The Self-Controlled Eyewitness:

Memory Changes Through Emotional Suppression

Michael Ryan

Appalachian State University

Abstract

The current study aimed to analyze differences in eyewitness memory of crime bystanders who suppress emotions versus express emotions. Twenty subjects were enrolled in a study presented as relating emotional regulation to risk-taking, and they played a card game against a confederate where the winner would be given more compensation. During each trial, a criminal confederate stole the quarters that the player confederate was using for the card game. Participants filled out several questionnaires related to their feelings and anxiety after the crime occurred. The participants then answered questions about the perpetrator and crime and were asked to identify the criminal in a photo lineup while ranking their confidence in all of their answers. Participants in the suppression group were significantly less accurate for their answers to the questions, but there was no significant difference between the two groups on the photo lineup. The suppression and expression group also demonstrated no significant differences in levels of confidence, regardless of the memory task. Suppression participants did not experience significantly more anxiety, but there was a strong overall negative correlation between anxiety and accuracy on the questions. The findings are discussed in terms of the arousal implications of suppression as well as future research based off of the framework provided by this study.

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Whenever a crime happens, having a reliable eyewitness can be key to solving it.

This can be extremely difficult, however, as an eyewitness' memory can be manipulated

and confabulated (Sharps et al., 2007). Authorities may ask eyewitnesses about a crime

minutes, hours, or even days after a crime occurs, but the stories can widely vary. What

accounts for some of these differences? Why do eyewitnesses present stories that seem

made-up or false about a crime that may have happened just recently? While many

different theories and studies have tried to explain the reasons behind this

phenomenon, there is still no solid answer. Eyewitness memory and the deficits

associated with it have yet to be fully explained. However, one idea that has never been

studied in relation to eyewitness memory is emotional regulation.

Memory and emotional regulation have been linked in many different studies,

and it has been found that suppression leads to lower levels of memory (Richards,

2004). However, suppression has never been studied specifically with eyewitness

memory related to a crime. It would make sense that some witnesses of a crime would

try to suppress their emotions; wouldn't a witness try to keep their emotions in check

when controlling a stressful situation or helping an overly emotional person?

Emotional regulation could potentially have some bearing on how eyewitnesses

remember crime, as they may use different regulation strategies while in the midst of a

situation. Some eyewitnesses may try to control the situation as much as possible, and

as a result, they regulate their emotional expression to make it seem like they are in

control as well. Others may be really emotional and not hold back on expressing what

they're feeling, whether these people express extreme fear, sadness, or anger among others. Could bystanders that use a suppressive emotional regulation strategy have significantly different memory of a crime than those who don't use suppression?

In the current study, participants were presented with an emotional regulation strategy to use during a card game, and were told that they would answer some questions relating to a made-up connection between emotional regulation and risk-taking. One of the players was the lead researcher acting as a confederate. During the card game, a crime was staged between the confederate and a criminal. After this crime, the participants filled out several questionnaires as distractor tasks along with gathering information from those questionnaires under the different conditions. The participants then answered questions about the criminal and crime itself before trying to identify the criminal from a photo lineup. In order to better inform this study, information about the connections between eyewitness memory, suppression, and anxiety will be discussed. The following review helped inform the predictions and analysis of this pilot study.

Eyewitness Memory

Eyewitness memory has been researched for decades, but the myriad of results have shown that the variables potentially influencing this form of memory is much more complex than the public perceives (Wells et al., 2000). Too often, the testimony of an eyewitness is accepted verbatim, but no matter what they might say or how confident they may feel, issues can easily be present in their telling of an event. Sharps et al. (2007) outlined many of the studied variables that seem to influence the accuracy of eyewitness memory. For example, more complex scenarios can reduce eyewitness

performance compared to memory for simple scenarios (Sharps et al., 2007).

Descriptions of the people involved in the crime and identification from lineups tend to

be inaccurate compared to other forms of measuring memory (Sharps et al., 2007).

Expectations may influence the memory of a crime or an event; for example, if a woman

is identified as the perpetrator, it can reduce the eyewitness memory of bystanders and

police alike (Sharps et al., 2007). This theory about expectations can also explain the

false memory of a weapon, since people typically associate the criminal with some form

of weapon, even if it wasn't present (Sharps et al., 2007). However, Sharps doesn't

address emotional regulation as a possible variable that can subconsciously alter

eyewitness memory. While there aren't studies that have linked emotional regulation

to eyewitness memory, there have been some that linked emotion-related variables

with this form of memory.

Yullie & Cutshall (1986) performed a case study on a real crime by analyzing the

eyewitness accounts of 21 bystanders that saw a shooting where one person was killed.

Witnesses showed fair accuracy for details of the crime in the police interview soon

after the crime, and their memory performance was not significantly different when

they did a research interview about five months after the study (Yullie & Cutshall,

1986). Certain questions such as memory about the age and height estimations were

subject to potential error by the participants (Yullie & Cutshall, 1986). One of the

interesting aspects of this study that will be elaborated upon later in the paper is that

this study found no ill effects of the levels of stress at the crime in terms of memory

(Yullie & Cutshall, 1986). Stress has been a widely discussed topic as it pertains to

changes in eyewitness memory, and the results of this study stand in contrast to others

that will be described later on. What are the true effects of stress on eyewitness

memory? Could it depend on the type of emotional regulation that bystanders use

while in the midst of a crime? These are questions that will be addressed in the present

study.

A different study examined anxiety aroused by ego threat within an academic

setting and how that may relate to eyewitness memory (Dobson & Markham, 1992).

Participants watched series of slides that they would encode, and then some from the

original anxiety arousing and control conditions were given additional anxiety-

provoking instructions (Dobson & Markham, 1992). Performance of the subjects under

high anxiety at encoding and retrieval demonstrated much lower accuracy on

eyewitnesses tasks, which seemed to be attributable to low-anxiety participants

experiencing a boost in performance (Dobson & Markham, 1992). It seemed that those

under low anxiety didn't have any worry when presented with the potential to fail in an

academic setting, which propelled them to give more effort (Dobson & Markham, 1992).

While this study is much different than the previous one, it demonstrates a conundrum

in studying variables as they pertain to memory. First of all, generalizability of studies

can be difficult, as all situations are unique. On top of this, it is difficult to parse out

exact effects of such aspects as stress and anxiety. More research needs to be done to

understand exactly how they work, especially in a criminal situation.

Nachson & Slavutskay-Tsukerman (2010) studied level of personal involvement

in a crime as it pertained to eyewitness memory of a terrorist explosion in Tel Aviv.

Three levels of participants were examined: injured victims, uninjured eyewitnesses,

and uninvolved controls (Nachson & Slavutskay-Tsukerman, 2010). When answering

open-ended questions about the terrorist attack as well as forced-choice questions, the

controls showed a much worse memory for the event than the other two groups, and

the victims were most accurate in their memory of central as well as peripheral details

(Nachson & Slavutskay-Tsukerman, 2010). This demonstrates yet another aspect that

could potentially influence eyewitness memory, but there is another side to this story.

While personal involvement could help aspects of memory, level of emotional

involvement and stress could potentially muddle these effects. As well, these effects

could change across different situations. While a terrorist attack demonstrated these

effects in the Nachson & Slavutskay-Tsukerman (2010) study, personal involvement

may negatively affect memory in such criminal situations as abuse.

