Compounding Effects of Dysphoria and Mood Stability on Eyewitness Identification

by

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Abstract

To date, research on the effect of depressive symptomatology on victim-witness identification is scarce even though depressive symptomatology is highly prevalent in the victim-witness experience. Furthermore, being a victim-witness often instigates the use of counselling services, which could cause a shift in affect, and applying mood dependent memory theories, any change in affect should be detrimental to eyewitness accuracy. Still, individuals suffering from subclinical depression, or dysphoria, have exhibited heightened perceptual skills, and depressed affect exhibits remarkable stability over time. Therefore, I theorized that: (1) dysphoric people’s heightened sensitivity and motivation towards accurate understanding may result in more accurate eyewitness identifications, and (2) individuals who express stable levels of dysphoria should have greater eyewitness identification accuracy than should people with stable levels of nondysphoria, with stable levels of severe depressive symptomatology, or with unstable depressive symptomatology. In Study One, 132 students were randomly assigned to one of three autobiographical mood inductions: a positive, negative, or neutral/control. Following this manipulation, participants completed 12 experimental trials each consisting of a target exposure, a 30-second distraction task, and lastly, a six-person simultaneous line-up. Higher levels of dysphoria were associated with greater overall identification accuracy, and temporary mood conferred an advantage only when participants recalled highly sad memories. In Study Two, 173 participants were exposed to 12 target faces at a first session and returned two-to-four weeks later to identify these faces from 12 six-person simultaneous line-ups. Individuals who exhibited stable levels of dysphoria from eyewitness event to the line-up task performed significantly better on the simultaneous
line-ups than all of the other groups. Among those exhibiting unstable dysphoria, people whose depressive symptomatology improved were almost as accurate as those who had stable dysphoria. These results support the need for victim-witnesses to receive immediate help to stabilize or improve depressive symptomatology not just for their mental well-being but also to preserve eyewitness accuracy.
Co-authorship

I assumed primary responsibility for the conceptualization, design, and execution of the research reported in this thesis. In recognition of her patient and tireless assistance with design, data analyses, and manuscript preparation, my supervisor, Dr. Jill A. Jacobson, will appear as second author on all publications. Furthermore, in recognition of his assistance with design, manuscript preparation, imparting his expertise in eyewitness research, and his generosity in providing materials, Dr. R.C.L. Lindsay will appear as third author on all manuscripts submitted for publication.
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Chapter One: Research Introduction

Depression is a well established characteristic of the victim-witness experience (Scarpa, 2003). Experiencing traumatic events can result in a range of depressive symptoms from mild depression to more severe clinically significant levels or major depressive disorder (Sorenson & Golding, 1989). Public stigmatism of individuals with even subclinical depression (Paykel, Hart, & Priest, 1998) may result in credibility issues for any potential eyewitness diagnosed with such a disorder should their diagnosis be revealed at trial. Unfortunately, little is known about the effect these chronic negative moods (i.e., dysphoria) have on eyewitness identification accuracy.

In addition, delays typically occur between witnessing the event and attempting identification from a line-up, and depressive symptomatology will often emerge after being victimized, which may alter identification accuracy after this delay. Although research on post-traumatic stress has shown a decrement in memory accuracy, this research has not been extended into the domain of the world’s second-most prevalent social disease, depression (World Health Organization, 2010). Ironically, the psychological literature is virtually barren with respect to the role that unstable chronic negative mood states can play in eyewitness identification. To understand the potential role of dysphoria in eyewitness identification, two lines of research are especially relevant: (1) the facial and emotion recognition literatures, and (2) research on the effects of mood on memory.

People with dysphoria, a current diagnosis of depression, or a past history of depression have an inhibitory deficit that enables them to automatically process information around a key area in facial recognition: the eyes (Joormann, 2004;
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Rutherford, Clements, & Sekuler, 2007). Additionally, people with mild depressive symptoms can actually have greater accuracy at recognizing basic and complex emotions in other people (Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005; Shallwani, Jacobson, & Sabbagh, 2010; but see Frewen & Dozois, 2005, and Persad & Polivy, 1993). This advantage in perceptual abilities has been only scantily linked to full facial emotion recognition, and it is bracketed by research that shows a major deficit in emotional recognition for those suffering from clinically significant levels of depression (Lee, Harkness, Sabbagh, & Jacobson, 2005).

In a similar vein, Forgas, Laham, and Vargas (2005) have shown that temporarily induced negative mood states reduce susceptibility to misinformation in eyewitness recall. Furthermore, psychological research on mood dependency has expounded the phenomenon that people can recall information better if they attempt to recall material when in the same mood state as when they encoded it. For example, people with bipolar disorder exhibit greater recognition of a previously seen inkblot when in a depressed mood at both encoding and retrieval (Eich, Macaulay, & Lam, 1997).

When combined, these lines of research led me to two hypotheses that are addressed in two separate studies. First, in Study 1, which is reported in Chapter Two, I predicted that dysphoria would be related to greater accuracy in an eyewitness context. This study could potentially replicate and extend the findings of Forgas et al. (2005) from temporary to chronic mood and from misinformation susceptibility to eyewitness identification accuracy. To this end, participants were assigned to one of three autobiographical mood inductions: happy, sad, or neutral/control mood. Following this manipulation, participants completed 12 experimental trials each consisting of a target
exposure, a 30-second distraction task, and lastly, a six-person simultaneous line-up. Once finished, participants then completed the Beck Depression Inventory-II (BDI; Beck, 1996), which was used as my measure of dysphoria or chronic negative mood.

Second, in Study 2, which is reported in Chapter Three, I theorized that any changes in mood over time should result in reduced accuracy. However, if a victim-witness happened to already be suffering from dysphoria at the time of the event, and somehow remained in this negative mood state without worsening (or getting better) until it was time to make an identification, then they should have a significant mood dependent advantage over those who were not dysphoric at the time of the event. They also should do better than those who exhibit instability in their mood. People exhibiting either worsening negative mood or potentially more positive mood due to access to the victim-services industry would not be afforded this mood dependent advantage.

To address this research question, participants viewed 12 target faces sequentially and completed the BDI. At a second session two-to-four weeks later, participants attempted to identify the 12 targets from six-person simultaneous line-ups before completing the BDI for a second time. Using these two measurements of depressive symptomatology, I calculated participants’ stability in depressed affect based on the categorical recommendations of Kendall, Hollon, Beck, Hammen, and Ingram (1987). Specifically, I categorized participants into four groups: stable dysphoria, stable nondysphoria, stable severe depressive symptomatology, and instable dysphoria. To test a mood dependent advantage for stable dysphoria in facial recognition, I then compared these groups on their eyewitness identification accuracy.
Foreword to Chapter Two

The study in this chapter focused on the relationships between eyewitness accuracy and chronic and temporary mood. Specifically, I examined if individuals with chronic negative mood (i.e., dysphoria) would have higher rates of accuracy than would those not similarly afflicted. Furthermore, I explored if participants who underwent a positive mood induction procedure would have lower accuracy rates than would participants who underwent a negative mood induction. Finally, I compared identification accuracy rates for people in the negative induction against those in a control group, who did not undergo a mood induction, to ascertain whether or not participants with higher levels of chronic negative mood or dysphoria would perform at similar levels of accuracy as those in an induced negative mood state.
Chapter Two:

Examining the Relationship between Chronic and Temporary Mood on Eyewitness Identification
Introduction

To date, no research has attempted to ascertain the effects of subclinical depression or dysphoria on eyewitness accuracy despite its prevalence in the victim-witness experience. Paradoxically, although public stigmatization of depression is prevalent (Paykel, Hart, & Priest, 1998) and thus could cause juries to discredit a victim-witness diagnosed with such a disorder, recent psychological literature suggests that juries actually should have more faith in such victim-witnesses. Dysphoric individuals exhibit both attention and memory biases that predispose them to filter out irrelevant information and concentrate on a key area in facial recognition: the eyes (Joormann, 2004; Rutherford, Clements, & Sekuler, 2007). Additionally, dysphoria or a previous history of depression increases accuracy at decoding the emotional expressions depicted in people’s eyes (Harkness, Jacobson, Duong, & Sabbagh, 2010; Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005). Moreover, research on temporarily induced mood states has shown that being in a negative mood can confer some advantages in accuracy, both in emotion recognition tasks and in resisting the influence of misleading information on eyewitness accounts (Forgas, Laham, & Vargas, 2005; Harkness et al., 2010). In the current study, I sought to combine these literatures by exploring the effects of dysphoria on eyewitness identification accuracy and by comparing the results for chronic negative mood to those obtained when people are temporarily induced to be in a positive or negative mood state.

Eyewitness Identification

Eyewitness testimony is often a very compelling and important component of criminal cases, yet this very same persuasive evidence is often cited as the leading source
of error in the growing number of DNA-related exoneration cases in the United States (Wells, Malpass, Lindsay, Fisher, Turtle, & Fulero, 2000; Wells & Olson, 2003). Erroneous eyewitness identifications have played a critical role in approximately 75% of cases that have been overturned by DNA testing (Innocence Project, 2010). So influential is mistaken eyewitness identification and testimony that a key Canadian report on wrongful convictions lists this source of error as second only to poor police investigative practices (Report on the Prevention of Miscarriages of Justice, 2004). These findings call into question the accuracy of eyewitnesses and demand researchers to ascertain the source of this eyewitness error.

In 1978, Wells proposed a distinction between two lines of research levied at various sources of error within the eyewitness experience: (1) system variables and (2) estimator variables. System variables refer to those sources of error that are under the control of the justice system such as the structure of the line-up or instructions given to eyewitnesses. Estimator variables refer to factors that are naturally occurring in the eyewitness experience such as lighting, distance between the eyewitness and perpetrator, and the degree of stress or trauma experienced by the victim-witness. Propagating this dichotomy, the majority of psychological literature has examined system variables (Wells & Olson, 2003). This dominant focus on system variables marginalizes the positive contribution that research on individual differences can provide and the degree to which this research may augment our understanding of eyewitness identification and credibility.

**Individual Differences**

In a meta-analysis, Shapiro and Penrod (1986) identified 103 out of 190 social and cognitive psychology studies that examined individual differences in eyewitness
identification. Of these studies, the majority (62) examined only sex or race, whereas a meagre 30 studies, spread across eight different personality characteristics or dimensions, examined such variables as verbal ability, anxiety, and self-consciousness. Shapiro and Penrod concluded that individual differences yielded small effects for both correct identifications and false identifications. However, as Prentice and Miller (1992) contested, small effects can still be important, particularly in this case where wrongful imprisonment can permanently alter people’s lives.

To better frame the importance of individual differences, I need to contextualize the problem within the criminal justice system. In the United States, victimization rates for young adults involved in violent crimes are high (78%), as is the likelihood of being an eyewitness to such an event (94%; Scarpa, 2003). Research by victimologists has shown that having tertiary involvement in a crime (i.e., simply being an eyewitness), being the victim of a property crime, or being the victim of a violent crime poses a substantial gradient of increasing risk for succumbing to various mental disorders (Norris & Kaniasty, 1994). Having been exposed to violent crime or victimized multiple times increases the risk of suicide, major depressive disorder, post-traumatic stress disorder (PTSD), interpersonal problems, as well as other negative effects (Scarpa, 2003; Sorenson & Golding, 1989). Finally, having a high fear of crime is related to a twofold risk of being depressed (University College London, 2007).

Unfortunately, the stigmatization of people with mental disorders has existed for a long time. Depressed individuals are subjected to preconceived misconceptions ranging from malingering to a complete inability to function (Paykel et al., 1998). Despite recent psychological evidence to the contrary, these authors report longitudinal stability in the
public perception that individuals with depression are likely to be “mad or unstable” (p. 520). Further exacerbating this issue, Whitley (1987) found in a meta-analysis that although having a discredited eyewitness obtains an accuracy rate that is higher than having no eyewitness at all, discredited eyewitness are still not as influential as credible ones. Thus emerges a paradox: the prevalence of depression or dysphoria in the victim-witness experiences suggests that depressed eyewitnesses will be frequently called upon to provide courtroom testimony despite a public stigma that may logically translate into the perception that they are inaccurate or unreliable eyewitnesses should their diagnosis come to light at trial.

Because depression is highly prevalent in the eyewitness experience, its effects on eyewitness identification are worthy of research attention. Furthermore, individuals with dysphoria (i.e., subclinical depression/chronic negative mood/depressed affect used interchangeably) have substantial risk of developing major depressive disorder, making it an important and distinctive individual difference to study in general (Cuijpers, Smit, & van Straten, 2007). Dysphoria is particularly relevant to the eyewitness situation because it encompasses attention and memory biases (Koster, De Raedt, Leyman, & De Lissnyder, 2009), chronic affective states and motivational differences (Weary, Edwards, & Jacobson, 1995), as well as individual differences in perception and accuracy (Harkness et al., 2005).

**Facial Recognition**

It is well known that depressed and dysphoric individuals have mood congruent attentional and memory biases (e.g., Koster et al., 2009). Aligned with a mood congruency hypothesis, people with dysphoria, a current diagnosis of depression, or a
past history of depression exhibit an inhibitory deficit whereby they are more capable of disregarding irrelevant negative stimuli (Goeleven, De Raedt, Baert, & Koster, 2006; Joormann, 2004). In this line of research, individuals with no history of depression demonstrate a delay when responding to incongruently valenced stimuli such as when a distractor stimuli is positive and a target stimuli is negative, or vice versa. When the distractor stimuli is negatively valenced and the target stimuli is positively valenced, dysphoric and currently or previously depressed individuals do not exhibit this delay. This discrepancy is argued to mean that these individuals automatically attend to negative information and thus are more apt to discount or ignore discrepant and irrelevant negative information (Goeleven et al., 2006; Joormann, 2004). In contrast to chronic negative mood or current and remitted depression, research has shown that temporarily induced negative mood does not affect inhibitory control of irrelevant information (Goeleven, De Raedt, & Koster, 2007). Therefore, dysphoric people tend to automatically process negative information that typically poses a problem for nondysphoric people, and this effect cannot be replicated by temporarily inducing a negative mood.

Dysphoric people also demonstrate an inhibitory deficit towards a reflexive tendency specifically trained at oval-shaped and facial stimuli (Derakshan, Salt, & Koster, 2009). Specifically, dysphoric individuals seemingly cannot resist looking at emotional facial stimuli, even more so if the stimuli are of happy faces. Indeed, dysphoria is associated with an inability to ignore emotional facial expressions using the Garner paradigm, which tests the ability to focus on one dimension while ignoring others (Gilboa-Schechtman, Ben-Artzi, Jeczemien, Marom, & Hermesh, 2004). Thus, individuals at risk for depression demonstrate a unique ability to focus on the stimuli that
is of greatest consequence, the eyes, an important factor in facial recognition (see Peterson & Rhodes, 2003, for a discussion on holistic versus analytic facial processing, and refer to Bicego, Salah, Grosso, Tistarelli, & Akarun, 2007, for evidence supporting analytical processing using simple classifiers).¹

Recent research on facial inversion, a task that requires participants to discern if particular features of a face have been turned upside down, has shown that the eye region is the main contributor to the classic inversion effect of participants being slower to recognize inverted faces (Itier, Villate, & Ryan, 2007b; Sekuler, Gaspar, Gold, & Bennett, 2004). The eye region is the focal point of nearly 90% of saccadic eye movements (Itier, Alain, Sedore, & McIntosh, 2007a). Rutherford et al. (2007) found a distinct advantage of gathering information from the eye region of the face for facial inversion and recognition tasks. These researchers identified a distinct subgroup of people with Autism Spectrum Disorder (ASD) who have extremely poor verbal abilities and exhibit a severe disadvantage at determining if target faces were manipulated when examining only the eye region of the face. Conversely, people with ASD who have higher verbal ability performed more closely to controls, with much higher rates of recognition accuracy when examining the eye region of the face. This finding suggests that useful information for facial recognition is ‘stored’ in the eyes.

I contend that dysphoric people may attend to the eye region more acutely than do their nondysphoric and depressed counterparts and thus harvest more socially relevant information. Because dysphoric people tend to focus on the face, they are afforded greater exposure to a key region in facial recognition, the eyes. Combined with their

¹ I am not suggesting that dysphoric people focus solely on eyes, representing analytical processing. I argue only that in focusing on the eyes, dysphoric people garner an advantage over those who discount the usefulness of the eyes in facial processing.
ability to automatically process and disregard irrelevant information, this tendency should make dysphoric people more adept at observing the key aspects necessary for facial recognition. In other words, dysphoric people will likely disregard or automatically process other areas of the face such as the mouth or chin, as these areas would not provide any information advantage. As a result, not only are dysphoric people better at identifying emotions from eyes stimuli (Harkness et al., 2005, 2010), but they should also be better able to identify target faces in general, making them better eyewitnesses.

