeking Safety</i> group therapy for veterans with both PTSD and SUD • Used Motivational Interviewing techniques to address treatment ambivalence • Provided CBT to veterans diagnosed with Bipolar Disorder, Schizophrenia, chronic PTSD, Major Depressive Disorder (MDD), and/or Anxiety Disorders • Actively participated in weekly interdisciplinary staff meetings Psychiatry Assessment Clinic <ul style="list-style-type: none"> • Evaluated patients presenting with psychiatric crises (e.g., suicidal/homicidal behavior, acute states of psychosis) in the emergency room and made decisions regarding psychiatric admissions |
|--------------|--|

- Conducted semi-structured intake interviews for patients requesting mental health outpatient treatment for PTSD, mood and anxiety disorders, schizophrenia, and substance use problems
- Was a member of an interdisciplinary team including psychologists, social workers, nurses, and psychiatrists who often coordinated care with Emergency Room attending physicians for patients in acute crises

Outpatient Psychiatry Clinic

- Provided Prolonged Exposure (PE), Cognitive Processing Therapy (CPT), CBT, and Acceptance and Commitment Therapy (ACT) to Veterans with PTSD (particularly due to Military Sexual Trauma), MDD, anxiety, SUD, anger problems, psychosocial stressors

Day Hospital Program

- Provided psychotherapy and case management services to patients in intensive psychiatric rehabilitation program
- Facilitated Emotion Management as well as process therapy groups
- Actively participated in weekly interdisciplinary staff meetings

Supervisors: Kenneth A. Lehman, Ph.D., Jenna Sheftel, Psy.D., Ryan D. Hooper, Ph.D. Robert Walters, Ph.D., Shondale DeLoach, Ph.D., John Mundt, Ph.D., Michael Fung, Ph.D

2014-2015

University of Illinois Medical Center, Department of Psychiatry

Mood and Anxiety Disorders Program

- Provided PE and CPT to patients experiencing traumatic stress and/or depressive symptoms
- Provided psychotherapy including CBT, ACT, and DBT in hospital setting to patients diagnosed with anxiety (e.g., OCD, GAD, simple phobias) and mood disorders

Supervisor: Jennifer Francis, Ph.D.

2013-2014

Edward Hines, Jr. VA Hospital

Trauma Services Program

- Provided CPT and PE to Veterans diagnosed with PTSD, MDD, and/or SUD
- Conducted structured diagnostic assessment interviews using the Clinician Administered PTSD Scale (CAPS-5)
- Led weekly DBT-related *Skills* group therapy.
- Led bi-weekly psychoeducational group for veterans with PTSD

Supervisors: J. Richard Monroe, Ph.D., Barbara Pamp, Ph.D.

2010-2016

Department of Psychology, University of Illinois at Chicago

Office of Applied Psychological Services

- Organized and facilitated manualized *Cognitive-Behavioral Group Therapy for Social Phobia*
- Provided manualized *Behavioral Activation* treatment as well as general CBT, ACT, DBT to clients diagnosed with anxiety and mood disorders
- Administered, scored, and interpreted psychological batteries of tests; wrote comprehensive testing reports as well as provided feedback of test results and recommendations to clients
- Conducted structured clinical intake interviews

Supervisors: Nancy Dassoﬀ, Ph.D., Gloria Balague, Ph.D., Ellen Herbener, Ph.D.,
Amanda Lorenz, Ph.D.

2008-2009

Department of Psychology, University of Illinois at Chicago

InTouch Crisis Hotline

- Provided crisis intervention, counseling, and referral services to a wide range of callers struggling with chronic mental disorders, sexuality issues, suicidal ideations, family stressors

Supervisors: Andrew Sia, Ph.D.

MANUALIZED THERAPY TRAINING:

Cognitive Processing Therapy (CPT) for PTSD

- Attended 3-day VISN Regional Training Program in CPT (led by J. Richard Monroe, Ph.D.) and subsequently participated in a 6-month weekly group consultation (led by Heidi Sigmund, Psy.D.)
- Provided CPT (Chard, Resick, Monson, & Kattar, 2009) to individuals diagnosed with PTSD, Major Depressive Disorder, and/or Substance Use Disorder in VA hospital and medical center settings

Prolonged Exposure (PE) for PTSD

- Received training and provided manualized PE therapy (Foa, Hembree, & Rothbaum, 2007) to individuals diagnosed with PTSD, Major Depressive Disorder, and/or Substance Use Disorder in VA hospital and medical center settings

Cognitive-Behavioral Group Therapy for Social Phobia

- Conducted CBGT protocol (Heimberg & Becker, 2002) for a group of socially anxious community members

Behavioral Activation Treatment for Depression: Revised Treatment Manual (BATD-R)

- Conducted BATD-R protocol (Lejuez, Hopko, Acierno, Daughters, & Pagoto, 2011) for community members experiencing depressive symptoms

TEACHING EXPERIENCE

Undergraduate Research Mentor (over the course of the graduate training)

- Trained, supervised, mentored, and led weekly research didactics with 54 research assistants
- Provided training in psychophysiological measurements including facial electromyography, skin conductance, and heart rate
- Supervised a student completing the Capstone Honors Thesis
- Advised students on post-baccalaureate opportunities and graduate schools

Co-Instructor

Psychological Interventions (Fall 2015) – 2 courses

- Developed and conducted lectures on principles of Cognitive-Behavioral Therapy over a 7-week period
- Helped create the syllabus, class materials, and exams

Guest LecturerGraduate Courses:*Attitudes and Social Cognition*

- Conducted a lecture on theories of emotion and debate about cognitive antecedents of emotion

Undergraduate Courses:*Abnormal Psychology*

- Independently conducted a lecture on Dissociative and Somatic Symptom Disorders

Lab in Clinical Psychology

- Conducted a lecture on statistical analyses using SPSS and writing research articles
- Conducted a lecture on induction and measurement of emotions in experimental psychology

Field Work in Applied Psychology

- Independently conducted series of seminars on statistical analyses using SPSS and writing research articles

Discussion Section Instructor*Introduction to Psychology* (1 semester)*Statistical Methods in Behavioral Science* (6 semesters)**Graduate Teaching Assistant***Abnormal Psychology* (6 semesters)*Psychological Interventions* (6 semesters)*Psychology of Interviewing* (2 semesters)*Field Work in Applied Psychology* (1 semester)*Lab in Clinical Psychology* (1 semester)*Theories of Personality* (1 semester)**PROFESSIONAL AFFILIATIONS**

American Psychological Association

Anxiety and Depression Association of America

Association for Behavioral and Cognitive Therapies

Association for Psychological Science

Society for Personality and Social Psychology

Psi Chi National Honor Society in Psychology