Another idea is that level of negative emotion can potentially affect recall and

recognition; as was mentioned before, different circumstances may bring about varying

levels of personal involvement and negative emotion among other variables, which can

influence memory differently. Houston et al. (2013) manipulated the elicited emotion

of a scenario by having participants either watch a negatively valenced crime or a more

neutral event like a conversation. In the first experiment, the effect of negative emotion

seemed to be multifaceted: while the negative group gave more elaborate descriptions

of the people in the scenario, they were less accurate in saying what the criminal did to

the identified victim (Houston et al., 2013). This further shows that not only do

external variables affect memory but also how specific aspects of an eyewitness'

description can be affected in different ways under a specific condition. In the second

study, participants tried identifying the criminal out of a photo lineup in addition to

giving a description of the perpetrator (Houston et al., 2013). This one showed a

similar result where the negative group gave more complete descriptions of the

criminal, but they were less accurate in identifying the criminal out of a photo lineup

(Houston et al., 2013). This all demonstrates how eyewitness memory and testimony

are multifaceted and require a holistic understanding of the many influences on them in

order to identify which eyewitnesses are potentially more accurate than others.

Suppression and Memory

Depending on the situation, many people may either express their emotions

outwardly or try to suppress them for a variety of reasons. Emotional suppression is a

common impression management strategy, as people often want to appear calm in

tough situations (Richards, 2004). However, this mechanism can have unintended

cognitive consequences. Richards (2004) described how regulating emotional

expression could potentially have negative consequences on memory, and there have

been several explanations proposed about this. The most salient explanation is that

regulating one's expression requires active thought on controlling behavior, which

results in a decrease in memory due to cognitive resources being directed towards this

regulation (Richards, 2004). Suppression has also been shown to result in increased

levels of stress, but connections between the physiologic effects of suppression and

memory are still unclear (Richards, 2004). Studies published after this one have

attempted to explain and demonstrate the connection between suppression and

activation of emotional areas of the brain while relating it to potential cognitive effects.

Gross (2013) reviewed the previous research on emotional regulation, and he

compiled empirical research and conceptual models about the topic. While suppression

and regulation are a common way for people to decrease a negative feeling or state

while attempting to increase the positives, there is more to suppression than this

(Gross, 2013). This may be a motivating factor in some situations, but in others, people

may be motivated to regulate their emotions in order to accomplish a different,

potentially unemotional goal (Gross, 2013). Outcomes of this can lead to higher

sympathetic nervous system activation, which falls in line with the idea of higher stress

that Richards (2004) proposed, and more activity in emotional areas of the brain,

specifically the amygdala (Gross, 2013). Tabert et al. (2001) used an fMRI to determine

how amygdala activation during emotional tasks may affect performance in memory

tasks. While a higher activation of the amygdala during emotional tasks may help

consolidation of these events into long-term memory, it brings about decreases in

short-term consolidation (Tabert et al., 2001). Connecting this to the Gross (2013)

article, there may be more activation of the amygdala if somebody regulates or

suppresses their expression during an anxiety-provoking event, which in turn may lead

to worse memory in the short term. Several different studies have been performed in

an attempt to determine the specific effects of emotional regulation on memory.

Richards & Gross (2000) performed several studies to determine the specific

consequences of several different emotion regulation strategies, including suppression,

on memory. While plenty of previous research has shown that emotional regulation

requires cognitive resources and attention, there haven't been many experiments done

to see its influence on memory (Richards & Gross, 2000). In the first of 3 studies

performed by Richards & Gross (2000), participants watched a negative film either

under a suppression or watch condition, and they were given multiple-choice memory

questions about what they saw. Regardless of whether the participants were recalling

auditory or visual information, those under the suppression condition performed worse

on the memory tasks and had less confidence in their memory. In the second Richards

& Gross (2000) study, the suppression group had the lowest memory compared to the

control and reappraisal group, but suppression didn't affect the actual experience of the

emotion nor change their attention towards the experimental stimuli. The last Richards

& Gross (2000) study found that individuals who suppressed their emotions more in

everyday life experienced lapses in their memory of their conversations with others.

This experiment was one of the first to connect emotional regulation strategy with

memory, but by using films and slides, this study wasn't associated with eyewitness

memory.

Inducing an emotion suppression strategy into a seemingly real event and

studying the effects on eyewitness memory haven't been done in an experimental

setting, but Franchow & Yuna (2015) connected real-life suppression with a variety of

measures. They asked about suppression experienced during the two weeks prior to

the study and also on the day of the study, and these levels were correlated with various

aspects of cognition, including executive function, working memory, and information

processing (Franchow & Yuna, 2015). On the day of the study, higher suppression was

associated with worse cognitive performance on a variety of tasks administered to

participants (Franchow & Yuna, 2015). As well, people reporting higher suppression

during daily life over the two weeks prior to the study demonstrated slower processing

beyond what depression measurements could explain (Franchow & Yuna, 2015). While

this study relies more on self-report for the daily lives of participants and involves

correlational research, this study is one of the first to connect real-life suppression with potential cognitive declines and worse performance on memory tasks.

While suppression has been seen to negatively affect memory, the mechanisms behind why this seems to occur wasn't known until Binder et al. (2012) used an fMRI to study brain activity while participants watched photos while either suppressing their emotions or just watching. As was consistent with previous research (see Richards & Gross, 2000), the suppression group demonstrated worse recall for the pictures than the watch group (Binder et al., 2012). When looking at the fMRI results, it seemed that this reduction in memory was associated with less activity in the right part of the hippocampus during encoding (Binder et al., 2012). In addition, a reduction in the connection between the hippocampus and a portion of the prefrontal cortex was associated with lower free recall performance while suppressing emotions (Binder et al., 2012). These results support the previous research on suppression negatively affecting memory, and they also provide a biological basis that provides a tangible explanation of why these results have been found.

Stress and Memory

As Richards (2004) elaborated on, suppression seems to raise levels of stress, but the connection between stress and memory was unclear. However, this article was describing the relationship in a general sense; what this article did not elaborate on was acute stress brought on by a situation and the eyewitness memory for that specific event. This kind of relationship is much easier to measure and manipulate, as chronic stress as it relates to memory is difficult to study outside of a correlational study. Christianson (1992) reviewed the literature describing the connection between

eyewitness memory and the emotional stress brought on by a situation. In general, past

research has proposed that emotional stress impairs memory due to less processing

capacity brought about by high arousal and a resulting drop in memory encoding

(Christianson, 1992). However, this idea is much more complex than that. For example,

memory of negative events seems to be less accessible than that for a more neutral

event (Christianson, 1992). Another hypothesized idea about the difficulty of studying

stress and arousal in a laboratory setting is that witnesses and victims in an actual

crime experience more extreme levels of stress, which leads to memory impairment;

however, when in a laboratory setting, participants don't typically feel the personal

threat of a real crime that may lead to memory deficits (Christianson, 1992). This is

connected to the difficulty of subjecting human subjects to stress by deception or

causing potential psychological harm, which leads to caution needing to be taken when

potentially distressing subjects (Christianson, 1992). However, according to a few

empirical articles that use the Yerkes-Dodson Law of Arousal, eyewitnesses experience

higher than optimal levels of emotional arousal during a crime, which may lead to less

than optimal memory (Christianson, 1992).