Mood and Accuracy

The intense emotions evoked by being victimized, or being witness to a highly stressful situation, have a deleterious effect on memory, especially as it translates to memory accuracy (Reisberg & Heuer, 2007). High levels of stress or fear have been found to result in misidentification of perpetrators (Goldsmiths, 2008). And in a study of PTSD, greater impairment of semantic memory retrieval in cancer survivors was related to higher levels of PTSD symptomatology, and reduced specificity of auto-biographical memory was related to higher levels of trauma-flashback in refugees (Moradi, Herlihy, Yasseri, Shahraray, Turner, & Dalgleish, 2008). However, upon close examination of these results, the effects of PTSD on memory accuracy were better explained by emotion or depression.

For example, in a review by Isaac, Cushway, and Jones (2006) on the association between PTSD and deficits in episodic memory, they concluded that people with PTSD have attentional deficits, and that deficits in episodic memory are related to either medial temporal lobe-related deficits or memory consolidation deficits related to amygdala and hippocampal functioning. The authors expressed caution, however, as these results were
confounded with concurrent emotional disorders. Burriss, Ayers, Ginsberg, and Powell (2008) demonstrated that PTSD also translates into learning and memory deficits on standardized tests, but when anxiety and major depressive disorder were controlled, these results were attenuated. Moreover, using stepwise regression, they found that only depression reliably predicted learning and memory deficits, thus suggesting that depression may mediate this relationship.

Several other studies have shown that depression and/or chronic negative mood play a cardinal role in memory accuracy. Pine et al. (2004) found that children and adolescents with depression or who had a past history of depression exhibit memory deficits for fearful faces, but not for happy or sad faces. Paralleling these findings in another study, depressed patients were less likely and slower than controls to recognize neutral faces as compared to happy or sad ones (Lappanen, Milders, Bell, Terriere, & Hietanen, 2004).

In contrast to these two studies, individuals with comorbid depression and anxiety, as opposed to individuals presenting with solely a generalized anxiety disorder, had enhanced recognition of angry compared to happy faces (Gilboa-Schechtman, Erhard-Weiss, & Jeczemien, 2002). In this latter study, comorbid depressed-anxious individuals exhibited mood congruency in that they were more accurate than people with generalized anxiety disorder at identifying target faces expressing a negative emotion, but the two groups did not differ on neutral faces.

One methodological variation may account for this contrasting effect. Specifically, during the encoding phase of Gilboa-Schechtman et al.’s (2002) study, participants indicated whether or not they would be interested in meeting the target
depicted in the photographs. This subtle social cue may have inadvertently, and
temporarily, increased depressed individuals’ social motivation, which Harkness,
Jacobson, Sinclair, Chan, and Sabbagh (2009) recently showed can enhance dysphoric
people’s accuracy on an emotion recognition task.

Indeed, dysphoric compared to nondysphoric people are more accurate at
detecting other people’s emotions (Harkness et al., 2005) at least when the stimuli are
pictures of eyes (but see Frewen & Dozois, 2005, and Persad & Polivy, 1993, for
differing results when the stimuli are full faces). Moreover, a recent study has found that
remission of depressive symptomatology was indicative of enhanced performance on the
same mental state decoding task (Harkness et al., 2010). Specifically, individuals who
had a history of major depressive disorder but were currently not clinically depressed
were more accurate at discerning the emotional expression in the eye region than were
never-depressed people. However, Lee, Harkness, Sabbagh, and Jacobson (2005) using
the same Reading of the Mind in Eyes Task (Baron-Cohen, Wheelwright, Hill, Raste, &
Plumb, 2001) as Harkness et al. (2005, 2010) found that clinically depressed people were
less accurate than their nondepressed counterparts. Combined, these results indicate a
decline in accuracy in emotion recognition from mild to severe depression.

In other words, whereas a negative mood may be somewhat beneficial for
accuracy in recognizing the mental states of others, people who have full onset major
depressive disorder shut down and can no longer process information in a similar fashion.
This incongruity poses a limitation on the beneficial aspects of negative mood and
suggests an optimal level of negative affect. Negative affect at the extreme of the
continuum should reduce accuracy. But does this advantage exist in a similar way for
people whose mood state is temporarily sad? Or must this negative mood be chronic?

**Temporarily Induced Mood**

To help delineate if the effect of dysphoria on emotion recognition was a result of temporary versus chronic mood, Harkness et al. (2010) included a priming manipulation in their study. They found that by priming previously depressed individuals with happy thoughts, the effect on mental state decoding was attenuated. The authors suggest that dysphoric individuals in a positive mood state may be less sensitive to and/or attend to less social information. They expected the opposite should also be true; being in a negative mood state would increase sensitivity or attention to social information. However, the effect of the negative mood induction did not translate into greater accuracy at the mental state decoding task, although the regression line was trending in that direction. Therefore, dysphoria was associated with greater accuracy at mental state decoding but a temporarily induced negative mood state did not show a similar advantage. These results suggest that chronic negative mood would triumph over temporarily induced mood. Still, this dependent variable is not full facial recognition. Consequently, the question remains, how does temporary and/or chronic mood influence eyewitness accuracy?

In opposition to the findings described above, a direct relationship between temporarily induced mood and accuracy is exactly the effect that Forgas, Laham, and Vargas (2005) have found with respect to eyewitness informational accuracy. In this study, Forgas et al. tested participants’ susceptibility to misleading information about a car crash and a wedding scene they witnessed before completing an autobiographic mood induction. They found that participants who were induced to be in a negative mood and
exposed to misinformation endorsed fewer falsified statements, akin to participants who had not been exposed to the misleading information. Furthermore, they concluded that simply matching the affective mood of the participant to the affective tone of the stimuli (i.e., mood congruency) did not defend against incorporating misleading information into their memories. Therefore, being in a temporarily induced negative mood has a unique effect that seems to defend against the incorporation of misleading information into memory.

In summary, these literatures provide seemingly contradictory evidence. On the one hand, a temporarily induced negative mood had no effect on mental state decoding accuracy, but on the other hand, people repel misinformation when induced in a negative mood, resulting in greater accuracy for witnessed event details. Extrapolating the trend towards greater mental state decoding accuracy seen by Harkness et al. (2010), and combining this trend with Forgas et al.’s (2005) finding that being in a negative mood can result in more accurate recall of witnessed events after being exposed to misleading information, I hypothesized that being induced to be in a negative mood may result in greater facial recognition.

Research Objectives and Hypotheses

Dysphoric individuals exhibit inhibitory biases that train their attention on emotional stimuli and allow them to disregard irrelevant information vis-à-vis automatic processing (Derakshan et al., 2009; Itier et al., 2007b). Furthermore, they exhibit a heightened sensitivity and motivation towards accurate understanding (Harkness et al., 2009, 2010). By amalgamating these literatures, I theorized that this motivation and honed focus may result in a heightened ability to attend to and process information
around a key facial feature: the eyes. In doing so, because important information is stored in the eyes (Rutherford et al., 2007), individuals at risk for depression show a finely tuned ability to discern the emotional states of others, and they should also be better able to recognize previously seen faces.

In the current study, I attempted to extend the findings of Harkness et al. (2005, 2010) to facial recognition and the finding of Forgas et al. (2005) to a different dependent variable, identification accuracy rather than information accuracy. In other words, my goal was to examine how chronic and temporary mood effects related to participants’ ability to identify previously seen photos of faces.

I hypothesized that for participants exposed to a positive mood induction and a control group whose moods were not manipulated, greater dysphoria would be associated with greater identification accuracy. For the participants exposed to a negative mood induction, I did not expect any dysphoria differences. Still, I predicted that these participants would have the highest rates of accuracy. I also believed that control group participants with higher levels of dysphoria would perform at similar levels of accuracy as those in a temporarily induced negative mood state, who Forgas et al. (2005) found to be the most informationally accurate. However, control group participants with lower levels of dysphoria should perform more similarly to those in the positive mood induction. Accordingly, I expected that being in a temporarily induced positive mood would attenuate the dysphoria advantage, such that accuracy would increase only moderately in relation to higher levels of dysphoria. Finally, I expected that participants exposed to the positive mood induction procedure would generally have lower identification accuracy rates than would participants who underwent a negative mood induction.
induction. In sum, I predicted that participants who were subclinically depressed and those in a negative mood state should have the highest rates of accuracy, followed by those in a neutral mood state, tailed lastly by those in a positive mood state.

Method

Participants

Participants were Canadian university students recruited from an introductory psychology participant pool based on their prescreening scores on the Beck Depression Inventory-II (BDI; Beck, 1996). Two separate lists were created so that I could contact prospective students at both low (total scores less than 6) and high (total scores greater than 9) ends of the spectrum. Because some slight variability is expected in BDI scores, this tactic increases the likelihood that experimental scores on the BDI will reside along the entire continuum of depressive symptomatology.² Using these contact lists, research assistants blind to participant BDI scores and list identification either emailed or called potential participants using a standardized script to invite them to participate in this study. Participants received either course credit or $10 for their participation.

Of the 138 participants who completed this study, four participants were excluded because they were univariate and bivariate outliers on either accuracy, BDI, or both (greater than +/- 3 SDs). One participant was excluded because she was a univariate outlier on a measure of anxiety (greater than + 4 SDs), and lastly, a final participant was excluded because she was a univariate and bivariate outlier on all of these experimental dimensions. These participants were significantly different from the inclusion sample on

² It is important to note that although I dichotomized BDI for the purposes of inviting students to participate, I used BDI continuously in all analyses.
In addition, a computer glitch in the html slider used to indicate age resulted in missing data for 36 participants. The main pattern of results did not differ as a result of excluding these participants. However, due to the large amount of missing data, some of the interaction effects were different when these participants were removed. Considering that age was not a significant predictor in any of the main analyses, I conducted a missing values analysis and substituted the predicted regression mean for these blank values.

The final sample consisted of 132 participants with an average age of 18.6 years ($SD = 1.20$, Median $= 18.0$ years). This group was predominantly female ($74\%, n = 98$) and of European ancestry ($71\%, n = 94$).

**Materials/Measures (See Appendix for all experimental materials)**

*Beck Depression Inventory-II.* The revised Beck Depression Inventory (BDI; Beck, 1996) is a measure of depressive symptomatology only. On 21 items, participants report the intensity of depressive symptoms ranging from 0 to 3, with higher scores indicating higher levels of depressive symptoms. The total score is calculated by summing across the items. The BDI is a highly reliable measure, with excellent reported internal consistency (see Beck, Steer, & Garbin, 1988, for a full review of psychometric evidence of the original version of the scale). In the present study, the scale had similarly high internal consistency ($\alpha = .92$; see Table 1). Although the BDI has been shown to be a well-validated measure of the depth of depressive symptomatology and to be an effective self-report measure of severity of depression, it is not a sufficient indicator of nosologic depression (Kendall, Hollon, Beck, Hammen, & Ingram, 1987; Weary et al., 1995). Thus, scores on this measure and my use of the terms depressed, depressive, and
depression are not meant to imply the presence of a clinical diagnosis of depression.

*Differential Emotions Scale.* The adapted Differential Emotions Scale (DES; Cacioppo, Martzke, Petty, & Tassinary, 1988) measures the absence or presence of discrete emotions. It consists of eight items describing how participants feel at the current moment (e.g., “Merry/Gleeful/Amused”) that are answered on a seven-point scale from (1) *not at all* to (7) *very strongly*. Scores are summed across two different scales (positive and negative affect), with negative items reverse scored. Higher composite scores indicate greater levels of expressed positive emotion. The internal consistency estimate for this scale was good ($\alpha = .74$; see Table 1).

Following the procedure of Harkness et al. (2010), four items from the DES were administered to assess participants’ immediate affective state post-mood induction: (a) merry/gleeful/amused, (b) warmhearted/joyful/elated, (c) sad/downhearted/blue, and (d) tense/anxious/nervous. The standardized internal consistency estimate of this shorter prime-DES in the present sample was .75.

*Mood and Anxiety Symptom Questionnaire.* The Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991) is a 90-item, self-report questionnaire that assesses both depressive and anxious symptomatology. The MASQ uses a five-point response scale, which ranges from (1) *not at all* to (5) *extremely*, and yields five indices. Two of the indices, anhedonic depression and anxious arousal, tap into symptom clusters that differentiate depression and anxiety, respectively; whereas the remaining three indices load onto various types of general distress (i.e., symptoms common to both anxiety and depression). This questionnaire was chosen because it has good convergent
Table 1

*Correlations, means, standard deviations, and alpha coefficients for all major Chapter Two variables.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
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<th>3</th>
<th>4</th>
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<td>1 Depressive Symptomatology(^a)</td>
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<td>3 Continuous Anxiety Scores(^b)</td>
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<td>0.053</td>
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<td>-0.027</td>
<td>-0.182 *</td>
<td>-0.005</td>
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<tr>
<td>7 Affect at Completion of Experiment(^c)</td>
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<td>0.018</td>
<td>-0.145</td>
<td>-0.024</td>
<td>-0.104</td>
<td>-0.012</td>
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<tr>
<td>8 Experimentally Induced Affect(^d)</td>
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<td>0.089</td>
<td>-0.112</td>
<td>0.152</td>
<td>-0.130</td>
<td>0.065</td>
<td>0.579 **</td>
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<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
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<tr>
<td></td>
<td>17.5</td>
<td>6.88</td>
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</table>

**Notes:** *\(^p\ < .05, **\(^p\ < .01.*

\(^a\) measured by the Beck Depression Inventory-II

\(^b\) measured by the Mood Anxiety Symptom Questionnaire

\(^c\) measured by the Differential Emotions Scale

\(^d\) measured by the Four-Item Differential Emotions Scale
and discriminant validity (Watson, Weber, Assenheimer, Clark, Strauss, & McCormick, 1995), and it allows for the examination of symptoms that are unique to depression and anxiety as well as symptoms that are shared by both conditions. Considering depression and anxiety often co-occur, the anxious arousal index is especially important because it allows one to take into consideration the unique contribution of anxious symptoms to task performance (cf. Harkness et al., 2005, 2010). In the current study, the anxious arousal index exhibited excellent internal reliability ($\alpha = .86$; see Table 1).

**Mood Induction.** Participants were randomly assigned to a positive mood induction, a negative mood induction, or a neutral/control group. Participants in the mood induction conditions were given five minutes and unlimited space to write an autobiographical account of either a (1) happy event / time in their life while listening to the first movement (Allegro) of “Eine Kleine Nachtmusik” by Mozart or (2) a sad event / time in their life while listening to “Adagio for Strings” by Samuel Barber. The control group wrote about a typical Saturday without listening to any music. The pieces of music chosen for the positive and negative mood induction conditions have been used successfully in previous studies to enhance the mood induction effects (Harkness et al., 2010; Scharff & Nguyen, 2003). To maintain the guise that this part of the experiment was a completely separate study, and to create a measure of between and within group variability in response to the mood induction, subsequent to this autobiographical task all participants rated their autobiographical event for its vividness, emotional intensity, valence, first-versus-third person perspective, and how long ago it occurred. Once finished, all participants completed a two-minute distraction task that involved writing detailed directions to one of two popular locations on campus (the library or the student
They lastly completed the post-mood induction “DES” to describe their current mood state, thus ending the mood induction procedure.

To account for variability in participants’ responses to the mood induction (cf. Harkness et al., 2010), I calculated a “mood response index” (MRI) by first centering participant scores on the emotional valence of the autobiographical event recalled, such that the middle of the index (neither positive nor negative) represents zero or no/neutral affect, negative scores represent negative affect, and positive scores represent positive affect. I then summed participant ratings on the vividness and intensity of the autobiographical event recalled and multiplied this number by the centered emotional valence ratings, such that higher positive scores represented extremely positive, intense, and vivid memories, and vice versa for negative scores.

Identification Procedure. The identification procedure involved 12 experimental trials, each consisting of three separate, yet interrelated tasks, presented in series: (1) the target exposure task, (2) the distraction task, and (3) the line-up task. The entire identification task was completed on a standard computer with a 19-inch monitor running MediaLab v2008. Prior to starting, participants were provided with instructions for how to complete the task. Although participants were given unlimited time to read the task instructions, the “Continue” button was withheld for 15 seconds to maximize the chances that participants actually read the instructions. Participants clicked “Continue” to start the experimental trials.

Target Exposure Task. Participants were exposed to target faces of European ancestry through a series of still images. During each trial, a single target image was displayed on the center of the computer screen for 10 seconds. Each image was
approximately 5- by 7.6-cm and depicted the full face and neck of the target centered within a coloured background (see Figure 1). Of the twelve target images, nine were of men and three were of women. The order of targets was randomized. After the time expired, the computer automatically advanced to the distraction task.

Figure 1. Examples of a male and a female target photograph.