More research has been performed in recent years studying the effects of high

levels of stress and arousal on eyewitness memory. Deffenbacher et al. (2004)

performed a meta-analysis on studies examining these relationships in order to parse

out the details. Whether the tested memory involved details on the central people in

the crime or on details of the crime itself, there has been plenty of support that higher

stress can negatively impact eyewitness memory (Deffenbacher et al., 2004). However,

in the analysis, it wasn't evident that any of these studies tested suppression during

crimes to see the impact of that on eyewitness memory compared to natural expression.

One very important finding was found though: staged crimes induced decreases in

recall compared to control over twice as high as studies that caused stress in ways

other than a crime (Deffenbacher et al., 2004). All stress manipulations brought about a

moderate effect size in regards to memory performance, but this is potentially

underestimating what may happen with a real crime (Deffenbacher et al., 2004). When

the effects were parsed out across different methods of inducing stress, it seemed that

staged crimes created the largest effect size between stress and memory, suggesting

that this style of inducing stress may come closest to estimating any potential effects of

stress on eyewitness memory.

One group that is taught to deal how to deal with stressful situations without

showing their emotions is the military, so studying them under highly stressful

situations may implicitly provide information on how suppression may impact

eyewitness memory. A study done by Morgan et al. (2009) used military participants in

survival training school to manipulate levels of stress in relation to eyewitness memory

as instructors from the school interrogated them. Participants were either in a high-

stress group, where they were interrogated and physically confronted, or a low-stress

group that didn't involve the physical aspect (Morgan et al., 2009). The results

demonstrated that the eyewitnesses who experienced the higher stress elicited much

fewer true positive responses and more false positives than the low stress condition,

regardless of what photo lineup method was used (Morgan et al., 2009). As well, a cued

presentation of the photographs brought about more true positive responses for both

groups, but the high stress condition demonstrated fewer true positives regardless of

cued or uncued presentations (Morgan et al., 2009). However, when those under the

high-stress condition were shown a photo of the suspect wearing the same clothing

from the stressful event at a later time, then the recognition was much higher (Morgan

et al., 2009). One hypothesis for why the low-stress group performed much better over

the short term of this study was that they consolidated details of the event much

quicker than the high stress group, which could be potentially mediated by studying

memory well after the crime. Regardless, this study demonstrates potentially

detrimental effects of stress and possible emotional regulation in a real-life situation,

where recognition of suspects went down when stress was increased.

Another study done by Valentine & Mesout (2009) examined effects of stress on

eyewitness identification in a horror labyrinth called the London Dungeon. An actor

stepped in front of chosen participants in the labyrinth to stop their path and was

defined as the "scary person" (Valentine & Mesout, 2009). High anxiety measured by

state and trait scales of anxiety showed a positive correlation with higher heart rate,

and higher state anxiety was associated with detriments in memory, including less

accurate descriptions of the scary person, false details, and lower rates of correct

identifications from a lineup (Valentine & Mesout, 2009). However, trait anxiety

showed no association with changes in memory (Valentine & Mesout, 2009). This

demonstrates that somebody who experiences more anxiety regularly does not have

any significant changes in memory according to this study. However, anxiety brought

about by this event seemingly caused changes in memory, which may indicate the level

of stress brought on by an event could affect the accuracy of memory. As was

consistent with previous research, females had higher state anxiety from these

conditions than males, which must be taken into account when studying eyewitness memory as it associated to levels of stress (Valentine & Mesout, 2009).

However, not all research has found this association between levels of state anxiety and stress brought on by a situation with levels of memory. For example, Krix et al. (2015) performed a study through a real-life situation of an argument with a confederate to see if participants would demonstrate detrimental effects in their memory under high-stress conditions. This study found that stress exposure did not show any interactions with memory performance, rates of false details, and interview type (Krix et al., 2015). However, there was a key difference between this study and others that involve real-life scenario that may demonstrate why studies such as this may not show an effect. Stress was induced through a preparation period where participants either submerged their hand in freezing (stress) or lukewarm (control) water (Krix et al., 2015). The emotional stress of a situation wasn't present, and this issue was perpetuated by the fact that all of the participants experienced the same potentially stressful situation with the confederates (Krix et al., 2015). What this study demonstrates is that stress isn't necessarily the cause of the differences found in other studies; it may be more linked to emotional regulation. While suppression may lead to higher amounts of stress felt during a situation, it seems that the stress itself isn't what causes the lower memory and is instead suppression leading to higher stress and lower memory concurrently.

Present Study

In order to be able to measure both emotional regulation and eyewitness memory at the same time, the present study had to be designed where a crime could be

staged without the participants knowing about it while manipulating their emotional

regulation strategy. The foundation for the present study came from Kassin (1984),

which compared the memory of victims of a crime versus bystanders. Kassin (1984)

created an experiment that was set up to seem like it was measuring risk-taking during

a card game, but a crime was staged in the middle of the game where money being used

for the game was stolen from one of the participants. After the researcher explained

that it was all staged, participants were tested on their memory in terms of

identification from a photo lineup and specific questions about the criminal and the

crime itself (Kassin, 1984). Results showed that the bystanders were significantly more

accurate than victims in identifying the criminal, and there was a positive correlation

between accuracy of identification of the criminal and physical descriptions of them

(Kassin, 1984). As well, there was no correlation between a participant's confidence of

how accurate their memory was and the objective measures of their memory (Kassin,

1984).

In order to further understand the eyewitness memory of bystanders, the

current study was designed to test if emotional regulation affects the accuracy of

memory. Different types of memory were tested, including specific questions on

different aspects of the criminal, questions about what happened, and photo

identification of the criminal. Based on the previous research and design of the current

study, several hypotheses were proposed. The suppression group will perform at a

lower level in the identification and specific question tasks than the expression group.

As well, the suppression group will demonstrate higher levels of state anxiety during

the crime and card game than the expression group. Lastly, confidence measures are

being taken for the participants' answer to each question, and since researchers such as

Christianson (1992) say that suppression brings about suboptimal arousal and

potentially stress, those participants under the suppression condition will demonstrate

lower levels of confidence compared to the expression group.

Methods

Participants

A total of 20 students between ages 18-22 (M = 20, SD = 1.34) were recruited to

participate in this experiment. All of the participants were undergraduate students

enrolled in Appalachian State University, and were recruited through flyers, emails, and

word of mouth. The participants had previously completed from one to seven

semesters of school (M = 4.2, SD = 2.99). Of the 20 participants, 85% were Caucasian,

while 10% were Hispanic and 5% Mixed Race. Monetary compensation was offered in

exchange for participation.

Materials

Card Game. The initial set-up involved a card game (5-card poker) that was

played between the participant and a confederate acting as another participant (defined

as Confederate A). A rectangular table with two chairs, one facing towards the door and

the other away from it, was arranged before the participant arrives (See Appendix F).

On the table, there were four stacks of 20 quarters set up for each player that were used

for betting and a deck of cards placed in the middle of the table. Before the participant

arrived, Confederate A was placed in the chair facing away from the door, allowing the

participant to have a direct view of the door where the criminal (who will be described

later) would enter.

Questionnaires. Participants filled out three questionnaires following the crime relative to how they felt during the card game and the crime ("I would like for you to fill out some forms regarding the stress and anxiety of the event that you just experienced."): the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1989), Beck Anxiety Inventory (BAI; Beck & Steer, 1993), and Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). It is important to note that although the PANAS has previously been validated for use as a state-dependent measure, the other two scales are typically administered to capture feelings over a longer period of time (BAI), or to measure trait-like behavior (ERQ).

The PANAS included 20 feelings and emotions, 10 positive and 10 negative, that participants rated on a 5-point Likert scale, with one meaning that they didn't feel the emotion at all and 5 meaning that they felt the emotion at an extreme level. Participants average PANAS responses for each type of word were used in the analyses. The Beck Anxiety Inventory included 21 different anxiety indicators, and participants filled out how much they felt these indicators from 0 to 3, with 0 being not at all and 3 being severely anxious. Participants total score for the BAI was used in the analyses. The ERQ included 4 suppression and 6 reappraisal options that participants ranked how much they agreed with the statements on a 7-point Likert scale, with one being strongly disagree and 7 being strongly agree. For this study, we were only interested in participants' suppression scores. Participants' average responses to the suppression items were used in the analyses.

Memory Questions and Lineup. As may be seen by Appendix B, participants answered eight questions about the perpetrator and six questions about the crime

while giving confidence ratings for each of their answers. The same perpetrator

performed each staged crime, so questions about him were created based either on his

physical features or on characteristics that were held consistent between every trial

(facial hair, shirt color, and shoe color). The criterion to mark the perpetrator answers

correct were based off of these features or ranges based around the perpetrator's actual

weight and height. As well, the participants were asked to rate their confidence in each

of their answers from one to five, with one being a random guess and five being

completely confident in their answer.

The six questions about the crime and criterion to mark those correct were

determined through aspects specifically kept consistent throughout rehearsals of the

staged crime. Ranges for correct answers were created for questions about time

elements of the crime, and flexibility in marking correct answers about what the

perpetrator said was created due to the difficulty of recalling exactly what was said.

Lastly, correct answers for the amount of quarters stolen was determined after

completion of each trial, as the number for each trial had to be tallied after the crime

occurred. Participants continued to give confidence ratings for each of their answers

As may be seen by Appendix C, a photo lineup was also distributed to the

participant, where they tried to pick the perpetrator out of the 8 faces present. The

seven photographs other than the photograph of the criminal came from Lundqvist et

al. (1998). Some photographs were chosen as random distractors that weren't similar

to the perpetrator, while others were chosen based on looking similar to the

perpetrator. Photographs were only taken from the neck up and put into black and

white to avoid recognition based on cues from some of the answered questions about

the perpetrator. Lighting conditions were mixed up to avoid solely the perpetrator

photograph looking different compared to the seven photographs from Lundqvist et al.

(1998). Participants were told that the perpetrator may or may not be present in the

lineup, so they could answer that the perpetrator wasn't present. The same photo

lineup was used throughout the experiment, so the criteria to mark a participant's

answer correct was based on choosing the photo in the correct spot on the page as

described in Appendix B.

Procedure

The procedures for this study were approved by the Appalachian State

Institutional Review Board (Appendix E). Participants started by filling out an informed

consent (Appendix D), which described the study as a card game study measuring the

relationship between emotional regulation and risk-taking. Through the study, the

assisting researchers as well as the principal investigator followed the same script for

each trial (Appendix A). Participants filled out a brief demographics form before being

given study instructions. At the start of the experiment, the study was presented to

participants as a study on the relationship of risk taking and emotional regulation.

All of the participants were randomly assigned to either be under a suppression

condition or an expression condition for the card game. In the expression condition, the

researcher instructed the players to act naturally, as if they were playing a casual game

with friends. In the suppression condition, the researcher instructed the players to

suppress their emotional expression, as if they were playing in a tournament and trying

to keep a poker face. Participants had no prior knowledge of the memory study or

about the staged crime that was going to occur.

The researcher then instructed the participants on how to play 5-card poker, and after giving the players a handout of the rules and different types of poker hands, the researcher answered any final questions about the game. The participants were told that the game would be played for real money, and whoever has the most quarters by the end of the game would be given $15 while the loser would receive $10. After the explanation, the researcher exited the room, and the subjects were left to play the game.

After the subjects played for about three minutes, a staged crime took place. Specifically, another confederate (labeled as Confederate B) acted as the criminal and abruptly entered the room, noticing the game that was going on. After a brief staged interaction between Confederate A and Confederate B, Confederate B suddenly stole money from Confederate A and rushed out of the room. Confederate A rushed after Confederate B and left the room, prompting the researcher who originally described the experiment to reenter the room quickly. The same two people acted as Confederates A and B throughout the experiment. The researcher told the participant that this event was a part of the experiment and apologized for any stress it may have caused. The participant was then told that they needed to fill out some questionnaires before moving on to the next part of the study.

Participants were then given the BAI, the PANAS Scale, and the ERQ to fill out before the memory tasks were administered. Participants were asked the questions about the perpetrator and then about the crime. The participants were then given the photo lineup. After completion of the memory tasks, the researcher informed participants that the lead researcher of the study was the one acting as the other participant in the experiment, so he debriefed the participants on the true aim of the

study and gave them the opportunity to ask about the real study. Participants were

given the full compensation, regardless of their standing in the game at the time of the

crime, in return for being part of the staged crime.

Results

The primary outcomes of the study were accuracy of recall in the different types

of questions along with levels of confidence for correct and incorrect answers. As well,

the accuracy for identifying the criminal in the lineup was assessed along with

confidence levels of correct and incorrect identification. Levels of anxiety and negative

affect were also assessed for any significant differences between groups and potential

relationships with memory performance.

Memory Accuracy

An independent-samples t-test indicated a significant difference between

conditions on performance on the memory questions, $t(18) = 3.63$, $p = .002$. As may be

seen in Table 1, the suppress group got fewer questions correct than the express group

for both the perpetrator, $t(18) = 2.75$, p = .013, and the crime, $t(18) = 2.12$, $p = .049$.

This is consistent with predictions, suggesting that suppression does have a negative

impact on memory for details of the crime and perpetrator.

For the photo lineup, nine of the ten participants in the suppression group

correctly identified the perpetrator in the lineup, with one answering incorrectly and

none claiming that the perpetrator wasn't present. In the expression group, seven of

the ten participants answered correctly on who the perpetrator was, while none

answered incorrectly and three participants claimed the perpetrator wasn't present in

the lineup. This pattern suggests that suppression does not have a negative impact on facial recognition of the perpetrator.

Memory Confidence

As may be seen in Table 1, there were no significant differences between the suppression and expression groups in terms of confidence levels for both correct and incorrect answers (all t's < 1.0, all p's < .35). Inspection of Table 1 suggested that, regardless of condition, people were more confident in their answers about the crime than the perpetrator, $t(19) = 2.34$, $p = .03$ for correct answers, $t(16) = 5.62$, $p < .001$ for incorrect answers. In addition, people were more confident in their correct answers than their incorrect answers, though this difference was only statistically significant for questions about the perpetrator, $t(18) = 4.04$, $p = .001$.