Distraction Task. Prior to starting the identification task, participants were given a 10-item questionnaire answer sheet by the experimenter and were told that they would need this answer sheet during the course of the next experiment. The instructions displayed on the screen before starting the task informed participants that they would see a “Where’s Waldo” picture in between each target image. “Where’s Waldo” is a graphic illustration of a distinctly dressed man that is embedded within a complicated scene of other people and things, and the task of the reader is to find Waldo among the clutter. Participants were further told that they were to use the answer sheet given to them by the experimenter and answer as many questions as possible. The questionnaire was designed to be impossible to complete because participants had to scout the “Where’s Waldo” picture for numerous details (e.g., “How many people are wearing red and white striped aprons?” or “How many fires are there?”).
For each trial, the same “Where’s Waldo; Gobbling Gluttons” picture was presented for 30 seconds. The image was 15.2- by 25.4-cm and was displayed in the center of the computer screen (see Appendix). Once the time had lapsed, participants were automatically moved to the line-up task.

**Line-up Task.** For each of the 12 trials, participants attempted to identify the target by viewing a six-person simultaneous line-up. Each line-up depicted six numbered (1-6) photographs of the same size and matching background colour as the target photograph and were arranged in two rows of three, spaced evenly across a different coloured background. A seventh “None of these people” option was centered directly to the left of the line-up (see Figure 2).

![Figure 2. Example of a six-person simultaneous line-up.](image)

Participants were randomly assigned to one of two target identification conditions that were counterbalanced for target present and target absent. In both conditions, six line-ups did not include the target (i.e., target absent) and six line-ups did include the target (i.e., target present). Across the conditions, the target-absent and target-present
line-ups for each target were presented equally often and the order of presentation of line-ups was randomized. Each foil (a person depicted in the line-up that is not the target) was unique and not repeated throughout the 12 trials. Participants placed a check mark in the box corresponding to their answer and then clicked “Continue” to proceed to the next screen.

Choosing any individual from the line-up advanced participants to a screen where they indicated if they recognized any of the other individuals (i.e., foils) from the line-up.3 Next, participants rated their confidence in their decision on a scale from 0 to 100. Participants choosing “None of these people” immediately rated their confidence. Accepting this rating by clicking “Continue” advanced participants to the next trial.

Identification accuracy was operationalized by determining if the identification represented a hit (choosing the correct target out of a target present line-up) or a correct rejection (choosing “None of these people” in a target absent line-up). By summing the number of accurate identifications, dividing across all 12 experimental trials, and multiplying by 100, I created a measure of percent accuracy. In the main analyses, total identification accuracy percentage was the key dependent measure. In the secondary analyses, I created two dependent variables for target condition, percent hits and percent correct rejections, by summing the accurate identifications for target present and absent line-ups separately, dividing by six, and multiplying each by 100.

Procedure

During recruitment, participants were informed that they would be taking part in two separate studies, the first a study on memory (the mood induction) and the second a

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3 The likelihood of recognition was extremely low as the majority of foils in the line-up were former students who were much older than the participants, and most foils had already graduated. No participant identified knowing any of the foils.
study on person perception (the identification procedure). Participants were not initially informed about the emotion priming manipulation or that the two experiments (memory and person perception) were related because previous research has shown that when individuals are aware of the prime or think the two tasks are connected, they tend to contrast (behave in the opposite manner to the prime) rather than assimilate to it (Bargh & Chartrand, 2000). Therefore, to maintain appearances that these studies were unrelated, participants informed the experimenter when they had completed the first study, so that they could receive instructions and the answer sheet needed for the second study.

After participants read a brief description of the study and provided informed consent, they completed the mood induction and informed the experimenter when this procedure was completed. Subsequent to receiving instructions for the ostensibly unrelated second study, participants then completed the following tasks: (1) the identification procedure, (2) a final DES, (3) the MASQ, (4) the BDI, and (5) a measure of suspicion. Once finished, all participants were fully debriefed, thanked for their time, and compensated.

Results

Preliminary Analyses

Overall, participants performed very well on the identification accuracy task 88.32% \( (SD = 12.65\%) \), with scores ranging from 50% to 100% accurate. To ascertain the role of target condition, sex, and ethnicity on identification accuracy, I conducted a mixed model repeated measures analysis of variance (ANOVA) with target condition
(present or absent) and target sex as within-subjects factors, and participant sex (1 =
males, 0 = females) and own-race identification as between-subjects factors.\textsuperscript{4} Overall
identification accuracy rates as a function of demographic characteristics can be seen in
Table 2.

Consistent with previous studies (Shapiro & Penrod, 1986), the hit rate in the
target present condition (95.33\%, $SD = 14.01\%$) was significantly higher than the correct
rejection rate in the target absent condition (81.31\%, $SD = 21.80\%$), $F(1, 128) = 11.73, p$
= .001. The interaction between target condition and participant sex was marginally
significant, $F(1, 128) = 3.44, p < .07$, with men demonstrating a decline in accuracy in
the target absent condition ($M = 79.17\%, SD = 26.45$) as compared with the target present
condition ($M = 96.88\%, SD = 7.85; p = .003$). Women on the other hand, performed
similarly well in both target absent ($M = 81.93\%, SD = 20.44$) and target present ($M$
$= 94.56\%, SD = 15.84; p > .11$) conditions.

Participants were more accurate at identifying female ($M = 91.86\%, SD = 17.17$)
versus male targets ($M = 86.96\%, SD = 13.72$), $F(1, 128) = 5.28, p = .02$, yet women
were not more accurate than men, $F(1, 128) < 0.56, p > .45$ (see Table 2). The
interaction of participant sex with target sex was marginally significant, $F(1, 128) = 3.38,$
$p < .07$. Examining the estimated marginalized means revealed that women were more
accurate at identifying female targets ($M = 93.33\%, SD = 15.06$) versus male targets ($M$
$= 86.54\%, SD = 13.45; p < .001$), whereas men performed almost identically for female ($M$
$= 87.50\%, SD = 22.00$) versus male targets ($M = 88.19\%, SD = 14.65; p > .79$).

Lastly, previous research has shown that identifying targets of your own race
\textsuperscript{4} As all targets were of European ancestry, I coded European participants as 1, signifying own-race
identification, and non-European participants as 0, signifying other-race identification.
confers an accuracy advantage (Shapiro & Penrod, 1986). To ascertain if this issue was a
confound in the current study, I included own-race as a between-subjects factor in an
ANOVA. Own-race bias was not a factor in this study, as both groups performed equally
well at identifying targets of European descent, $F(1, 128) = 0.43, p > .51$. Additionally,
identification accuracy percentage was not correlated with age, sex, or participant scores
on the DES, MASQ, MRI, nor the BDI ($p > .20$).

Mood Manipulation Check

To determine if the mood induction was successful, I conducted a one-way
ANOVA on participants’ prime-DES scores by affect condition (Positive, Negative,
Neutral), and it was significant $F(2, 129) = 5.30, p = .006$ (see Figure 3). Therefore, I
compared each affect condition using planned contrasts. Participants in the negative
prime condition ($M = 16.22, SD = 3.96$) reported significantly lower positive affect on the
DES than did those in the positive prime condition ($M = 17.67, SD = 3.03$), $p = .04$.
Participants in the negative prime condition also reported significantly lower positive
affect than did those in the neutral prime condition ($M = 18.47; SD = 2.81$), $p = .002$.
Lastly, paralleling results found in Harkness et al.’s (2010) study using the same priming
procedure, participants in the positive and neutral prime conditions did not differ from
each other on positive affect, $p > .26$.

As described above and similar to the approach taken by Harkness et al. (2010), I
created a mood response index (MRI) to account for variability in participants’ reaction
to the mood induction. Scores on this index ranged from -20 to 9 for the negative mood
induction condition ($M = -7.09, SD = 8.15$), from -6 to 20 for the positive mood induction
condition ($M = 10.36, SD = 6.96$), and from -5 to 18 for the neutral mood induction
condition ($M = 6.49, SD = 5.40$). Using the same methodology employed above for exploring the effects of each affect condition on the prime-DES, I conducted a one-way ANOVA on MRI scores by affect condition and followed with planned contrasts.

Table 2

*Overall identification accuracy rates as a function of the Chapter Two sample demographic characteristics.*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>$M$</th>
<th>$SD$</th>
<th>$p$</th>
<th>$n$</th>
<th>%</th>
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<tr>
<td>&lt; 18</td>
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*Notes: $M =$ mean of sample, $SD =$ standard deviation of sample mean, $n =$ total number of participants per category; % = Percent of total sample*
The one-way ANOVA was significant for the MRI scores, $F(2, 129) = 77.13$, $p < .001$ (see Figure 3). Participants in the negative prime had significantly more sad, vivid, and intense emotional recall than did those in the positive and neutral primes ($p s < .001$). Participants in the positive prime rated their memories as significantly more happy, vivid, and intense on the MRI than did those in the neutral prime, $p = .01$.

In summary, participants in the negative prime condition exhibited significantly lower levels of positive affect and reported significantly more intense, vivid, and sad memories than did participants in the positive and neutral prime conditions. Although the participants in the positive condition did not report significantly higher positive affect on the DES than did those in the neutral condition, they did differ significantly on the MRI
in the expected direction. Amassed, these results evidence the success of the prime manipulation in producing the desired affects.

*Identification Accuracy Analyses*

In this study, I examined the influence of dysphoria and affect condition on participants’ eyewitness identification accuracy using multiple regression analyses. To reduce multicollinearity between the main effects and interaction terms, I first centered participants’ BDI and MRI scores. For the categorical variables, I created two dummy-coded variables for affect condition: Negative versus Neutral Mood variable (+1 = negative mood induction, 0 = control / no induction, 0 = positive mood induction) and Positive versus Neutral Mood variable (0 = negative mood induction, 0 = control / no induction, +1 = positive mood induction). Then I regressed participants’ identification accuracy percentage onto participants’ continuous centered BDI scale scores, the dummy-coded variables for affect conditions, the centred MRI, and all two- and three-way interactions. I also included age, sex, and participants’ continuous anxious arousal scores as covariates.

In the main analyses, I report on overall identification accuracy, and in the secondary analyses, I report on hits and correct rejections separately. A hit refers to making a correct identification from a target present line-up, whereas a correct rejection refers to selecting “None of these people” in a target absent line-up. In target present and target absent line-ups, the eyewitness can also select a foil, that is, selecting someone the police or experimenter knows to be innocent, representing a false alarm. And in target present line-ups, rejecting the entire line-up constitutes an incorrect rejection, also referred to as a miss. Both false alarms and incorrect rejections were examined in post-
Main Analyses. Results of the regression analysis revealed a significant main effect of BDI, $B = 1.78$, $t(116) = 2.13$, $p = .04$, such that higher levels of dysphoria were associated with superior performance on the identification task. Contrary to expectations, neither affect condition effect (negative affect condition $p = .36$; positive affect condition $p = .89$), nor the interactions between BDI and affect conditions ($ps > .10$) were significant.

Although the main effect of the MRI and its interactions with the affect conditions did not reach significance ($ps > .47$), the interaction between BDI and MRI was significant, $B = -.15$, $t(116) = -2.24$, $p = .03$. This two-way interaction was further qualified by a significant three-way interaction between BDI, MRI, and the positive versus neutral affect condition variable, $B = .16$, $t(116) = 2.10$, $p = .04$, highlighting a difference in the BDI effect on accuracy for the positive versus neutral mood conditions at different levels of MRI. To interpret this three-way interaction, I first examined the simple two-way interaction between dysphoria and the positive versus neutral mood condition variable separately at higher and lower scores on the MRI. Specifically, as recommended by Cohen, Cohen, West, and Aiken (2003), I used one $SD$ above and below the centred MRI mean.

The two-way interaction was not significant at higher scores on the index, $B = .72$, $t(116) = 1.11$, $p > .26$, but was significant at lower scores on the MRI, $B = -2.53$, $t(116) = -2.14$, $p = .04$. In other words, the slopes for the relationship between BDI and accuracy were significantly different from each other in the positive affect and neutral conditions when participants rated their memories as more vividly and intensely sad.
To determine how the slopes differed from each other, I next examined the simple main effects of BDI for each mood condition separately (Cohen et al., 2003). As can be seen in Figure 4, the relationship between BDI and accuracy was positive in all three conditions. BDI was associated with significantly greater accuracy in both the neutral and negative affect conditions, \( B = 3.30 \) and \( 1.24 \), respectively, \( t(116) \geq 2.04, p \leq .04 \). Because the three-way interaction with the negative versus neutral condition variable was not significant, I can conclude that these two slopes did not differ significantly from each other. In the positive affect condition, the relationship between BDI and accuracy was not significant, \( B = .76, t(116) = .82, p = .41 \).

Due to the nature of regression, I can make only two comparisons between the three levels of the categorical prime condition variable in a given analysis. As I have already presented, the relationship between BDI and accuracy did not differ in the neutral compared to the negative condition, but the relationship was significantly stronger in the neutral than in the positive affect condition. I do not know if the relationship between BDI and accuracy differs in the negative compared to the positive affect condition at lower MRI levels. To test this difference, I conducted a similar analysis, but I recoded the prime condition variables to make the negative affect condition the comparison group rather than the neutral condition. In this analysis, I found that the slope or relationship between BDI and accuracy in the positive and negative affect conditions were not significantly different from each other, \( B = -.47, t(116) = -.63, p = .53 \).
Secondary Analyses. To examine the relationship between dysphoria and accuracy for hit and correct rejections separately, I performed the same analyses above substituting the percent accuracy for hits and correct rejections as the dependent variable. A similar pattern of results as the main analyses emerged for correct rejections, but not for hits. Specifically, the main effect of BDI was positively related to accuracy for correct rejections, $B = 3.31$, $t(116) = 2.34$, $p = .02$, but not for hits, $B = .25$, $t(116) = .28$, $p > .77$. Also, the two-way interaction between BDI and MRI was significant, $B = -.28$, $t(116) = -2.55$, $p = .01$, which was qualified by two significant three-way interactions between BDI and MRI, with the positive versus neutral affect condition variable, $B = .30$, $t(116) = 2.37$, $p = .02$, and with the negative versus neutral affect condition variable, $B = .29$, $t(116) = 2.44$, $p = .02$.

To interpret these 2 three-way interactions, I first examined the simple two-way

Figure 4. Overall identification accuracy percentage as a function of BDI at lower scores on the mood response index by mood induction condition.
interactions between dysphoria and the positive and negative versus neutral mood condition variables separately at higher and lower scores on the MRI. Again, the pattern of results mirrored the main analyses. Neither two-way interaction was significant at higher scores on the MRI, \( t(116) < 1.64, p > .10 \), yet at lower scores on the MRI, the interaction between BDI and the positive versus neutral mood condition variable was significant, \( B = -4.30, t(116) = -2.19, p = .03 \), as was the interaction with the negative versus neutral mood condition variable, \( B = -4.23, t(116) = -2.49, p = .01 \). When examining each affect condition separately as I did above, BDI was related to significantly greater accuracy in the neutral condition, \( B = 6.16, t(116) = 3.01, p < .01 \), and marginally greater accuracy in the negative affect condition, \( B = 1.94, t(116) = 1.92, p < .06 \). Similar to the main analyses, the positive affect condition was not significant, \( t(116) = 1.21, p > .22 \). Because both three-way interactions between BDI, MRI, and the affect-coded condition variables (negative and positive) were significant, I can conclude that both the negative mood and positive mood condition slopes were significantly different from the neutral condition. Lastly, an examination of the positive versus negative affect conditions identified no significant differences, \( B = -0.07, t(116) = -0.06, p > .95 \).

Post-Hoc Analyses

To explore the discrepancy between hits and correct rejections, I first created two new dependent variables representing false identifications and incorrect rejections. False identifications refer to the selection of a foil (person who is not the target) from either a target present or target absent line-up. An incorrect rejection is when eyewitnesses erroneously reject all people in the line-up, selecting “None of these people,” despite the
target being present. I performed the same analyses as above but substituting in these two new dependent variables separately.

A similar, albeit negative, relationship emerged for false identifications, but not for incorrect rejections. In the former, higher scores on the BDI were related to fewer false identifications, $B = -1.77$, $t(116) = -2.38$, $p < .02$. Again, the three-way interactions between BDI and MRI, with positive versus neutral, and negative versus neutral affect conditions were significant ($ps \leq .01$), as were the follow-up tests examining the simple two-way interactions at lower levels on the MRI, $ps \leq .02$, but not at higher levels on the MRI. Examining the simple main effects of BDI on false identifications for each affect condition separately, BDI was related to significantly fewer false identifications for the neutral affect condition, $B = -3.40$, $t(116) = -3.11$, $p < .01$, and marginally fewer false identifications for the negative affect condition, $B = -0.98$, $t(116) = -1.82$, $p < .08$, but was not related to false identifications in the positive affect condition, $t(116) < -1.08$, $p > .28$. Because both three-way interactions were significant, I can conclude that the positive and negative slopes were significantly different from the neutral slope, and a comparison of the positive to the negative affect condition revealed no significant difference ($p > .89$).