In the suppression group, the nine participants who answered correctly averaged 3.33 on their confidence level, and the one incorrect participant recorded a 3 for their confidence level. In the expression group, seven participants who answered correctly averaged a confidence rating of 3.29, while the three that said the perpetrator wasn't present in the lineup averaged a confidence level of 3. There was no significant difference between the two conditions for confidence about the photo lineup, $t(18) = -0.28$, $p = .78$.

Questionnaires

Table 2 presents the average questionnaire scores for each of the groups as well as the standard deviations. There were no significant differences between the groups on Negative Affect, Positive Affect, or ERQ Suppression (all t's < 1, all p's > .38). There was a strong negative correlation between levels of Negative Affect across all

participants and overall performance on the memory questions, $r(18) = -.575$, $p = .008$.

However, there was no relationship of Positive Affect or ERQ Suppression with overall

performance on the memory questions (all r's < |.1|, all p's > .69). There was a trend

towards participants in the Suppress group reporting greater anxiety than people in the

Express group, but the difference between the conditions did not meet statistical

significance, $t(18) = 1.63$, $p = .12$. As may be seen in Figure 1, however, there was a

strong negative correlation across both conditions between anxiety and performance

on the memory questions, $r(18) = -.71$, $p < .001$.

For the photo lineup memory task, the one participant in the suppression group

that guessed incorrectly had a Beck Anxiety Inventory total score of 7. In the

expression group, the three participants who said that the perpetrator wasn't present

in the lineup averaged a BAI score of 6.33. No relationship was observed between

anxiety and performance on the photo lineup across the two conditions. As well, there

were no discernable connections of performance on the photo lineup with Negative

Affect, Positive Affect, or ERQ Suppression, regardless of the conditions.

Discussion

The expression group was significantly more accurate than the suppression

group in answering the questions about the perpetrator and crime, which supports part

of the hypothesis where the expression group would perform better on the memory

tasks. However, there was no difference in memory between the two groups for the

photo lineup. The difference in anxiety between the two groups was not significant

enough to support that suppression brings about heightened anxiety compared to

expression. Lastly, there were no significant differences between the confidence levels

of the expression and suppression groups regardless of question type and

correct/incorrect answers, which doesn't support the hypothesis that the expression

group would demonstrate higher confidence in their memory overall.

Both conditions demonstrated a strong trend towards performing worse on the

questions when experiencing heightened anxiety or higher negative affect. However,

the suppression group didn't record significantly higher levels of anxiety, making it

tough to conclude that anxiety is a main contributor to memory differences between the

two groups. Interestingly, the two high anxiety outliers within the suppression group

also recorded the highest negative affect scores on the PANAS. This may indicate that

people who try to suppress emotions but still feel and recognize their negative

emotions may have much higher anxiety than those who successfully suppress negative

feelings. Regardless, it's tough to know whether suppression would bring about

different results for anxiety in similar studies since this is a pilot study, but through

analyzing these results, it's not likely that this difference in anxiety can explain the

significant difference between the groups on the memory questions.

This idea of stress not causing the difference falls in line with Krix et al. (2015).

In that study, participants were exposed to either a stress condition or control before

they all underwent a stressful argument with a confederate. Krix et al. (2015) saw that

inducing just the anxiety didn't impact the eyewitness memory of this real-life scenario,

as no differences were seen between the control and experimental groups. Therefore,

the thought that the additional stress seen within the suppression group may be

causing the decrease in memory performance is difficult to support. This means that

suppression is likely to have an underlying mechanism in reducing memory

performance beyond what stress can explain. There could be a potential biological

mechanism (see Binder et al., 2012) that may be involved, and heightened emotional

arousal beyond the optimal level may also occur with suppression that could be

furthered compounded from the arousal caused by a crime, making eyewitness memory

under suppression much worse (Christianson, 1992). This idea of the Yerkes-Dodson

Arousal Model seems to fit the combination of suppression and eyewitness memory of a

crime, as both the emotional regulation strategy and arousal from the crime would push

the emotional arousal of a bystander well beyond the optimal level, which may explain

the difference in memory seen between the two groups. However, the memory with the

photo lineup didn't fit with this idea, but as mentioned above, an improved and more

difficult lineup may provide different results.

         While anxiety doesn't account for the difference between the two groups, both

groups demonstrated a strong negative correlation between anxiety levels and accuracy

on the questions.   Stress has been seen to affect memory during staged crimes in

previous studies (see Deffenbacher et al., 2004), but it seems that, although the

relationship still existed in the suppression condition, suppression didn't seem to cause

a significant increase in emotional arousal, nor did it cause significantly more stress in

of itself. One of the difficulties in constructing this type of experiment is ensuring that

participants will continue using the strategy during the crime. As well, a crime

performed during a study has relatively low anxiety levels compared to a real crime, so

it's unclear how suppression may change memory and anxiety in a real scenario

compared to an experiment. In future experiments, manipulation checks and stronger

ways to induce suppression may change the difference in anxiety between the groups

while keeping this overall correlation between anxiety and memory accuracy.

However, this experiment demonstrated that instructing people to suppress reduces

accuracy on questions compared to expression in of itself, and anxiety doesn't seem to

be a confounding variable in regards to changing the memory of suppressors. In

addition to the stronger suppression inducers and manipulation checks proposed

above, future studies could add another independent variable of high/low anxiety to the

two emotional regulation groups, which would further parse out the effects of anxiety

and regulation on eyewitness memory.

Originally, one thought was that confidence levels would be lower in the

suppression group due to overly heightened arousal and a subsequent increase in

anxiety, but there were no significant differences between the two groups on

confidence in any of the memory tasks, regardless if assessing correct or incorrect

answers. Why might suppression bring about lower memory when answering the

questions, yet these participants are just as confident in their answers as those in the

expression group? The mechanism of how suppression works during a crime to reduce

memory is unknown, and this study is the first to show that it significantly reduces

eyewitness memory. At the very least, it seems that suppression during this study

reduced memory beyond conscious awareness. In other words, the suppressing

participants weren't cognizant that they did not remember the crime as well as if they

expressed their emotions, so they were just as confident in their correct and incorrect

answers as the expression group. However, both groups demonstrated significantly

higher confidence in their correct answers about the perpetrator than their incorrect

answers. This at least demonstrates that the suppression group may have had some

awareness about being less confident in some questions that they didn't know the

answer to, but overall, they were just as confident as the expression group despite their

significantly reduced memory. So far, the differences in the variables has been

discussed in regards to performance on the questions, but when it came to the photo

lineup, these associations broke down.

While the expression group performed better in answering questions about the

physical features of the perpetrator, both groups performed virtually the same when

identifying the criminal from the photo lineup. What could account for this? The high

memory of the participants in both groups falls in line with the study that the methods

were based off of (Kassin, 1984) where bystanders experienced a high memory on the

photo lineup. However, suppression didn't significantly affect memory for the lineup

compared to expression. One idea may come from the study performed by Morgan et

al. (2004). As mentioned before in the review of this study, the military personnel in

the high stress group of that experiment may be considered similar to a suppression

group, as they are taught to not show emotions in the face of extreme stress. When

giving visual hints to the high stress group like showing the interrogator in the lineup

wearing the same shirt, the reduction in their performance on identifying the

interrogator compared to the low stress group disappeared. Morgan et al. (2004)

proposed that those under the low stress group consolidated memory in the short term

quicker than the "suppression" group. Applying this idea to the current study,

participants in the expression group may have initially consolidated visual memory of

the criminal better than the suppression group. However, through answering the

questions about the criminal several minutes after the crime, the suppression group

may have been able to consolidate their memory of the criminal more and perform just as well as the expression group. To parse out if suppression truly doesn't cause lower performance on a photo lineup, future studies on this topic should use more difficult photo lineups, where the false people in the lineup look much more like the criminal than the ones used in the present study. As well, the relationship of anxiety and confidence with performance on the photo lineup could be found more accurately through an altered lineup as well as a larger sample size, since ten responses to the photo lineup within each group did not provide a good overview of the relationship of anxiety and confidence with performance on the lineup.

Beyond the small sample size used for this pilot study, there are several limitations to this study that were noticeable after completion. The Beck Anxiety Scale is typically used to measure anxiety levels over longer periods of time, so while participants were instructed to answer relevant to how they felt during the card game and crime, future studies should look into using anxiety measurements designed more for acute situations. Along that same line, there should be stronger manipulation checks to verify that those within the suppression group follow the instructions properly even before the crime occurs. Suppression should also be induced in a stronger way, as suppression was induced in this study by telling participants to keep a poker face and to treat the game as if they were playing in a tournament. The crime itself that was based off of Kassin (1984) worked well for this pilot study, but manipulations to the mechanism or complexity of the crime could be used for future studies. For example, studies that may focus on high versus low anxiety in addition to emotional regulation may manipulate some aspects of the crime to heighten its anxiety

level, as the crime for the current study didn't seem to induce heightened anxiety for

the majority of the participants. Experiments that use a crime simulation can't match

the anxiety produced by a real crime, but there can potentially be other ways to

manipulate the staged crime that may produce more anxiety. While this is just a pilot

study that can be improved upon in the future, this study lays the foundation for a

valuable area of research.

The results of this study demonstrate that suppression may have a role in

impacting eyewitness memory, which could impact future research and potentially

inform society about the reliability of one's eyewitness account if future research is

consistent with this study. Depending on the situation and individuals' characteristics,

some people may suppress their emotions in order to control a situation, but others

may be overwhelmed and let their feelings show. This study demonstrates that both

groups of eyewitnesses would be likely to exhibit similar levels of confidence in their

testimony, contingent on those witnesses having a similar vantage point of the crime.

Through the results of this initial study, it would seem that the testimony of the ones

who were, in fact, more expressive would be more reliable. To the average person, this

may seem counterintuitive: people may expect that the emotional witnesses aren't as

attentive to what is going on, but this study demonstrates that someone who acts

naturally may be more attentive about the crime due to not focusing cognitive efforts on

suppressing emotions. While this study needs more empirical support in order to make

real-world applications a reality, it provides a framework for a new area of study that

may further support this pilot study. Alterations to this study may provide more

specific details on why this difference was seen between participants who suppressed versus expressed their emotions.

In conclusion, there is a significant decrease in eyewitness memory for those who suppress their emotions relative to answering questions, and higher levels of anxiety is strongly correlated with lower performance on those question tasks. However, suppression didn't cause a significantly higher level of stress or bring about different levels of confidence compared to the expression group. While this is still just a pilot study, the statistical significance observed between the groups relative to the memory questions provides promise for future research into this area. If suppression can be further demonstrated to affect eyewitness memory, it could provide more insight into what makes eyewitness memory one of the most volatile and unreliable forms of memory.

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Table 1

Average Scores and Confidence Levels on the Questions

	Suppression	**Expression**
Average Percent Correct about Perpetrator	56.25%	72.50%
Average Confidence of Correct Answers about Perpetrator	3.11	3.36
Average Confidence of Incorrect Answers about Perpetrator	2.23	2.23
Average Percent Correct about Crime	55.00%	73.33%
Average Confidence of Correct Answers about Crime	3.58	3.59
Average Confidence of Incorrect Answers about Crime	3.07	3.25

Table 2

Average Scores and Standard Deviations on Questionnaires

Measurements	Condition	Overall Averages	Standard Deviation
BAI Total Anxiety Scores	Express	6.90	4.46
	Suppress	10.80	6.14
PANAS Averaged Negative Affect Scores	Express	1.51	0.53
	Suppress	1.76	0.77
PANAS Averaged Positive Affect Scores	Express	2.71	0.66
	Suppress	2.43	0.72
ERQ Averaged Suppression Scores	Express	3.40	1.83
	Suppress	3.58	1.21
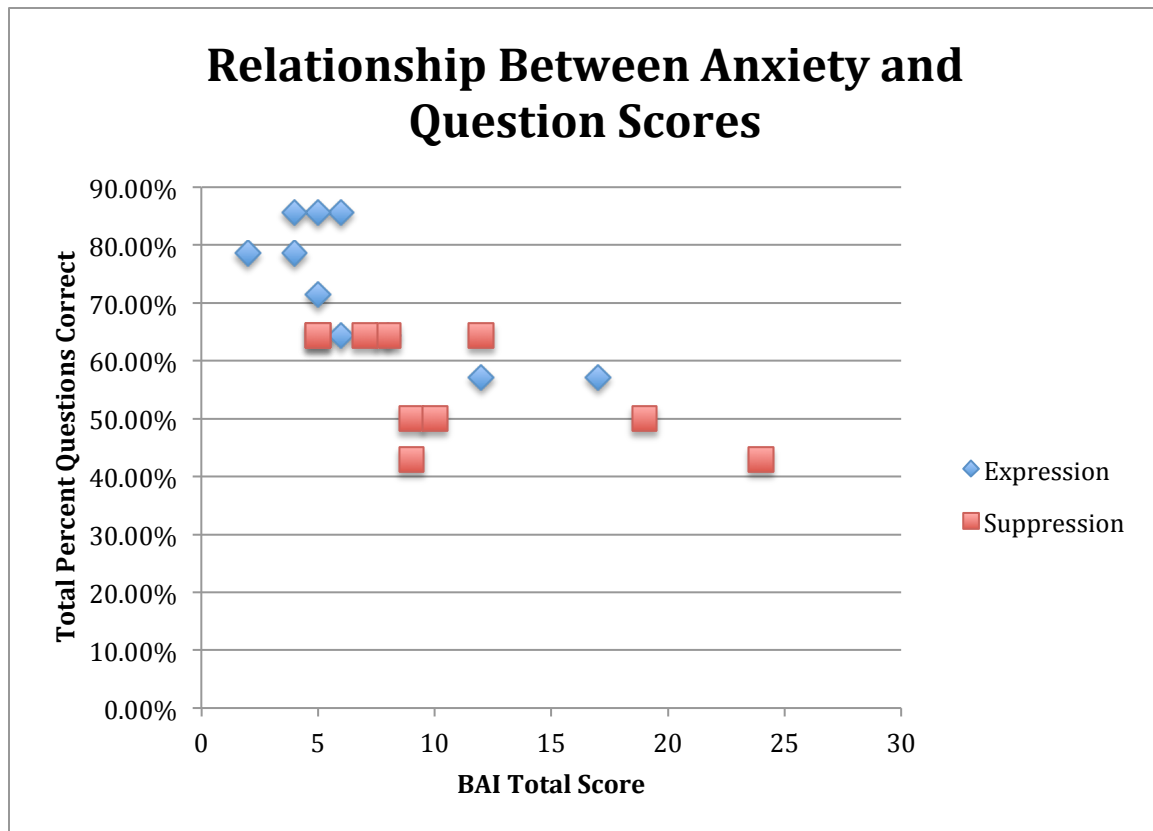
Figure 1. Anxiety and Question Scores Under Different Regulation Conditions. Two

suppression data points overlapped at (5, 64.30%). One of the expression data points

was hidden by the suppression data point at (8, 64.30%).