**Summary**

In summary, I obtained partial support for my original hypotheses: First, I found a significant main effect of dysphoria, such that higher levels of depressed affect resulted in greater accuracy overall. Second, the nonsignificant mood induction results were qualified by an effect of recalling highly intense and vivid sad memories. Specifically, in an examination of the individual regression lines at this level of the mood response index, I found a strong positive relationship between dysphoria and accuracy in the neutral
condition, a significant yet attenuated positive relationship in the negative mood condition, and a nonsignificant positive relationship between dysphoria and accuracy in the positive affect condition. The neutral and positive condition slopes were significantly different from each other, but the negative condition slope did not differ from either the neutral or positive conditions. An almost identical pattern of results was found for correct rejections, but not for hits. For correct rejections, the sole discrepant finding was that both the negative and positive affect condition slopes were significantly different from the neutral condition, but not from each other. Lastly, post-hoc analyses identified an inverse dysphoria-accuracy relationship for false identifications, but no significant relationships were found for incorrect rejections.

Discussion

This study demonstrates that heightened levels of depressive symptomatology are associated with greater accuracy on an eyewitness identification task. This effect held for correct rejections, but not for hits. Greater dysphoria also was inversely related to false identifications, but not related to incorrect rejections. Furthermore, these effects were partially moderated by participants’ responses to a mood induction. More specifically, among those whose recollections were more intensely and vividly negative, dysphoria and accuracy were significantly related in the neutral and negative mood induction conditions but not in the positive mood induction condition. These effects held after controlling for age, sex, anxiety, the interaction between dysphoria and anxiety, and the variability in response to the mood induction in general.

The results of this study parallel the seminal works of Harkness and her
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colleagues (2005, 2010) who originally evidenced the heightened emotion perceptual abilities of dysphoric people. Moreover, this study extends these findings from an emotion recognition task to full facial recognition. Together, these studies suggest that individuals at risk of succumbing to major depression have not only better theory-of-mind capabilities, but better facial memory abilities in general.

Interestingly, the results of this study, and those of Harkness and her colleagues (2005, 2010) stand in direct opposition to the findings of Persad and Polivy (1993) and Frewen and Dozois (2005) who found no such dysphoria advantage. Persad and Polivy found that dysphoria conferred a disadvantage in recognizing the seven primary human emotions, whereas Frewen and Dozois found no relationship between BDI scores and emotion accuracy for five basic emotions. Placing methodological differences aside, both of these studies used basic emotions rather than complex emotions used by Harkness and her colleagues, and none of these studies looked at full facial recognition as I did in the current study.

The results of the current study also are generally consistent with affect-cognition theories that posit emotion as serving an asymmetrical effect on cognitive processing strategies (e.g., Bless, Clore, Schwartz, Golisano, Rabe, & Wolk, 1996; Schwartz & Clore, 1983). Also, consistent with the inhibitory control literature and the findings of Forgas et al. (2005), I found that positive induced mood confers no advantage in eyewitness accuracy, whereas under specific conditions, a negative mood confers a recognition advantage.

Chronic versus Temporary Mood

Contrary to expectations, the current study did not extend the beneficial effects of
negative mood found in Forgas et al. (2005) to identification accuracy per se. Instead, my negative mood effects were contingent upon the emotional profoundness of recalled sad memories. The more intense, vivid, and sad recalled memories were, the greater the relationship between dysphoria and identification accuracy. Partially explaining why this effect would apply only to individuals who were induced in a temporary negative mood and scored at the extreme on highly vivid and intense sad memories, Goeleven et al. (2007) found that temporarily induced mood does not inhibit negative attention biases. However, Goeleven et al. did not report on the emotional valence of participants; therefore, the role of negative valence should be more fully explored in future research.

Accounting for the discrepancy between Forgas et al. (2005) and my study may be as easy as ascribing them to the differences in methodology. First, Forgas et al. did not control for extraneous variables such as anxiety, age, or most importantly for comparisons to the current study, dysphoria. Thus we do not know if their results might have been more comparable had the effects of dysphoria been taken into account in their study.

Second, Forgas et al. (2005) used a slightly different mood manipulation and different timing. In their study, participants completed a similar autobiographical mood manipulation one hour after encoding the stimuli. Immediately thereafter, participants were subjected to the misinformation, followed by another lengthy (45 minute) distraction task. This long delay makes it questionable as to whether or not participants were in the same mood state at encoding as during retrieval. Furthermore, Forgas et al. did not attempt to control for these potential differences. In contrast, I controlled for participant mood state by having the mood manipulation first, and then participants
encoded and retrieved within minutes of each other. Thus, my participants benefited from mood dependent retrieval, whereas we do not know about Forgas et al.’s participants. We also do not know what mechanism was actually responsible for greater accuracy in Forgas et al.’s study: Was it mood dependency (i.e., did participants regress back to the ‘neutral’ state at which they started the experiment)? Or was it because participants were still benefiting from the mood induction?

Third, Forgas et al. (2005) used informational accuracy as their dependent variable, whereas I examined identification accuracy. The effect of temporary mood may simply not extend to the latter construct. Indeed, in a recent field study, Rounding, Jacobson, Clemane, Murphy, and Lavictoire (2010) found a similar nonsignificant result using Schwarz and Clore’s (1983) weather manipulation. That is, a mild negative mood state induced by inclement weather did not yield greater identification accuracy than a mild positive mood state induced by sunny weather. Future research should attempt to determine which of these various factors best accounts for the differences between our results.

*Hits versus Correct Rejections*

Why did the effect not hold for both hits and correct rejections? Foremost, I speculate that the extremely high hit percentage resulted in a ceiling effect, minimizing the power to find any significant differences in correct identifications. Next, the post-hoc results identified that compared to nondysphoric people, dysphoric individuals are less likely to select a foil from the line-up, which accounts for the discrepancy between hits and correct rejections. The use of relative decision making typically found in simultaneous line-ups is associated with a twofold increase in false identifications over
sequential line-ups, which promote absolute decision making (Lindsay & Wells, 1985). As noted above, people with dysphoria, a current diagnosis of depression, or a past history of depression are more capable of ignoring irrelevant information (Goeleven et al., 2006; Joormann, 2004). Thus dysphoric people may scrutinize each person in the line-up in more absolute, rather than relative, manner. Another possibility is that the memory trace of the target is better for dysphoric people due to greater encoding of details, something they may be more motivated to do. Or perhaps dysphoric people are simply more motivated to be accurate than are nondysphoric people, a point to be discussed in greater detail below.

To elucidate the effects of dysphoria on correct rejections, future studies first should make the identification task more difficult to reduce the ceiling effect on hits. Second, researchers could add a time constraint or vary the exposure and retrieval poses, both of which should reduce dysphoric people’s ability to perform a more detailed examination of the line-up photos. Varying poses would have the added advantage of being able to elucidate whether or not the eye region is necessary for the dysphoria advantage. Third, researchers could compare and contrast accuracy rates using both simultaneous and sequential line-ups. Fourth, future research should try to untangle these processes to ascertain if dysphoric people are conferred an advantage at encoding, retrieval, or both.

**Limitations**

Among the limitations of the current study are two that pertain to nearly all laboratory research in social psychology. First, my participants were undergraduate students who Henrich, Heine, and Norenzayan (2009) have argued are different from the
general population because they are more likely to be “WEIRD;” that is, they are more likely to be Western, highly educated, more independent self-construal, richer, and democratic. However, to my knowledge, none of these factors have been argued to significantly influence eyewitness accuracy.

Second, using a multiple exposure design and not a singular staged crime can be detrimental to ecological validity and generalizability. Eyewitness studies have long suffered from the accusation that their methodologies do not exactly replicate real-world events. In defence, had I added this dimension to the present study, I may have introduced too many confounds in the event that I did not replicate the dysphoria-accuracy relationship. The innovative nature of the present study dictated that I limit the scope and methodology, aiming to determine only whether or not the effects of dysphoria on recognition accuracy could be extended into the eyewitness realm. Still, I do not know how depressed affect might influence identification accuracy had I introduced a delay between encoding and retrieval. Several studies have concluded that our memories fade during the delay between the victim-witness experience and identification (e.g., Dysart & Lindsay, 2007). Moreover, theories of mood dependency would suggest a fluctuation in accuracy after a delay if the current mood state at retrieval is not the same as the mood state during encoding (Miranda & Persons, 1988). To date, no research has undertaken this endeavour.

Finally, I cannot rule out the possibility that the instructions or design in the present study may have served as a motivational catalyst for dysphoric people resulting in increased performance. Weary, Marsh, Gleicher, and Edwards (1993) argued that dysphoric people are more motivated to attend to social cues than are nondysphoric
people. Motivational cues have been found to affect dysphoric people differentially (Harkness, Jacobson, Sinclair, et al., 2009), and this difference offers a possible explanation for the dysphoria advantage. Although the instructions and/or design should have affected participants uniformly, or arguably may have singularly enhanced nondysphoric people’s motivation to a level comparable to that of dysphoric people, I believe that dysphoric people may have experienced a disproportionate effect of this motivational cue. That is, motivational cues may affect dysphoric people relative to nondysphoric people in an ‘exponential’ way resulting in dysphoric people engaging in an even more detailed examination of possible line-up options before making their decision.

DNA exoneration cases such as *People v. Cotton* (1985, as cited by Innocence Project, 2010) and a study by Krangel (2004) have shown that accuracy does not improve when eyewitnesses know to pay attention to an individual; however, this latter study did find increased accuracy when participants were told beforehand they would need to choose the target from a line-up. This attentional cue is something participants in the current study would figure out after completing the first of the 12 experimental trials. Therefore, knowing they would need to perform subsequent line-up identifications, dysphoric people may have been differentially motivated to encode and/or search for information to make a correct decision in both the presence or absence of the target. Consequently, this difference in motivation could result in fewer false identifications.

*Conclusions*

The importance of accurate eyewitness identifications cannot be overstated. Although discredited eyewitness testimony still has a distinct influence on juries, it is
attenuated when compared to non-discredited eyewitnesses (Whitley, 1987). Logically, lawyers may attempt to use a previous history of depression to discredit and moderate the impact of eyewitness testimony. Through the application of the current research, the criminal justice system can make more informed decisions as to whether or not an eyewitness is credible when suffering from subclinical depression.
Foreword to Chapter Three

In this manuscript, I examined the effects of mood dependency on eyewitness identification by comparing the accuracy of individuals who were either stable or unstable in their depressive symptomatology from the time of encoding a target photo to a subsequent line-up identification task some two-to-four weeks later. More specifically, I examined if people with stable levels of dysphoria would have greater accuracy at an identification task than: (a) those who were nondysphoric at the time of encoding and remained so at the time of identification, (b) those who exhibited instability in their depressive symptomatology (e.g., who were nondysphoric at encoding and dysphoric at identification, or vice versa, etc.), and (c) those who exhibited stable severe depressive symptomatology.
Chapter Three:

Examining the Effects of Changes in Depressive Symptomatology on Eyewitness Identification
Introduction

Imagine being a victim or witness to a crime. Now imagine how this event may affect you mentally as well as your ability to assist the police and prosecution. Although research on post-traumatic stress has shown a decrement in memory accuracy (e.g., Reisberg & Heuer, 2007), no psychological research has examined what effect depression, a well known outcome of being victimized, has on eyewitness accuracy.

The theory-of-mind literature has evidenced a unique advantage for individuals with subclinical levels of depression in accurately discerning the emotional states of others (e.g., Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005). Drawing on this knowledge, I found in Chapter Two that individuals with dysphoria also exhibited higher rates of eyewitness identification accuracy. However, one caveat was left unexplored: delays typically occur between witnessing the event and participating in a line-up. Depressive symptomatology often develops after one has been victimized, and this shift in affect may alter identification accuracy.

In the current study, I sought to determine if identification accuracy over the course of time would wane as a result of changes in depressive symptomatology. Based on the results of Chapter Two and drawing on the mood dependency literature, I predicted that individuals who exhibited stable dysphoria over time would have greater accuracy than would those who exhibited stable nondysphoria, stable severe depressive symptomatology, or changes in depressive symptoms.

Eyewitness Identification

Mistaken eyewitness identification is the leading source of error in DNA-related exoneration cases in the U.S. and is cited as the second most important contributor to
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wrongful convictions in Canada (Innocence Project, 2010; Report on the Prevention of Miscarriages of Justice, 2004). These findings make eyewitness accuracy a highly salient topic for psychological research. But where should researchers focus their time?

In 1978, Wells helped to answer this question by proposing a distinction between two different sources of error within the eyewitness experience: (1) system variables – sources of error that are under the control of the justice system, versus (2) estimator variables – sources of error that are naturally occurring in the eyewitness experience. Wells argued that due to the uncontrollable nature of estimator variables in the criminal justice system, “system-variable research may prove more fruitful than estimator-variable research” (p. 1546). In the decades following this distinction, the majority of psychological research has focused on finding better methods and techniques that police can use to administer line-ups and improve eyewitness recall (i.e., system variables; Wells & Olson, 2003).

*Effect of Delay on Accuracy*

One effect that bridges the expanse between estimator and system variables is that of a delay between the eyewitness experience and perpetrator identification. Many reasons exist for these delays, such as difficulty in finding a suspect or the crime is not reported immediately, and these delays have a deleterious effect on identification accuracy. For example, Turtle and Yuille (as cited in Read & Connelly, 2007) reported a 43% reduction in detail over a time span of one to five months, and Flin, Boon, Knox, and Bull (as cited in Read and Connelly, 2007) report a 10% reduction. Archival reviews point to a consistent reduction in accuracy as a result of delay (Dysart & Lindsay, 2007), and empirical studies have found significant, but weak, deficits over time for correct
identifications but not in false alarms (Shapiro & Penrod, 1986). Read and Connelly (2007) propose that the more central details as compared to peripheral details in relation to understanding the gist of an event will be more easily recalled. Finally, Anderson, Cohen, and Taylor (2000) contend that memory loss is not linear; more information is forgotten over the first several years, with memory stabilizing over time, allowing for accurate repetition of details as much as 12 years later.

Making the issue of delay highly prominent and ripe for psychological inquiry are several U.S. court rulings that tout the importance of delay in evaluating eyewitness accuracy. For example, Dysart and Lindsay (2007) referred to rulings from Neil v. Biggers (1972) and Commonwealth v. Bumpus (1968) wherein U.S. courts cited delay as an important criterion for their determination of eyewitness credibility. However, according to Dysart and Lindsay, U.S. courts may use this evidence to justify rather than formulate their decisions. Moreover, with respect to delay, they conclude that court rulings are inconsistent with short delays cited as cause for an accurate identification, whereas long delays are moderated by citing other factors in the case that promote eyewitness accuracy and credibility. Indeed, the courts cite unsubstantiated factors such as witness confidence, exposure time, rehearsal, consistency of statements, and procedural factors to defend courtroom decisions regarding eyewitness credibility across variable delays.

Our memories can be preserved in several ways, both individually and procedurally. By utilizing techniques such as rehearsal, self-generated narratives, overlearning, and repeated recall, memories can be bolstered, inconsistencies reduced, and accuracy increased (Read & Connelly, 2007). These techniques can be used to
maintain victim-witness memories thereby attenuating the effects of long passages of time on people’s ability to identify the perpetrator accurately. Furthermore, Dysart and Lindsay (2007) reference court decisions that have allowed for procedural variations if such variations will compensate for memory loss (e.g., allowing the identification of a quickly caught suspect who is in the back of a police car [i.e., show-ups]). Therefore, although some delays are under the control of the criminal justice system, what is not is the effect that such delays will have on the victim-witness. Individual differences, such as mental health, may emerge to have an influential effect on eyewitness identification accuracy, especially after a delay.

**Individual Differences**

To understand the importance of estimator variables such as eyewitness mental health, I need to contextualize the problem within the criminal justice system. Victimization rates in the U.S. for young adults involved in violent crimes are high (78%), and the likelihood of being an eyewitness to such an event is almost a certainty (94%; Scarpa, 2003). The more you are involved in a crime (i.e., being a victim versus being a witness) and the more severe the crime is (i.e., violent versus property crime), the greater the risk for succumbing to various mental disorders (Norris & Kaniasty, 1994). Moreover, multiple exposure and/or victimization increases the inherent risk of suicide, major depressive disorder, post-traumatic stress disorder (PTSD), interpersonal problems, as well as a host of other negative effects (Scarpa, 2003; Sorenson & Golding, 1989). Simply having a high fear of crime is related to twofold risk of being depressed (University College London, 2007). Therefore, depression is highly prevalent in the eyewitness experience and calls for psychological inquiry into its impact on eyewitness
Depressive symptomatology resides along a continuum, and at any given point, people can be classified as having no, mild, moderate, or severe depressive symptomatology (Ruscio & Ruscio, 2002; but see Coyne, 1994, and Santor & Coyne, 2001, for alternative views about the continuity of depressive symptoms). The prevalence rate of subthreshold depression or dysphoria is between 5% and 10% of the population (Cuijpers, de Graaf, & van Dorsselaer, 2004). Moreover, individuals suffering from subclinical depression have a substantial risk of developing major depressive disorder (Cuijpers, Smit, & van Straten, 2007). Dysphoria is of particular interest to this study because it encompasses chronic affective states and motivational differences (Weary, Edwards, & Jacobson, 1995), as well as individual differences in recognition and accuracy (e.g., Harkness et al., 2005).