Appendix A

<u>Researcher Script</u>

Before we can start, please read over this informed consent form, and if you are willing and able to participate in this study, please print, sign, and date on the back of the form. As well, here is a brief demographics form to fill out.

[Hand out the forms to both, wait a few minutes for both to fill out the forms]

Thank you for agreeing to participate in this study today. Your participation will help us understand how risk-taking is affected by different emotion regulation strategies. Throughout this study, I will be reading this script word for word in order to keep consistency between every trial, so it may feel a bit formal at times. Before we begin, are you both students at Appalachian State and are 18-25 years old?

[Confederate will confirm, participant must confirm as well. If they do not fit these criteria, they cannot be included in the study]

Alright, we will now begin the study. As mentioned before, you will be asked to utilize a specific emotional regulation strategy while playing this game:

_____

[If number on folders is odd, give the following instructions] For this study, you will be expressing any emotions you feel and acting naturally. You should treat this card game as if you are playing a casual and fun card game with your friends.

[If number on folders is even, give the following instructions] For this study, you will be suppressing any emotions you may feel during the game. You should treat this card game as if you are playing in a tournament. Try to keep a poker face throughout the game, and suppress all emotions that may surface while playing.

_____

[Back to universal instruction]

The game that you will be playing is a standard game of 5-card poker. Are either of you familiar with how to play poker?

[Confederate nods regardless of what participant does]

I will explain how this version works. One of you will deal 5 cards to each player face down. After looking at your cards, you will be able to bet from 0 to 5 quarters. The player who didn't deal the cards starts the betting. If one player bets any quarters, the other player has three options: fold or forfeit the hand, match the bet, or raise the bet by at least doubling the initial amount of quarters. However, the maximum that can be bet at one time is 10 quarters. If both of you match the amount of quarters you bet, then you will be able to switch out as many or as little cards that you want in order to reach the best hand. After you decide which cards to get rid of, draw an equivalent amount of cards from the top of the deck. Once you go through another round of betting, you reveal your cards, and whoever has the best hand wins the quarters. After each hand, you should switch who deals the cards. So that it will be easier for you to know which hands are best, here is a sheet with the different types of hands you can get. As well, here's a sheet with the rules in case you forget any of them.

[Hand out sheet to both]

Do either of you have any questions about the game?

[Answer any questions from participant, confederate won't have questions]

You will be playing for approximately 10 minutes, and if either of you happens to run out of quarters, record who won that round and start the game over with the same

amount of quarters. At the end of the 10 minutes, whoever has the most round wins or

most quarters wins $15, and the loser wins $10. Keep your emotional regulation

strategy in mind, and good luck to both of you! I will be back in a few minutes; I have to

go print some forms.

*[**Researcher leaves room**, play goes on for approximately 3 minutes. While out of the*

room, get rest of the forms from the confederate criminal, Dillon, in nearby room, and

after 3 min., Dillon enters room and has staged confrontation with the player confederate.

Once the crime has been committed and both confederates have rushed out of the room,

__researcher immediately re-enters the room__]

[This part may potentially require going off-script if participant experiences heightened

levels of stress]

This was a staged part of the experiment. I apologize if this has caused you any

additional stress and anxiety. Before we continue, I would like for you to fill out some

forms regarding the stress and anxiety of the event that you just experienced. Fill them

out relative to what you were feeling through the card game and the staged crime. As

well, you only need to fill out the number for each option; do not worry about adding up

the columns on the Beck Anxiety Inventory.

[Give the PANAS, Beck Anxiety Inventory, and the ERQ to the participant and allow for a

few minutes to fill them out]

I would like to first ask some questions about the perpetrator. As well, after

each question, please rank your confidence in your answer from 1 to 5, with 1 being a

random guess and 5 being completely confident in your answer.

[The questions will be provided on a separate sheet by itself in the same list as on here. On

that sheet, you will need to mark Correct or Incorrect based on their answers. The criteria

for marking Correct or Incorrect will be listed next to the option. As well, write their level

of confidence on the blank for each question. **Read questions from scoring sheet and**

come back to script after the first 8 questions are done.*]*

1. What was his approximate height?

2. What was his approximate weight?

3. What was his eye color?

4. What was his hair color?

5. Can you describe his hairstyle?

6. Can you describe his facial hair?

7. What was the color of his shirt?

8. What was the color of his shoes?

These next questions will be about the crime itself. Also, please continue to rate

your confidence in your answer from 1 to 5, with 1 being a random guess and 5 being

completely confident in your answer.

[For the question on the amount of quarters stolen, record their answer instead of Correct

or Incorrect, as the stolen quarters will be tallied while the study is ongoing. **Read**

questions from scoring sheet and come back to script after the first 8 questions are

done.*]*

1. Who began the interaction between the two: the victim or the perpetrator?

2. Approximately how many quarters were stolen?

3. How long did the confrontation last, from the time the perpetrator entered the room to the victim exiting?

4. Did the perpetrator say anything, and if so, what did he say?

5. Did the perpetrator bump or make contact with the victim?

6. How long after I exited the room did the perpetrator enter the room?

Now, I will provide a photo lineup of 8 faces, and if you think you see the person that stole the quarters in the lineup, please point them out. However, keep in mind that they may or may not be present in the lineup, so if you feel the perpetrator isn't present, then let me know. After you make your decision, rank your confidence in your answer from 1 to 5, with 1 being a random guess and 5 being completely confident in your answer.

[Present the lineup, give them a minute to think it over and answer. Mark one of the choices on the scoring sheet based on the criteria listed there and write the participant's confidence level in the blank.]

The other participant that you played against is the lead researcher conducting this study, so he will come in to describe the true nature of the study and answer any final questions.

[Researcher now exits the room; the role of the researcher ends here]

PI: Thank you for participating in this study, and I hope that we did not cause any stress or anxiety for you. This study was designed to observe the effects of emotional regulation on eyewitness memory of a crime. Previous research has demonstrated that emotional suppression can lead to higher amounts of stress and worse memory for tasks as well as static objects such as photographs and video clips. Factors such as

negative emotion and personal involvement have been shown to affect eyewitness memory, but there is a gap in the research on the true effects of emotional regulation and stress on this form of memory.

You were asked to perform a card game with me acting as an undercover participant and employ an emotional regulation strategy. The study was portrayed as studying risk-taking in order to make you unaware that a crime would be staged, therefore allowing us to more accurately study eyewitness memory. We are interested in studying how suppressing emotions versus expressing emotions affects eyewitness memory. As well, we are using the scales to observe any potential effects of stress and anxiety on eyewitness memory under the different regulation conditions. We hypothesize that the suppression condition will bring about higher anxiety and lower performance compared to the neutral group in the question and photo identification tasks. The results could demonstrate which eyewitnesses of a crime are more reliable based on if they suppress emotions and take control of a situation or let the intense emotion of a crime overwhelm them.