**Mood and Accuracy**

Studies aimed at understanding the effects of negative mood states on eyewitness accuracy often are rooted in a theory of mood congruency positing that memories are more accurate when our mood matches the emotional valence of the material we are encoding (Matlin, 2005). For instance, Murray, Whitehouse, and Alloy (1999) found that dysphoric participants recalled a slightly greater percentage of negative words than did nondysphoric participants. Paralleling mood congruency is the theory of mood dependency or that recall of information is more accurate when we are in the same mood at retrieval as we were when we encoded it (Matlin, 2005). For example, when participants generated a story and had to recall that story 2 or 3 days later, Eich, Macaulay, and Ryan (1994) found greater accuracy when participant moods matched at
Although the robustness of this latter phenomenon has been questioned, researchers have determined how to reliably evoke this effect (cf. Bower & Mayer, 1985; Eich & Forgas, 2003). Mood dependency is more likely to operate in real-world conditions when the mood is strong, stable, and genuine, and when the mood is intense during both retrieval and encoding (Eich & Forgas, 2003; Ucros, 1989). Furthermore, changes in mood result in corresponding changes in judgements, suggesting that as negative moods deepen, more negative judgements will transpire (Mayer & Hanson, 1995). Thus, mood dependency is especially germane to the current study, for individuals who experience affective changes from encoding to retrieval should experience a decrement in accuracy. Specifically, victim-witnesses who succumb to the intense emotions of the situation resulting in increasing levels of negative affect will likely have less accurate recall.

To date, the majority of research examining the effects of intense emotions on eyewitness accuracy has tended to focus on stress and anxiety. Unsurprisingly, the high levels of stress or fear that result from being a victim or witness have a detrimental effect on memory accuracy and can often lead to misidentification of perpetrators (Goldsmiths, 2008; Reisberg & Heuer, 2007). For example, in a study of PTSD, higher levels of trauma-flashback were related to reduced specificity of auto-biographical memory (Moradi, Herlihy, Yasseri, Shahraray, Turner, & Dalgleish, 2008).

However, a study by Burriss, Ayers, Ginsberg, and Powell (2008) suggests that the effects of PTSD on memory accuracy are better explained vis-à-vis depression. In their study, PTSD translated into learning and memory deficits on standardized tests, but
when anxiety and depression were controlled, these results were attenuated. Moreover, using stepwise regression, only depression reliably predicted learning and memory deficits, thus suggesting that depression may mediate this relationship. In sum then, depression and/or chronic negative mood appear to play a cardinal role in memory accuracy.

Interestingly, dysphoric individuals and people who had a previous history of depression but were in remission have been found to be more accurate in distinguishing the mental states of others (Harkness et al., 2005; Harkness, Jacobson, Duong, & Sabbagh, 2010). However, this advantage was not seen among clinically depressed people; they were significantly less accurate in their ability to ascertain the mental state of others than their nondepressed counterparts were (Lee, Harkness, Sabbagh, & Jacobson, 2005). Thus, theories of mood dependency become bracketed by this research, posing a limitation and suggesting an optimal level of negative affect. Negative affect at the extreme of the continuum or changing over time should reduce accuracy.

Extending the findings on mental state decoding to full facial recognition, I found in Chapter Two that dysphoric people also experienced a similar advantage. Greater levels of dysphoria were related to better performance on a facial recognition task. Furthermore, being in either a temporarily induced happy or sad mood did not significantly influence accuracy, which suggests that chronic negative affect contributes a unique effect to perceptual accuracy. Therefore, at least for immediate encoding and retrieval, dysphoric people have a perceptual advantage over those who do not exhibit the same depressive symptomatology. How dysphoric people perform over time, however, can only be extrapolated from the application of the mood dependency literature. This
question is the focus of the current study.

*Research Objectives and Hypotheses*

The goal of this study was to investigate how changes in mood state can affect identification accuracy. Participants encoded target faces at a first session (Session 1) and returned for a second session (Session 2) after receiving their first midterm grades from an introductory psychology course. I hypothesized that this experience would result in marked variability in scores on the depression measure for a substantial number of participants, such that some participants would have higher or lower levels of depressive symptomatology relative to their Session 1 scores, leading to differences in their overall level of accuracy.

Drawing from the mood dependency literature, I hypothesized that participants who demonstrated any shift from Session 1 dysphoria levels would perform more poorly than would those whose levels remained stable. Also, drawing on the results presented in Chapter Two, I predicted that participants who were dysphoric at the time of encoding would have a significant advantage over those who were not, especially if they remained dysphoric at Session 2. In other words, I expected that stable dysphoric participants would have the highest rates of accuracy, followed by participants in a stable nondysphoric mood state, followed by those whose mood state was unstable, and tailed lastly by those whose dysphoria scores at Session 1 and 2 suggest stable, yet severe levels of depressive symptomatology. For the latter, I thought that participants with very high levels of depressive symptoms during either session would not process information thoroughly during the target presentation and line-up procedures, causing them to have the lowest rates of identification accuracy.
Method

Participants

To ensure representation across the broad spectrum of depressive symptomatology, participants were recruited using two lists that were created by categorizing participants’ prescreening scores on the Beck Depression Inventory-II (BDI; Beck, 1996) into nondysphoric and dysphoric (0-5 and 10+, respectively). Using a standardized script, research assistants blind to participant BDI scores and list identification either emailed or called students to invite them to participate in this study. Prospective participants were told that they would take part in a single study that required participation in two sessions with a delay of approximately two-to-four weeks between sessions. As the nature of this study was obvious (an eyewitness task), I did not attempt to deceive students of the nature of Session 1 or 2. Participants received partial course credit for their participation in each session.

Of the 189 participants who completed the first session, 16 did not return for the second experimental session. Although these participants were significantly higher on the anhedonic depression index ($M_s = 100.69, 88.96; SDs = 23.33, 19.55$) of the Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991), $t(187) = 2.26, p < .05$, they did not significantly differ on any demographic dimension, nor other experimental measure including Session 1 BDI scores, $p_s > .10$.

A computer glitch in the html slider used to indicate age resulted in missing data for 57 participants. Due to the large amount of missing data, I conducted a missing values analysis and substituted the predicted regression mean for these blank values. A post-hoc examination determined that the main pattern of results were the same if these
participants were included or excluded; therefore, the subsequent analyses will include this substitution.

In sum, of the participants included in the final sample ($N = 173$), 74% were female ($n = 129$), and 73% were of European ancestry ($n = 126$). The average age for participants was 18.6 years old ($SD = 2.44$), with a median age of 18 years.

*Materials/Measures (See Appendix for all experimental materials)*

**Beck Depression Inventory-II.** The revised Beck Depression Inventory (BDI; Beck, 1996) is a measure of depressive symptomatology only. On 21-items, participants report the intensity of depressive symptoms ranging from 0 to 3. The total score is calculated by summing across the items with higher scores indicating higher levels of depressive symptoms. The BDI is a highly reliable measure of depression, with excellent reported internal consistency (see Beck, Steer, & Garbin, 1988, for a full review of psychometric evidence of the original version of the scale). In the present study, the BDI had similarly high internal consistency (Session 1 $\alpha = .92$; Session 2 $\alpha = .93$; see Table 3). Although the BDI has been shown to be a well-validated measure of the depth of depressive symptomatology and to be an effective self-report measure of severity of depression, it is not a sufficient indicator of nosologic depression (Kendall, Hollon, Beck, Hammen, & Ingram, 1987; Weary et al., 1995). Thus, scores on this measure and my use of the terms depressed, depressive, and depression are not meant to imply the presence of a clinical diagnosis of depression.

**Mood and Anxiety Symptom Questionnaire.** The Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991) is a 90-item, self-report questionnaire that assesses both depressive and anxious symptomatology. The MASQ uses a five-point
response scale, which ranges from (1) not at all to (5) extremely, and yields five indices.

Two of the indices, anhedonic depression and anxious arousal, tap into symptom clusters that differentiate depression and anxiety, respectively; whereas the remaining three indices load onto various types of general distress (i.e., symptoms common to both anxiety and depression). This questionnaire was chosen because it has good convergent and discriminant validity (Watson, Weber, Assenheimer, Clark, Strauss, & McCormick, 1995), and it allows for the examination of symptoms that are unique to depression and anxiety as well as symptoms that are shared by both conditions. Considering depression and anxiety often co-occur, the anxious arousal index is especially important because it allows one to take into consideration the unique contribution of anxious symptoms to task performance. In the current study, the anxious arousal subscale exhibited excellent internal reliability (Session 1 $\alpha = .91$; Session 2 $\alpha = .89$; see Table 3).

Mood Variability Induction. Previous studies have demonstrated a high degree of stability in the BDI when measured 6 to 10 weeks apart (Weary et al., 1995). Yet, as noted above, those victimized do not exhibit similar stability in their affect, with considerable variability in how being a victim-witness affects people. The purpose of the current study was to examine how changes in depressive symptomatology influence identification accuracy; therefore, I needed to introduce variability in at least some participants’ responses on the BDI. Consequently, I timed Session 2 after a transition period likely to produce fluctuations in affect for some students. Specifically, participants were scheduled to return approximately six weeks into their first term at university during a period that many students experience life changes such as the
Table 3

*Correlations, means, standard deviations, and alpha coefficients for all major Chapter Three variables.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predictor Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Depressive Symptomatology at Session 1 a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Depressive Symptomatology at Session 2 a</td>
<td>0.783 **</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outcome Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Eyewitness Identification Accuracy</td>
<td>-0.044</td>
<td>-0.042</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Continuous Anxiety Scores at Session 1 b</td>
<td>0.529 **</td>
<td>0.511 **</td>
<td>-0.072</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Continuous Anxiety Scores at Session 2 b</td>
<td>0.513 **</td>
<td>0.547 **</td>
<td>-0.026</td>
<td>0.806 **</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demographic and Background Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Age</td>
<td>-0.055</td>
<td>-0.023</td>
<td>-0.041</td>
<td>-0.096</td>
<td>-0.086</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Sex</td>
<td>-0.120</td>
<td>-0.098</td>
<td>-0.016</td>
<td>-0.122</td>
<td>-0.090</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>10.9</td>
<td>11.2</td>
<td>16.4</td>
<td>28.2</td>
<td>27.3</td>
<td>18.6</td>
<td>n/a</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>8.57</td>
<td>9.26</td>
<td>12.17</td>
<td>10.15</td>
<td>9.29</td>
<td>2.44</td>
<td>n/a</td>
</tr>
<tr>
<td>Cronbach's Alpha</td>
<td>0.92</td>
<td>0.93</td>
<td>n/a</td>
<td>0.91</td>
<td>0.89</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Notes:* *p < .05. **p < .01.

a measured by the Beck Depression Inventory-II

b measured by the Mood Anxiety Symptom Questionnaire
redistribution of grades, personal relationship changes, and adjustments to being away from home for the first time. I theorized that during this transition period, I would see a marked shift in BDI scores for some participants, such that students who were coping better would show lower levels of depressive symptomatology than would those who were not coping as well with these transitions. Thus this procedure was used to mimic, albeit likely to a lesser degree, the potential effects of increasing levels of depressed affect that may be experienced by someone who witnesses an actual crime or who has been victimized.

Participants scheduled their second appointment immediately after having completed the first session. They were given a range between 9:00 a.m. and 5:00 p.m. on each day during the week immediately following the Sunday that midterm grades were posted. To minimize attrition, the experimenter provided all participants with an appointment card after scheduling their second session, and research assistants, via email, reminded them of their appointment on the day before their return.

*Target Presentation Task.* On a standard computer with a 19-inch monitor running MediaLab v2008, participants were exposed to the target faces through a series of still images. Each target image was displayed on the center of the computer screen for 30 seconds before automatically advancing to the next image. Each target image was approximately 5- by 7.6-cm and depicted the full face and neck of the target centered within a coloured background (see Figure 5). Of the 12 target images, nine were men, and three were women. All targets were of European ancestry, and the order of target presentation was randomized.
Figure 5. Examples of a female and a male target photograph.

Target Identification Task. Participants attempted to identify targets by viewing a six-person simultaneous line-up. The line-ups depicted six numbered (1-6) photographs of the same size and matching background colour as the target photographs and were arranged in two rows of three, spaced evenly across a different coloured background. A seventh “None of these people” option was centered vertically to the left of the line-up (see Figure 6).

Figure 6. Example of a six-person simultaneous line-up.
Participants were randomly assigned to one of two target identification conditions that were counterbalanced for six target present and six target absent line-ups. Across the two conditions each target present and each target absent line-up appeared equally often. In both conditions, the order of presentation of line-ups was randomized. Each foil (a person depicted in the line-up that is not the target) was unique and not repeated throughout the 12 trials. Participants placed a check mark in the box corresponding to their answer and then clicked “Continue” to proceed to the next screen.

Choosing any individual from the line-up advanced participants to a screen where they could indicate if they recognized any of the other individuals (i.e., foils) from the line-up. Next, participants rated their confidence in their decision on a scale from 0 to 100. Participants choosing “None of these people” immediately rated their confidence. Accepting this rating by clicking “Continue” advanced participants to the next trial.

Identification accuracy was operationalized by determining if the identification represented a hit (choosing the correct target out of a target present line-up) or a correct rejection (choosing “None of these people” in a target absent line-up). By summing the number of accurate identifications, dividing across all 12 experimental trials, and multiplying by 100, I created a measure of percent accuracy. In the main analyses, total identification accuracy percentage was the key dependent measure. In the secondary analyses, I created two dependent variables for target condition, percent hits and percent correct rejections, by summing the correct identifications for target present and absent line-ups separately, dividing by six, and multiplying each by 100.

---

5 The likelihood of recognition was extremely rare as the majority of foils in the line-up were former students who were much older than the participants, and most have already graduated. Indeed, no participant identified knowing any of the foils.
**Procedure**

*Session 1.* After reading a brief description of the study and providing written consent, participants completed the target exposure task and the MASQ followed lastly by the BDI. Once finished, participants booked their return appointment, were thanked for their time, and compensated for their participation in this first session.

*Session 2.* As previously mentioned, I did not attempt to deceive participants regarding the nature of the first session. In fact, participants in Session 1 were told that they would need to study the target faces intently so that they could answer some questions at Session 2 pertaining to what they saw. Participants were not told, however, that the purpose of the delay was to naturally create variability in depressive symptomatology.

Upon returning to the lab on the day of their scheduled appointment, participants first completed a brief series of questions to ascertain if any potential event may have taken place that could interfere with their ability to make an identification (e.g., witnessing a crime in real life, etc.). Participants then completed the target identification task followed by the same social and personality measures completed in Session 1. Once finished, all participants were fully debriefed, thanked for their time, and compensated.

**Statistical Analyses**

Data from the 173 participants included in the study were reverse-coded as necessary. Demographic data were recoded to delineate common categorical options, and where indiscernible, these data points were coded as system missing. In all analyses, total identification accuracy percentage was the key dependent measure. Participants’ age, sex, and the main effect of participants’ continuous anxious arousal scale scores at
both Session 1 and 2 were examined as covariates. Additionally, as the time elapsed between Session 1 and 2 was variable between participants, I included the number of days delay between sessions as an additional covariate.

Following the syndromal recommendations by Kendall et al. (1987), I created the following categorizations used to distinguish participants’ stability in BDI scale scores: (a) 0-4, (b) 5-9, (c) 10-13, (d) 14-17, (e) 18-24, (f) 25-30, and (g) 31+. Kendall et al. (1987) and Tennen, Hall, and Affleck (1995) suggest that people scoring in the 10-17 range should be considered as endorsing dysphoric symptoms, those below would be considered nondysphoric, and those above would correspond to mild to severe levels of depressive symptomatology (i.e., exhibiting symptoms of severe depression).

Participants’ BDI scores from Session 1 were used as the anchor for evaluating stability and to form four dysphoria stability groups: stable dysphoric, stable nondysphoric, unstable dysphoric, and stable severe depressive symptomatology. Participants in the range of 10-17 in Session 1 who did not move at least two categories were coded as stable dysphoric. Participants who reported stable low levels of depressive symptomatology at both time points were coded as stable nondysphoric. The unstable dysphoric group was comprised of those participants whose BDI scale scores shifted at least two categories (e.g., from the 0-4 range to the 10-13 range). Participants who reported Session 1 and 2 levels on the BDI greater than 18 were coded into the stable severe depressive symptomatology group (see Table 4).

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6 I use the term unstable dysphoric to refer to all categories of instability, which would include movement that did not include dysphoria at all, such as nondysphoric to severe depressive symptomatology.
Table 4

*Means and standard deviations of scores on the BDI by dysphoria stability group.*

<table>
<thead>
<tr>
<th>Categorization</th>
<th>M</th>
<th>SD</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphoria Stability Group</td>
<td>10.9</td>
<td>8.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable Dysphoric</td>
<td>14.6</td>
<td>1.8</td>
<td>18</td>
<td>10.4</td>
</tr>
<tr>
<td>Stable Nondysphoric</td>
<td>4.2</td>
<td>2.8</td>
<td>81</td>
<td>46.8</td>
</tr>
<tr>
<td>Unstable Dysphoric</td>
<td>14.1</td>
<td>5.4</td>
<td>55</td>
<td>31.8</td>
</tr>
<tr>
<td>Stable Severe Depressive Symptomatology</td>
<td>26.3</td>
<td>9.0</td>
<td>19</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*Notes: M = mean of sample, SD = standard deviation of sample mean, n = total number of participants per category; % = Percent of total sample.*

**Results**

**Preliminary Analyses**

As expected after a two-to-four week delay, participant accuracy rates were quite low, averaging only 16.4% correct \((SD = 12.2\%)\), with scores ranging from 0% to a maximum of 50% correct, and a median percent accuracy of 16.7%. To ascertain the role of target condition, sex, and ethnicity on identification accuracy, I conducted a mixed model repeated measures analysis of variance (ANOVA) with target condition (present or absent) and target sex as within-subjects factors, and participant sex \((1 = \text{male}, 0 = \text{female})\) as a between-subjects factor. Lastly, previous research has shown that identifying targets of your own race confers an accuracy advantage (Shapiro & Penrod, 1986). To ascertain if this factor was a confound in the current study, I included own-race as an additional between-subjects factor.\(^7\) Overall identification accuracy as a function of demographic characteristic can be seen in Table 5.

---

\(^7\) As all targets were of European ancestry, I coded European participants as 1, signifying own-race identification, and non-European participants as 0, signifying other-race identification.
Table 5

Overall identification accuracy rates as a function of the Chapter Three sample demographic characteristics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>M</th>
<th>SD</th>
<th>p</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 18</td>
<td>20.0</td>
<td>14.8</td>
<td>10</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>15.8</td>
<td>11.9</td>
<td>82</td>
<td>47.4</td>
<td></td>
</tr>
<tr>
<td>19 +</td>
<td>15.3</td>
<td>12.2</td>
<td>24</td>
<td>13.9</td>
<td></td>
</tr>
<tr>
<td>System Missing</td>
<td>17.3</td>
<td>12.2</td>
<td>57</td>
<td>32.9</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16.1</td>
<td>13.1</td>
<td>ns</td>
<td>44</td>
<td>25.4</td>
</tr>
<tr>
<td>Female</td>
<td>16.5</td>
<td>11.9</td>
<td></td>
<td>129</td>
<td>74.6</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>25.0</td>
<td>0.0</td>
<td>1</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>East Asian</td>
<td>15.8</td>
<td>12.6</td>
<td>30</td>
<td>17.3</td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>16.1</td>
<td>12.4</td>
<td>126</td>
<td>72.8</td>
<td></td>
</tr>
<tr>
<td>Middle Eastern</td>
<td>20.8</td>
<td>5.9</td>
<td>2</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>South Asian</td>
<td>20.8</td>
<td>10.2</td>
<td>6</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>System Missing</td>
<td>20.2</td>
<td>10.6</td>
<td>8</td>
<td>4.6</td>
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<tr>
<td><strong>Type of Ethnicity Bias</strong></td>
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<td></td>
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</tr>
<tr>
<td>Own-Race</td>
<td>16.1</td>
<td>12.4</td>
<td>ns</td>
<td>126</td>
<td>72.8</td>
</tr>
<tr>
<td>Other-Race</td>
<td>17.4</td>
<td>11.6</td>
<td></td>
<td>47</td>
<td>6.6</td>
</tr>
</tbody>
</table>

*Notes: M = mean of sample, SD = standard deviation of sample mean, *n* = total number of participants per category; % = Percent of total sample.

The correct hit rate ($M = 8.03\%, SD = 11.12$) was significantly lower than the correct rejection rate ($M = 24.50\%, SD = 24.60$), $F(1, 169) = 12.03, p = .001$.

Participants were marginally more accurate at identifying male ($M = 17.20\%, SD = 13.54$) versus female targets ($M = 13.45\%, SD = 19.76$), $F(1, 169) < 3.61, p < .07$, and
women were not more accurate than men, $F(1, 169) < .12, p > .73$. There was also no
evidence of own-race bias, with participants of European ancestry ($M = 16.07\%, SD =
12.39$) no more accurate at identifying European targets than were participants of other
ancestry ($M = 16.88\%, SD = 11.86$), $F(1, 169) = .04, p > .84$. The interactions between
target or participant sex, own-race bias, or target condition also were not significant,
$Fs(1, 169) < .90, ps > .34$. Lastly, identification accuracy percentage was not correlated
with age, sex, or scores on the MASQ and the BDI ($ps > .34$).

*Mood Variability Manipulation Check*

To test whether or not my real-world mood variability manipulation was effective,
I examined the changes in BDI at each of the three levels of the Session 1 BDI
categorization. By examining each Session 1 BDI categorization separately (i.e.,
nondysphoric, dysphoric, or severe depressive symptomatology), I could more accurately
determine if substantial variability in depressive symptomatology resulted in
categorization changes at Session 2. In other words, I expected to find significant
differences between Session 1 and Session 2 BDI scores as evidence of high levels of
variability. To this end, I performed a repeated measures analysis of covariance
examining differences in BDI scores from Session 1 to Session 2 separately for each level
of Session 1 BDI categorization, controlling for anxious arousal at both sessions, the
number of days between sessions, age, and sex.

Results of this analysis were at least moderately significant at all levels (see
Figure 7). The Session 1 nondysphoric participants reported significantly higher levels of
depressive symptomatology at Session 2, $F(1, 85) = 4.91, p = .03, \eta^2 = .06$. For the
Session 1 dysphoric participants, results were marginally significant, $F(1, 45) = 2.95, p =
.09, $\eta^2 = .06$, with participants exhibiting somewhat higher levels of depressed affect at Session 2. Lastly and contrary to expectations, participants in the severe depressed symptomatology category reported significantly lower levels of symptomatology at Session 2, $F(1, 25) = 18.65, p < .001, \eta^2 = .43$. This latter result may be due to several factors (e.g., regression to the mean, seeking and receiving help for their symptomatology, or doing better than expected on the midterm resulting in more positive affect after receiving their grades).

![Graph](image_url)

**Session 1 Dysphoria Categorization**

*Notes: † $p < .10$. * $p < .05$. *** $p < .001$.

**Figure 7.** Changes in depressive symptomatology from Session 1 to Session 2 by initial Session 1 BDI category.

Overall, this analysis identified significant variability in participant scores on the BDI. Scores on the BDI were higher for both the Session 1 nondysphoric and dysphoric groups and lower for those reporting higher levels of depressed affect at Session 1.
However, as I did not specifically manipulate student grades, I cannot conclude whether or not the changes in depressive symptomatology are a direct result of this event or the result of some other unobserved event. Nevertheless, for the purposes of the present study, a direct causal link between BDI scores and the mood variability manipulation is actually irrelevant, as the intended purpose of the mood variability manipulation was only to increase variability in the BDI. This movement was evidenced by the 55 participants (31.8%) who were categorized as unstable in affect because they shifted at least two categories from Session 1 to Session 2.

Identification Accuracy Analyses

To examine the effects of changes in mood on accuracy, I conducted a one-way univariate ANOVA, using identification accuracy percentage as the dependent variable and dysphoria stability (stable dysphoric, stable nondysphoric, unstable dysphoric, stable severe depressive symptomatology) as the independent variable, while controlling for the covariates described above. I expected stable dysphoric people to have significantly higher accuracy than all of the other groups, even though the main effect of dysphoria stability group may not be significant itself. Furthermore, I predicted that stable nondysphoric participants would have accuracy rates equal to or slightly greater than unstable dysphoric participants, and these two groups would be significantly higher than participants categorized as having stable high levels of depressive symptomatology.

In the main analyses, I will report on overall identification accuracy, and in the secondary analyses, I will report on hits and correct rejections separately. A hit refers to making a correct identification from a target present line-up, whereas a correct rejection refers to selecting “None of these people” in a target absent line-up. In target present and
target absent line-ups, the eyewitness can also select a foil, that is, selecting someone the police or experimenter knows to be innocent, representing a false alarm. And in target present line-ups, rejecting the entire line-up constitutes an incorrect rejection, also referred to as a miss. Both false alarms and incorrect rejections will be examined if necessary in post-hoc analyses.

*Main Analyses.* Consistent with expectations, the main effect of dysphoria stability was not significant, $F(3, 164) = 1.66, p > .17$; however, driven by a priori hypotheses, I conducted planned contrasts to evaluate the differences between each level of dysphoria stability. As predicted, individuals who were originally dysphoric at the time of encoding (i.e., during the target exposure task) and were still dysphoric at the time of the target identification task performed significantly better at the identification accuracy task than all of the other stability categorizations (see Figure 8). Specifically, stable dysphoric participants had a significant advantage over stable nondysphoric participants ($p < .05$) and over those participants who exhibited instability in their depressive symptomatology ($p = .05$). Oddly, even though the mean difference was greater compared to other categorization groups, stable dysphoric people were only marginally higher in accuracy than the stable severe depressive symptomatology group ($p < .08$). This effect may be nonsignificant because of the lower power due to the fewer participants involved in this comparison. Finally, stable dysphoric participants were significantly higher in accuracy than all of the other groups combined, $F(1, 164) = 4.90, p = .03, \eta^2 = .03$.

Also consistent with my predictions, I found that accuracy rates for stable nondysphoric people were not significantly different than were unstable dysphoric
participants’ rates ($p > .98$). However, contrary to my hypotheses, neither stable nondysphoric, nor unstable dysphoric participants were significantly different from stable severe depressive symptomatology participants ($p > .81$). Moreover, when stable nondysphoric and unstable dysphoric participants were grouped together, these participants were not any different from participants classified as having severe depressive symptomatology ($p > .79$).

Figure 8. Eyewitness identification accuracy percentage by dysphoria stability group.

*Notes:* † $p < .10$. * $p = .05$. ** $p < .01$.

*Secondary Analyses.* When examining eyewitness identification accuracy separately for target conditions, I found a similar pattern of results as the main analyses above for correct rejections, but not for hits. For hits, the main effect of BDI was not significant, $F(3, 164) = 1.89, p > .13$, and all contrast differences among the four BDI
stability groups were nonsignificant, \( ps > .14 \), except people with unstable dysphoria were significantly more accurate than those classified as having stable severe depressive symptomatology (\( p = .03 \)).

The relationship between stable dysphoria and accuracy was stronger for correct rejections compared to the overall analyses. The main effect of BDI was marginally significant, \( F(3, 164) = 2.10, p = .10 \). Participants exhibiting stable levels of dysphoria (\( M = 37.04\%, \ SD = 38.16 \)) were significantly more accurate than were stable nondysphoric participants (\( M = 24.69\%, \ SD = 25.15; \ p = .04 \)) and unstable dysphoric participants (\( M = 20.91\%, \ SD = 17.92; \ p = .01 \)), but not any more accurate than were participants exhibiting stable major depressive symptomatology (\( M = 24.56\%, \ SD = 19.54; \ p > .16 \)). Compared to all of the other groups combined, stable dysphoric participants were significantly more accurate (\( p = .03 \)).

Next, to examine the unexpected disparity between hits and correct rejections, I first created two new dependent variables representing false alarms and incorrect rejections. False alarms refer to the selection of a foil, or person who is not the target, from either a target present or target absent line-up. An incorrect rejection is when eyewitnesses erroneously reject all people in the line-up, selecting “None of these people,” despite the target being present. I then performed two separate analyses using these two new variables as the dependent variables.

A similar relationship emerged for false alarms, but not for incorrect rejections. For false alarms, as expected, the main effect of BDI was not significant, \( F(3, 164) = 1.30, p > .27 \). Although attenuated when compared to the planned analyses, participants exhibiting stable levels of dysphoria (\( M = 45.83\%, \ SD = 28.48 \)) exhibited marginally
fewer false alarms than did stable nondysphoric participants \((M = 55.97\%, SD = 22.17; p = .08)\), and unstable dysphoric participants \((M = 57.77\%, SD = 18.62; p = .06)\), but they were not any more discerning than participants exhibiting stable major depressive symptomatology \((M = 54.39\%, SD = 23.47; p > .23)\). Compared to all of the other groups combined, stable dysphoric participants made marginally fewer false alarms \((p = .07)\).

**Summary.** In summary, stable levels of dysphoria were associated with greater eyewitness identification accuracy than all of the other groups. Specifically, participants who were dysphoric at encoding and remained dysphoric at the time of the line-up were significantly more accurate at identifying the targets than were participants who were stable nondysphoric, instable in their dysphoria, or stable severe depressive symptomatology. This pattern of results was replicated for correct rejections, but not for hits. A similar pattern also emerged for false alarms, but not for incorrect rejections. That is, people with stable levels of dysphoria are less likely to identify an innocent suspect (foil) when the target is not present in the line-up.

**Additional Analyses of the Stability Effects**

To more closely examine the effects of the specific categorical changes from Session 1 to Session 2, I recoded each of the dysphoria stability groups to account for all possible variations of the dysphoria instability category (e.g., Session 1 nondysphoric to Session 2 dysphoric, or Session 1 severe depressive symptomatology to Session 2 dysphoric, etc.). In this fashion, six additional dysphoria instability categories were created (see Table 6 for descriptive statistics). Then I repeated the same identification accuracy analyses as mentioned above by substituting the four-group dysphoria stability
variable with this nine-group dysphoria stability variable.

Examination of the contrasts revealed a significant difference between stable dysphoric participants and those who were dysphoric at Session 1 and subsequently reported even higher levels of depressive symptomatology at Session 2 (i.e., categorized as severe depressive symptomatology; \( p = .04 \)). No other categorizations of instability were significant (\( ps > .14 \)). Furthermore, contrary to my expectations, when all participants who were dysphoric at Session 1 were grouped together, regardless of their Session 2 BDI scores, they did not outperform any other category of depressive symptomatology (\( ps > .15 \)), and the six newly formed dysphoria instability groups did not differ significantly (\( ps > .21 \)).

<table>
<thead>
<tr>
<th>Categorization</th>
<th>M</th>
<th>SD</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable Dysphoric</td>
<td>22.2</td>
<td>17.6</td>
<td>18</td>
<td>10.4</td>
</tr>
<tr>
<td>Stable Nondysphoric</td>
<td>16.0</td>
<td>12.4</td>
<td>81</td>
<td>46.8</td>
</tr>
<tr>
<td>T1 dysphoric to T2 nondysphoric</td>
<td>19.4</td>
<td>12.5</td>
<td>12</td>
<td>6.9</td>
</tr>
<tr>
<td>T1 nondysphoric to T2 dysphoric</td>
<td>16.7</td>
<td>9.8</td>
<td>14</td>
<td>8.1</td>
</tr>
<tr>
<td>T1 dysphoric to T2 severe depressive</td>
<td>13.3</td>
<td>6.9</td>
<td>15</td>
<td>8.7</td>
</tr>
<tr>
<td>T1 severe depressive to T2 dysphoric</td>
<td>15.2</td>
<td>10.4</td>
<td>11</td>
<td>6.4</td>
</tr>
<tr>
<td>T1 nondysphoric to T2 severe depressive</td>
<td>12.5</td>
<td>17.7</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>T1 severe depressiveto T2 nondysphoric</td>
<td>8.3</td>
<td>1</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Stable Severe Depressive Symptomatology</td>
<td>14.5</td>
<td>10.0</td>
<td>19</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Notes: M = mean of sample, SD = standard deviation of sample mean.
\( n \) = total number of participants per category; \% = Percent of total sample.

Upon closer examination of the means for each category of instability, a small trend emerged wherein participants who improved in depressive symptomatology seemed
To exhibit higher accuracy rates than did those who declined. To test this idea, I further recoded changes in BDI scores into five categories: stable dysphoric, stable nondysphoric, those who decreased on the BDI (e.g., Session 1 dysphoric to Session 2 nondysphoric), those who increased on the BDI (e.g., Session 1 dysphoric to Session 2 severe depressive symptomatology), and those who remained stable severe depressive symptomatology. After conducting the same analysis as above, I found that stable dysphoric participants had significantly higher rates of accuracy than did those who increased on the BDI (i.e., whose depression had gotten worse; $p = .04$), but I found no differences between stable dysphoric people and those who decreased on the BDI (i.e., whose depression got better; $p > .16$; see Figure 9). Furthermore, participants whose symptoms improved were not significantly different from those who worsened ($p > .49$), nor were any other group differences significant ($ps > .57$).

When examining this effect for hit and correct rejections separately, the post-hoc results were again replicated with correct rejections, but not for hits. However, one interesting deviation was found; participants who improved in depressive affect ($M = 22.92\%, SD = 18.92$) were now marginally lower in accuracy than were stable dysphoric participants ($M = 37.04\%, SD = 38.12; p = .06$). Furthermore, participants improving in depressive symptomatology ($M = 56.60\%, SD = 20.56$) recorded marginally more false alarms than did participants with stable levels of dysphoria ($M = 45.83\%, SD = 28.48; p = .06$).
Figure 9. *Comparison of identification accuracy for participants who improved and participants who worsened in depressive symptomatology.*

**Discussion**

This study demonstrates that stable moderate levels of depressive symptomatology are associated with significantly greater accuracy and that changes in affect along the continuum of depressive symptoms results in reduced accuracy on a delayed eyewitness identification task. These effects were robust after controlling for age, sex, level of anxiety at both sessions, and the number of days between encoding and retrieval. Therefore, this study affirms the existence of a paradox: Despite a public stigma that may logically translate into the perception that people with depressive symptomatology are inaccurate or unreliable eyewitnesses should their diagnosis be revealed at trial, the criminal justice system should not dismiss dysphoric eyewitness
testimony because it may be the most accurate.

Why do people with stable levels of dysphoria perform better? I think the advantage is due largely to the negative affect associated with dysphoria. First, drawing on Eich and Forgas’s (2003) idea of an affect-infusing process as the explanation for mood dependent memory, the chronic malaise experienced by dysphoric people may be ‘fused’ to the stimuli during encoding. Then during retrieval, the congruent emotion serves as a possible cue to the stimulus, acting as a catalyst to aid in recollection.

Second, in general, negative mood initiates different motivations resulting in heightened sensitivity, attention, and processing of socially relevant information (Harkness et al., 2010; Weary & Jacobson, 1997). Indeed, according to Weary, Marsh, Gleicher, and Edwards (1993), dysphoric people are especially motivated to attend to social cues. Furthermore, their depressed symptomatology effects mood-congruent automatic processing of negative stimuli, resulting in inhibitory deficits and an increased propensity to look at and pay greater attention to facial features such as the eyes (e.g., Joormann, 2004; Derakshan, Salt, & Koster, 2009). In looking at the eyes, dysphoric people can obtain a lot of information that would aid in facial recognition (Rutherford, Clements, & Sekuler, 2007). Thus, dysphoria may afford an advantage not only at encoding, but also at retrieval.

Unexpectedly, improving chronic negative affect (i.e., decreasing levels of depressive symptomatology) resulted in similar levels of accuracy as stable dysphoria. On the other hand, a worsening mood (i.e., going from happy to sad) resulted in the typical mood dependent outcomes. Thus, during encoding, dysphoric people may attend to a greater number of details that facilitates their recognition when in a better mood state.
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(i.e., when nondysphoric). Conversely, people in an extremely negative mood (i.e., clinically depressed) may still encode sufficient information, and when attempting to recollect, people who improve somewhat (i.e., are currently dysphoric) may engage in a more detailed and elaborate search of their memories for the correct answer. This elaboration is an effortful process that their stable-severely depressed brethren may not have the energy or motivation to execute. That dysphoria confers an advantage both at encoding and retrieval would be consistent with previous studies showing greater dysphoria is associated with greater perceptual accuracy (e.g., Harkness et al., 2005) and more detailed recollections (Koster, De Raedt, Leyman, & De Lissnyder, 2009). Future research could try to ascertain if people with dysphoria are conferred an advantage at facial recognition at encoding, retrieval, or possibly both. Then again, an important caveat to this finding is that the effect was marginally different for both correct rejections and false alarms.

*Hits and Correct Rejections*

Why did the effect of dysphoria stability hold for correct rejections but not hits? Foremost, the extremely low average hit rate, being even lower than chance, suggests that participants could not recall the targets at all. This low recall minimizes, if not eliminates, the power to find any significant differences in correct identifications.

Still, accounting for the discrepancy between hits and correct rejections, people with stable levels of dysphoria are less likely to select an innocent person from a target absent line-up. This tendency suggests that people with dysphoria may be more discerning in their decision making. Relative decision making in simultaneous line-ups is associated a twofold increase in false alarms over techniques that promote absolute
decision making, such a sequential line-ups (Lindsay & Wells, 1985). Because dysphoric people are more capable of ignoring irrelevant information (Goeleven et al., 2006; Joormann, 2004), they may scrutinize each person in the line-up in a more absolute rather than relative manner, ignoring the other stimuli present in the line-up.

To elucidate the effects of dysphoria on correct rejections, future designs should make the identification task easier to obtain a hit rate greater than chance. Additionally, future research should compare and contrast accuracy rates using both simultaneous and sequential line-ups.

*Mood Dependent Memory*

The present study is generally consistent with the mood dependency literature in finding that greater stability in mood results in greater accuracy at recall (e.g., Eich, Macaulay, & Ryan, 1994). However, my findings do counter the opinion of some leading emotion researchers that mood dependent memory may be an experimental artefact (cf. Bower & Mayer, 1985; Eich & Forgas, 2003). Notably, the majority of the research on mood dependent memory has been conducted using experimentally manipulated and temporary mood states. The current study, however, examined endogenous and natural shifts in affective states rather than temporarily induced mood.

This distinction alone may account for why I found a strong mood dependent memory effect, whereas other researchers have not. That is, perhaps the internalized negative mood creates a stronger relationship between the stimuli and memory, facilitating recall at a later time. Indeed, participants may decipher the specific nature of the mood manipulation, especially when undergoing multiple mood manipulations, resulting in a contrasting effect, which confounds results (cf. Bargh & Chartrand, 2000).
In my study, participants gave no indication that they knew the purpose of the delay; therefore, they would be unlikely to contrast away from the effects of their mood.

Another methodological difference that could account for the discrepant findings is that most previous mood dependent memory studies used word list recall, whereas I used a facial recognition task. The mood dependent memory effect may simply be greater for facial recognition than for word list recall. To examine if the effects of the current study were related to the dependent variables used, participants in future studies could be given a word recall list in addition to the facial recognition task to assess for differences in performance on the two tasks.

The findings of this study are also generally consistent with the literature on contextual reinstatement vis-à-vis a cognitive interview. Police often use a procedure referred to as the cognitive interview to help witnesses and victims recall greater details about the event experienced. This interview is based on the encoding-specificity principle (Dando, Wilcock, & Milne, 2009). Studies have found that with multiple contextual reinstatement techniques employed, eyewitness identification rates were better than other singular methods (Clifford & Gwyer, 1999). And experimental studies on recalled details of an event exhibit similar effectiveness of contextual reinstatement on accuracy (Dando et al., 2009). Limiting the validity of these studies is that neither attempted to measure the perceived emotional or contextual congruency within the witness. In other words, both studies entrusted the reliability of the procedure to induce contextual similarity, yet the witness may not have been appropriately ‘reinserted’ into the same emotional context as when the witness encoded the to-be-remembered event.

Therefore, an interesting direction for future research would be to explore if a
temporarily induced mood state can improve recollection for Session 1 dysphoric people whose depressive symptomatology gets better. In other words, would temporarily putting someone who was dysphoric at encoding back in a negative mood state at retrieval result in similar levels of accuracy as those exhibited by stable dysphoric people? If so, this approach might be important for the practical implications of this research. Prior to being exposed to a line-up, trained professionals and/or police could temporarily induce a negative mood, similar to the contextual reinstatement procedure discussed above, to help facilitate recognition in an eyewitness who has subsequently improved in chronic affect perhaps from receiving therapy.

Limitations

One important limitation of the present study was the use of a classification system. By using a classification system to categorize participants into groups based on their depressive symptomatology scores, I unavoidably introduced another potential counter-explanation: my results are due to how I classified participants, and a different classification system would yield different results.

Tennen et al. (1995) argue that recommended cut-off ranges on the BDI are misleading and may not be tapping into depressive symptomatology at all. For example, these authors suggest that a score of 10 could be obtained by strongly endorsing only body image items. To counter this problem, they recommend that to classify a participant as depressed, the participant should endorse at least one of the following items: depressed mood, loss of satisfaction, or loss of interest. However, Weary et al. (1995) presented evidence that 95% of participants scoring above 10 on the BDI did indeed endorse one of the three items. Furthermore, six weeks later, 89% continued to endorse one of the three
items. In the present study, I lose 13 participants and significant power by qualifying my categories in this way. More importantly though, I must reiterate that the purpose of the classification system was not to determine who was or was not clinically depressed, but merely to place participants within a category so that I could ascertain whether or not their dysphoria levels remained stable over time.

Several other limitations of the present research may affect the generalizability of the findings. First, a major criticism of psychological research is its use of a convenience sample, and the present study is limited by the same fault. Henrich, Heine, and Norenzayan (2009) refer to samples such as mine as “WEIRD” -- Western, educated, independent self-construal, rich, and democratic. However, to my knowledge, none of these factors have been argued to significantly influence eyewitness accuracy. Moreover, with respect to generalizability, Scarpa (2003) has shown that the age range of this sample is the group most likely to be victimized.

Second, using a multiple exposure design like I did rather than a singular staged crime can be detrimental to ecological validity. Eyewitness studies have long suffered from the accusation that their methodologies do not exactly replicate real-world events. In my defence, the innovative nature of the present study dictated that I limit the methodology, attempting to achieve the most rich identification accuracy measure possible. A single exposure may have seriously hampered the power of the present study to find significant differences.

**Conclusions**

This study evidenced the deleterious effects of changing mood on eyewitness identification. Until we know the effects of a temporary negative mood induction on
potentially restoring accuracy levels, police would want to ensure that witnesses were stable in affect or at least improving over time as any worsening affect could be severely detrimental to identification accuracy. The literature on contextual reinstatement is promising and provides hope that this cognitive interview procedure can re-establish eyewitness identification accuracy.

Fortunately, this goal would be consistent with the goals of the individual and victim-service groups who would want to improve or at least not worsen the mental and emotional well-being of the self/victim-witness. Pending replication and generalizability of these results, policy could be changed within police departments to provide contextual reinstatement techniques for victim-witnesses experiencing worsened mood. Also, the courts could be advised to object to discrediting a dysphoric or depressed victim-witness based solely on their mental disorder. Knowing the benefits that dysphoria confers on eyewitness accuracy, the courts would be smart to allow expert testimony to this fact and/or include such instructions to juries. In this manner, juries could place appropriate importance on these individuals’ identification testimony.
Chapter Five: General Discussion

The studies presented herein sought to examine the role that subclinical depression has on eyewitness identification accuracy. In Chapter Two, I presented evidence that chronic negative mood confers an advantage in an eyewitness identification task. A similar advantage was found among participants subjected to a negative mood induction who recalled highly vivid and intense sad memories. Therefore, the advantage of dysphoria in emotion recognition demonstrated by Harkness and her colleagues (2005, 2010) was extended to facial recognition in both an immediate (Chapter Two) and a delayed (Chapter Three) eyewitness identification task. In addition, the effect of a temporary negative mood was extended from informational to identification accuracy, albeit encumbered by a caveat that it must be an extremely sad mood.

In Chapter Three, I found evidence that participants who expressed stable levels of chronic negative mood from encoding to retrieval had the highest rates of accuracy compared to those who exhibited stable nondysphoric or depressed affect and to those who were unstable in affect. Encouragingly, individuals who exhibited improved affect from encoding to retrieval had similar rates of accuracy as stable dysphoric people. These findings extend theories of mood dependency into endogenous moods and naturalistic mood shifts as well as provide evidence that dysphoria may confer an advantage independently at both encoding and retrieval.

This dysphoria advantage was replicated at both high and low levels of accuracy, as evidenced by the large discrepancy in hits between Study One and Study Two. And in both chapters, the dysphoria advantage was restricted to correct rejections and not to hits. Upon further inspection, this advantage was conferred only among false identifications,
also known as false alarms. Participants with dysphoria, both immediate and stable across time, exhibited significantly fewer false identifications than did people who were nondysphoric or whose depressive symptomatology was unstable. Moreover, placing a caveat on the findings in Chapter Three, individuals whose mood improved were only marginally superior with respect to correct rejections and false identifications. Floor and ceiling effects aside, should this result be replicated in future studies, this differentiation suggests that dysphoria may confer an advantage towards wrongful identification while not affecting the hit rate. In other words, dysphoric participants are less likely to select an innocent person from a line-up.

Future research should examine the role of motivation as a potential mechanism for dysphoric people’s greater eyewitness accuracy. As noted above, motivation can play a pivotal role in mental state decoding (Harkness, Jacobson, Sinclair, et al., 2010), and it might have similar benefits for facial recognition accuracy as well. Or as Forgas et al. (2005) argued, motivation may trump mood effects.

I also proposed that heightened mental state decoding and facial recognition is a function of saccades and gaze focus on the eye region of the face. To test this potential mechanism for dysphoric people’s greater accuracy, researchers should employ eye-tracking methods while having participants complete either of these tasks. I suspect that studies would find a significant difference in the amount of time dysphoric people spend looking at the eyes.

Lastly, and potentially most important in a practical sense, by combining the findings of these two studies, I propose that future research should examine the interaction of chronic negative mood and extreme temporary sad moods at encoding on
eyewitness accuracy over the course of time. Eyewitnesses who experience a highly potent sense of anguish during the victim-witness experience should have similar accuracy as dysphoric people, and over time, stable dysphoric people have the highest rates of accuracy. This result raises the question: Would placing someone who was particularly disturbed during the victim-witness experience in a temporarily induced extremely negative mood after a delay but immediately before making the identification result in a similar advantage in accuracy? In other words, can higher rates of identification accuracy be maintained vis-à-vis a negative mood induction prior to an eyewitness identification task? This hypothesis is consistent with the contextual reinstatement literature (Clifford & Gwyer, 1999; Dando et al., 2009). By examining the combination of intense mood at encoding and temporary negative mood at retrieval, researchers may be able to sustain identification accuracy over time.

Conclusion

In this series of studies, higher levels of dysphoria were related to greater eyewitness identification accuracy, both immediately and over time. After a delay of two-to-four weeks, stable levels of dysphoria and improving depressive symptomatology were associated with greater accuracy as well. Together, these studies help fill a gap in psychological knowledge and should help the police and court judge the accuracy of eyewitnesses experiencing subclinical depression. Unfortunately, the nature of these studies leaves us with many more questions than answers. Future research is needed to differentiate the effects of temporary from chronic mood and the mechanisms by which both exert influence on facial recognition. In doing so, this research can better inform policy within the criminal justice system.
Understanding the apparent salutary effects of dysphoria on identification accuracy, the courts can be better informed as to the credibility of potential eyewitnesses. Despite a public stigma (Paykel et al., 1998) regarding depression that may translate into a lay perception that depressed or subclinically depressed people may be less accurate than someone who is not depressed, I found that the dysphoric individuals may actually be the best witnesses. Should the identification take place relatively immediately, the victim-witness likely would remain in the same mood, preserving accuracy. Should even a minor delay result in varying moods from encoding to identification, this change will result in worsening accuracy. However, accuracy will not decline provided the eyewitness’ mood improves during that time. Pending future research and replication, the best advice given to the criminal justice system, victim services, and mental health professionals would be to ensure that a victim-witness receives immediate help, so that the victim/witness does not experience any worsening depressive symptoms.
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Appendix:

Experimental Materials.
LETTER OF INFORMATION & CONSENT TO ACT AS A HUMAN RESEARCH SUBJECT – WITNESS

Kevin Rounding, B.A., Jill A. Jacobson, Ph.D., and Rod C.L. Lindsay, Ph.D.
Department of Psychology, Queen’s University

NAME OF PARTICIPANT (please print): ____________________________________

PURPOSE OF THE STUDY: I have been asked to participate in two separate research projects designed to investigate memory and person perception.

PARTICIPANT: I understand that I have been asked to participate in two separate experimental sessions with a possible delay of 2-8 weeks (NOTE: this time period will vary depending on the design of the study) between each session. I understand that I will be compensated separately after completion of each session. I understand that in each session I may be asked to participate in two separate studies. The first may be a study on memory in which I will be asked to recall and write about various situations. The second will be a study on person perception in which I will be asked to view some photos or a video and answer some questions pertaining to what I saw. I will also complete some personality measures in each session. These sessions will take approximately one half hour each.

RISKS: No risks are anticipated, however some questions may seem personal in nature, or may make me feel uncomfortable. If there is something that makes me uncomfortable, I understand that I have the right to refuse to answer any questions or withdraw from the study by letting the experimenter know I do not wish to continue, at any time and without penalty. If I do experience any discomfort from participating in this study, I realize that I may contact the Student Health, Counselling and Disabilities Centre at 613-533-2506.

BENEFITS: I will receive 0.5 credit per session for my Psychology 100 course through the Queen’s University Psychology subject pool for participation. For the second session, I may receive an additional monetary compensation for my participation. I will also have the opportunity to learn more about social psychology and research in general.

CONFIDENTIALITY: I understand that any information that I provide will remain entirely confidential and will be stored in a locked cabinet in a secured building. I hereby authorize the use of all records and personal data derived from this experiment for research purposes. I understand that any information derived from this research project that personally identifies me will not be voluntarily released or disclosed by the researchers without my separate consent, except as specifically required by law.

IF I HAVE QUESTIONS: If I have any comments or questions regarding the conduct of this research or my rights as a research participant, I may contact Dr. Jill Jacobson at 613-533-2847; Dr. Rick Benninger, Head of the Psychology Department at 613-533-2492; and/or Dr. Joan Stevenson, Chair of the General Research Ethics Board for Queen's University, c/o Research Services at 613-533-6081.

VOLUNTARY PARTICIPATION: By signing below, I indicate that I have read this Letter of Information & Consent Form and understand the nature of this study. In addition, the experimenter has answered my questions satisfactorily. I know that I may refuse to answer any questions or discontinue my involvement at any time without penalty. My signature below indicates that I have read the information in this form and consent to participate in this study voluntarily.

___________________________________________ ________________________
SIGNATURE OF PARTICIPANT    DATE

I can obtain a copy of this consent form from the experimenter at any time.

This study has received clearance from Queen's University.
EFFECTS OF EYEWITNESS DYSPHORIA 101

DEBRIEFING LETTER – WITNESS
Department of Psychology, Queen’s University

At some point during this study, you took part in a mock eyewitness line-up. Some of you were asked to do this task after detailing a happy or sad event in your life or after having undergone a procedure that would make you question why events happen, while still others may have completed the line-up after a delay or after having been given some misinformation about the target in the study. The purpose of all this was so that we could study how different levels of mood and how delays before making an eyewitness identification influences how accurate you are at the line-up task.

Eyewitness testimony is often a very compelling and important component of criminal cases, yet it is this very same persuasive evidence that is often cited as the leading source of error in the growing number of DNA-related exoneration cases in the USA (Innocence Project, 2008; Wells, Malpass, Lindsay, Fisher, Turtle, & Fulero, 2000). One reason for these errors is a delay between the event and the line-up, while another reason is the intense emotions evoked by being victimized, both of which have a deleterious effect on memory, especially as it translates to memory accuracy (Reisberg & Heuer, 2007). Conversely, recall of information is more accurate when we are in the same mood as we were when we encoded it (Matlin, 2005); and research has shown that non-clinically depressed individuals are more accurate in distinguishing the mental states of others (Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005). Combined, these results indicate that whereas a negative mood may be somewhat beneficial in accuracy, there is a decline in accuracy in mental state decoding as chronic negative mood becomes more severe.

Although there is plenty of research on eyewitness line-ups, no research has attempted to ascertain the immediate and long term effects of chronic negative mood on eyewitness accuracy. Nor have researchers tried to distinguish these types of eyewitnesses from other victim-witnesses. Therefore, the main rationale behind this proposed program of research is to address these specific gaps in the literature and attempt to shed light on the effects of chronic negative mood on eyewitness identifications.

We would appreciate it if you would not reveal the purpose and hypotheses of this study to others as this may bias their performance should they sign up for this study.

If you experience any discomfort from participating in this study, you should contact the Student Health, Counselling and Disabilities Centre at 613-533-2506. We have a treatment referral list available for your convenience; please ask the experimenter and we will provide you with this list.

If you have any complaints, concerns, or questions about this research, please feel free to contact, Dr. Jill Jacobson at 613-533-2847 (jill.jacobson@queensu.ca), Rick Benninger, the Head of the Department of Psychology at 613-533-2486 (psychhead@queensu.ca), or the Chair of the Queen's University General Research Ethics Board, Dr. Joan Stevenson, 613-533-6081, email: chair.GREB@queensu.ca.

If you are interested in this area of research, you may wish to read the following reference: Lindsay, R.C.L., Ross, D.F., Read, J.D., and Toglia, M.P. (2007). The handbook of eyewitness psychology, Vols I & II. Mahwah, NJ, USA: Lawrence Erlbaum Associates Publishers.

Thank you for participating! Your interest in participating in this research study is appreciated.

Kevin Rounding    Jill A. Jacobson    Rod C.L. Lindsay
M.Sc. Candidate    Associate Professor    Professor
PHONE SCRIPT - WITNESS
FOR PARTICIPANTS WHO COMPLETED A PRE-SCREENING PACKET

Hello, is (student’s name) there?
IF NO:
* If you get an answering machine, you can either leave a message for the person to call you
  if he/she is interested or don’t leave any message.
* If you get a roommate or family member, ask him/her if there is a good time to reach the
  student, make a note of it, and try back at that time if possible.

IF YES:
Hi, my name is (your name). I'm working with Dr. Jill Jacobson in the Psychology Department on
a research project. Your name was selected from the prescreening questionnaires completed by PSYC 100
students. Would you like to participate in an experiment we’re running?
  IF NO: OK. Thanks for your time. Good-bye.
  IF YES:
    Great. If you need another experiment credit for PSYC 100, you will receive 1.0 credits
    and $XX for participating in two 30 minute experiments, provided you consent to and return for
    the second study after a 2-8 week delay (NOTE: this delay will vary depending on the study
design). If you do not need any more credits, participation would be completely voluntary.
    Would you be willing to return after a 2-8 week delay?
    IF NO: OK. Thank you for your time. Good-bye.
    IF YES:
      Great, then let me give you a bit more detail before you agree to sign up. Each
      session may have two separate studies: the first will be a study on memory in which you
      will be asked to recall and write about various situations. The second will be a study on
      person perception in which you will be asked to view a video and answer some questions
      pertaining to what you saw in that video. You also will complete several personality
      measures in each session. Each session will not last longer than 30 minutes, and again,
      you will receive 0.5 credit and/or $XX per 30 minute session, for a total of 1.0 credit
      and/or $XX if you come back for the second session. Would you still be interested in
      participating?
        IF THEY ASK ABOUT NOT COMING BACK FOR THE SECOND
        SESSION:
          If you participate in the first session, but do not return for the second
          session, you will receive the standard 0.5 credit and/or $XX for 30 minutes of your time.
          IF NO: OK. Thank you for your time. Good-bye.
          IF YES:
            I generally have times available on (give some idea of when the schedule is
            open). What tends to work best for you? (Refer to the sheets to see what is available and
            if a mutually agreeable time can be arranged.)

WHEN A MUTUALLY AGREEABLE TIME IS DETERMINED:
1. Write down the participant’s name and phone number on the schedule at the agreed upon time.
2. Ask the student to write down the following information:
   a. Experiment Name: WITNESS
   b. The location: Humphrey Hall 124
   c. Your name and the lab phone number: 613-533-6000 ext. 75417. In case he/she needs to cancel.
   d. Password for the session [will vary]
3. Then say: Thank you. We'll see you on (day and time). It is important that you are on time.
   IF NO TIME CAN BE DETERMINED: Thank him/her for his/her time and exit the call.
# Beck Depression Inventory-II

**Instructions:**
This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Fill in the circle beside the statement you have picked. If several statements in the group seem to apply equally well, fill in the circle next to the highest numbered statement for that group. Be sure that you do not choose more than one statement for any group, including Item 16 or Item 18.

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I do not feel sad.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I feel sad much of the time.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I am sad all of the time.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I am so sad or unhappy that I can't stand it.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I am not discouraged about my future.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I feel more discouraged about my future than I used to be.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I do not expect things to work out for me.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I feel my future is hopeless and will only get worse.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I do not feel like a failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I have failed more than I should have.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>As I look back, I see a lot of failures.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I feel I am a total failure as a person.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I get as much pleasure as I ever did from the things I enjoy.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I don't enjoy things as much as I used to.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I get very little pleasure from the things I used to enjoy.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I can't get any pleasure from the things I used to enjoy.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I don't feel particularly guilty.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I feel guilty over many things I have done or should have done.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I feel quite guilty most of the time.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I feel guilty all of the time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I don't feel I am being punished.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I feel I may be punished.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I expect to be punished.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I feel I am being punished.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I feel the same about myself as ever.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I have lost confidence in myself.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I am disappointed in myself.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I dislike myself.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I don't criticize or blame myself more than usual.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I am more critical of myself than I used to be.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I criticize myself for all of my faults.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I blame myself for everything bad that happens.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>I don't have any thoughts of killing myself.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>I have thoughts of killing myself, but I would not carry them out.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I would like to kill myself.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I would kill myself if I had the chance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 10. | 0 | I don't cry anymore 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. | 0 | I am no more restless or wound up than usual.  
    | 1 | I feel more restless or wound 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. | 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 or things.  
    | 3 | It’s hard to get interested in anything.  
| 13. | 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. | 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. | 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. | 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. | 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. | 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. | 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.  
<pre><code>| 3 | I find I can’t concentrate on anything.  |
</code></pre>
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I am no more tired or fatigued than usual.</td>
</tr>
<tr>
<td>1</td>
<td>I get more tired or fatigued more easily than usual.</td>
</tr>
<tr>
<td>2</td>
<td>I am too tired or fatigued to do a lot of things I used to do.</td>
</tr>
<tr>
<td>3</td>
<td>I am too tired or fatigued to do most of the things I used to do.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>I have not noticed any recent change in my interest in sex.</td>
</tr>
<tr>
<td>1</td>
<td>I am less interested in sex than I used to be.</td>
</tr>
<tr>
<td>2</td>
<td>I am much less interested in sex now.</td>
</tr>
<tr>
<td>3</td>
<td>I have lost interest in sex completely.</td>
</tr>
</tbody>
</table>
### Mood and Anxiety Symptom Questionnaire

Instructions: Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each statement and then mark the appropriate choice in the space next to that item. Use the choice that best describes how much you have felt or experienced things this way during the past SEVEN WEEKS, including today. Use this scale when answering:


<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Felt cheerful</td>
<td>46.</td>
<td>Felt really talkative</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Felt afraid</td>
<td>47.</td>
<td>Felt like a failure</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Startled easily</td>
<td>48.</td>
<td>Had hot or cold spells</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Felt confused</td>
<td>49.</td>
<td>Was proud of myself</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Slept very well</td>
<td>50.</td>
<td>Felt very restless</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Felt sad</td>
<td>51.</td>
<td>Had trouble falling asleep</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Felt very alert</td>
<td>52.</td>
<td>Felt dizzy or lightheaded</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Felt discouraged</td>
<td>53.</td>
<td>Felt unattractive</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Felt nauseous</td>
<td>54.</td>
<td>Felt very clearheaded</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Felt like crying</td>
<td>55.</td>
<td>Was short of breath</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Felt successful</td>
<td>56.</td>
<td>Felt sluggish or tired</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Had diarrhoea</td>
<td>57.</td>
<td>Hands were shaky</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Felt worthless</td>
<td>58.</td>
<td>Felt really “up” or lively</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Felt really happy</td>
<td>59.</td>
<td>Was unable to relax</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Felt nervous</td>
<td>60.</td>
<td>Felt like being by myself</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Felt depressed</td>
<td>61.</td>
<td>Felt like I was choking</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Felt irritable</td>
<td>62.</td>
<td>Was able to laugh easily</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Felt optimistic</td>
<td>63.</td>
<td>Had an upset stomach</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Felt faint</td>
<td>64.</td>
<td>Felt inferior to others</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Felt uneasy</td>
<td>65.</td>
<td>Had a lump in my throat</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Felt really bored</td>
<td>66.</td>
<td>Felt really slowed down</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Felt hopeless</td>
<td>67.</td>
<td>Had a very dry mouth</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Felt like I was having a lot of fun</td>
<td>68.</td>
<td>Felt confident about myself</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Blamed myself for a lot of things</td>
<td>69.</td>
<td>Muscles twitched or trembled</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Felt numbness or tingling in my body</td>
<td>70.</td>
<td>Had trouble making decisions</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Felt withdrawn from other people</td>
<td>71.</td>
<td>Felt like I was going crazy</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Seemed to move quickly and easily</td>
<td>72.</td>
<td>Felt I had a lot of energy</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Was afraid I was going to lose control</td>
<td>73.</td>
<td>Was afraid I was going to die</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Felt dissatisfied with everything</td>
<td>74.</td>
<td>Was disappointed in myself</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Looked forward to things with enjoyment</td>
<td>75.</td>
<td>Heart was racing or pounding</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>Had trouble remembering things</td>
<td>76.</td>
<td>Had trouble concentrating</td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>Felt like I didn’t need much sleep</td>
<td>77.</td>
<td>Felt tense or “high strung”</td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>Felt like nothing was very enjoyable</td>
<td>78.</td>
<td>Felt hopeful about the future</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>Felt like something awful was going to happen</td>
<td>79.</td>
<td>Was trembling or shaking</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Felt like I had accomplished a lot</td>
<td>80.</td>
<td>Had trouble paying attention</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Felt like I had a lot of interesting things to do</td>
<td>81.</td>
<td>Muscles were tense or sore</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Did not have much of an appetite</td>
<td>82.</td>
<td>Felt keyed up, “on edge”</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>Felt like being with other people</td>
<td>83.</td>
<td>Had trouble staying asleep</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>Felt like it took extra effort to get started</td>
<td>84.</td>
<td>Worried a lot about things</td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>Felt like I had a lot to look forward to</td>
<td>85.</td>
<td>Had to urinate frequently</td>
<td></td>
</tr>
<tr>
<td>41.</td>
<td>Thoughts and ideas came to me very easily</td>
<td>86.</td>
<td>Felt really good about myself</td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>Felt pessimistic about the future</td>
<td>87.</td>
<td>Had trouble swallowing</td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>Felt like I could do everything I needed to do</td>
<td>88.</td>
<td>Hands were cold or sweaty</td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>Felt like there wasn’t anything interesting or fun to do</td>
<td>89.</td>
<td>Thought about death or suicide</td>
<td></td>
</tr>
<tr>
<td>45.</td>
<td>Had pain in my chest</td>
<td>90.</td>
<td>Got tired or fatigued easily</td>
<td></td>
</tr>
</tbody>
</table>
Differential Emotions Scale

Instructions: Please circle the point on the scales that best describes the way you feel at this moment.

1. Merry/Gleeful/Amused
   1. Not at all
   2
   3
   4
   5
   6
   7. Very Strongly

2. Warm-hearted/Joyful/Elated
3. Sad/Downhearted/Blue
4. Irritated/Angry/Mad
5. Fearful/Scared/Afraid
6. Tense/Anxious/Nervous
7. Disgusted/Turned-Off/Repulsed
8. Contemptuous/Scornful/Disdainful


**Study 1**

*Instructions for the Mood Induction*

You will now take part in the first of two experimental sessions.

In this first experiment on memory, we are studying how distractions may affect your perceptions of certain remembered events.

When you are ready to start, please click "Continue"...

*Instructions for the Identification Procedure*

You will now take part in the second of two experiments.

In this second experiment on person perception, we are studying how people perceive others. In this study, you will view some photos and answer some questions pertaining to what you saw.

After each photo, you will see a "Where's Waldo" picture. When the "Where's Waldo" picture is shown, please use the questionnaire found on your desk and answer as many questions as you can, as accurately as you can.

When you are ready to start, please click "Continue"...

**Study 2**

*Instructions for the Target Exposure Procedure*

You will now take part in the first of two sessions in this experiment. The second experimental session will take place AFTER the delay, when you come back for your return appointment.

In this first session you will view a series of photos. We ask that you study these photos as well as possible. When you return after the delay, you will answer some questions pertaining to what you saw.

When you are ready to start, please click "Continue"...

*Instructions for the Identification Procedure*

In the previous experimental session, you were shown a series of photos. You were asked to study those photos and try to remember as much detail as possible.

You will now complete the final portion of that experiment. In this portion of the experiment, you will be asked to answer some questions pertaining to what you saw in the first portion before the delay.

When you are ready to start, please click "Continue"...
Distraction Task; Where’s Waldo: Gobbling Gluttons