Do you have any final questions or comments about the experiment or what you experienced today?

[Answer any final questions]

As we simulated the crime in the middle of our card game, we are compensating you with the amount equivalent to what the winner would have received, which is $15. Please sign this receipt that acknowledges you received this money today, and then you are free to go! And please do not discuss the true study with anyone until after data collection is completed.

[Give money and receipt]

Appendix B
Scoring Sheet for Participant #_____
*Only for researcher use; do not give to participant

Questions about the perpetrator

1. What was his approximate height?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: 5'10"-6'2"

_____

2. What was his approximate weight?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: 140-160

_____

3. What was his eye color?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: Blue

_____

4. What was his hair color?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: **Dirty blonde/Light brown** (If they say just blonde or brown, ask them "Do you remember it more specifically?" If they say no or give something wrong, mark incorrect. Mark correct if they provide correct shade.)

_____

5. Can you describe his hairstyle?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: long, wavy/messy (Must get both details to mark correct)

_____

6. Can you describe his facial hair?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: clean-shaven

_____

7. What was the color of his shirt?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: White

_____

8. What was the color of his shoes?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: Black

_____

Questions about the crime

1. Who began the interaction between the two: the victim or the perpetrator?

☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: Victim began it.

_____

2. Approximately how many quarters were stolen? **Don't check correct or incorrect; record the amount the participant guesses along with the confidence level*

☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: Within 10 of the amount

Amount the participant guessed: _____   **Actual: _____**

_____

3. How long did the confrontation last, from the time the perpetrator entered the room to the

victim exiting?   ☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: 5-10 seconds

_____

4. Did the perpetrator say anything, and if so, what did he say?

☐ Correct   ☐ Incorrect

Confidence level: _____

Criteria to mark correct: Yes, "Give me those". If answer is close but not exact, mark correct.

---

5. Did the perpetrator bump or make contact with the victim?

         □ Correct   □ Incorrect

Confidence level: _____

Criteria to mark correct: No he did not.

---

6. How long after I exited the room did the perpetrator enter the room?

         □ Correct   □ Incorrect

Confidence level: _____

Criteria to mark correct: 2-4 minutes.

Response to Photo Lineup

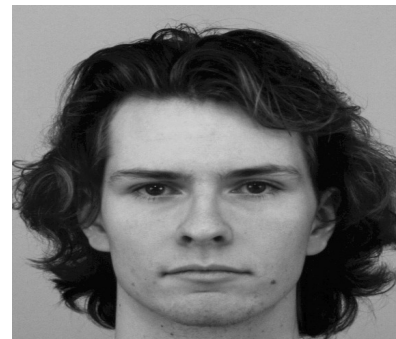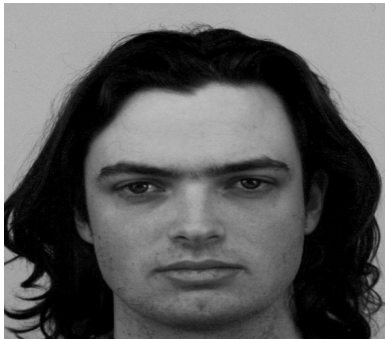□ Correct Pick   □ Incorrect Pick   □ Perpetrator not present

Confidence level: _____

Correct pick is the photo on the right and second from the bottom. Mark correct if they choose that photo, mark incorrect if they choose one other than that photo, or mark perpetrator not present if the participant says that the perpetrator isn't in the lineup.

Appendix C

<u>Criminal Photo Lineup</u>

Appendix D

Consent to Participate in Research
Information to Consider About this Research

Effects of Emotion Regulation Strategies on Levels of Risk Taking
Principal Investigator: Michael Ryan
Department: Psychology
Contact Information: Email- ryanmc1@appstate.edu, Phone: 919-607-8660
Faculty Adviser: Lisa Emery, Email- emerylj@appstate.edu, Phone: 828-262-2272

You are being invited to take part in a research study about the influences of emotional regulation on your levels of risk-taking. If you take part in this study, you will be one of about 40 people to do so. By doing this study we hope to learn how emotional suppression affects levels of risk-taking compared to not suppressing expression.

The research procedures will be conducted at Smith-Wright Hall.

You will be asked to play a card game where you will either suppress or express your emotions and then complete several surveys relating to your experience.

What are possible harms or discomforts that I might experience during the research?

To the best of our knowledge, the risk of harm for participating in this research study is no more than you would experience in everyday life.

What are the possible benefits of this research?

There may be no personal benefit from your participation but the information gained by doing this research may help others in the future by helping us understand what influences the amount of risks that people take in daily life.

Will I be paid for taking part in the research?

We will pay you for the time you volunteer while being in this study. You will be given the money in whole if you complete the card game, and the amount will depend on how you perform in the game. If you lose the game against the other participant, you will be paid $10 for participating. If you win the game, you will be paid $15 for participating.

How will you keep my private information confidential?

Data will be stored in a secure lab room (201C Smith-Wright) that only members of our lab have access to. Videos will be stored on a password-protected desktop computer and identified with a participant number, and original paper copies of the questionnaires will be stored in a filing cabinet in the locked room, labeled only with a participant number. No identifiable data will be shared with personnel not on the application. Data from the study will be stored for 3 years after study completion without identifiable information. Your data will be protected under the full extent of the law.

Who can I contact if I have questions?

The people conducting this study will be available to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 919-607-8660, or the Faculty Adviser at 828-262-2272. If you have questions about your rights as someone taking part in research, contact the Appalachian Institutional Review Board Administrator at 828-262-2692 (days), through email at irb@appstate.edu or at Appalachian State University, Office of Research and Sponsored Programs, IRB Administrator, Boone, NC 28608.

Do I have to participate? What else should I know?

Your participation in this research is completely voluntary. If you choose not to volunteer, there will be no penalty and you will not lose any benefits or rights you would normally have. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. There will be no penalty and no loss of benefits or rights if you decide at any time to stop participating in the study. If you decide to participate in this study, let the research personnel know. A copy of this consent form is yours to keep.

This research project has been approved by the Institutional Review Board (IRB) at Appalachian State University.
This study was approved on: March 30, 2016
This approval will expire on March 29, 2017 unless the IRB renews the approval of this research.

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Participant's Name (PRINT)   Signature   Date

Appendix E

IRB Approval Letter

To: Michael Ryan
CAMPUS EMAIL

From: Dr. Lisa Curtin, Institutional Review Board Chairperson
Date: 3/30/2016
RE: Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)
Agrants #:
Grant Title:

STUDY #: 16-0190
STUDY TITLE: Effects of Emotion Regulation Strategies on Levels of Risk Taking
Submission Type: Initial
Expedited Category: (7) Research on Group Characteristics or Behavior, or Surveys, Interviews, etc.
Approval Date: 3/30/2016
Expiration Date of Approval: 3/29/2017

The Institutional Review Board (IRB) approved this study for the period indicated above. The IRB found that the research procedures meet the expedited category cited above. IRB approval is limited to the activities described in the IRB approved materials, and extends to the performance of the described activities in the sites identified in the IRB application. In accordance with this approval, IRB findings and approval conditions for the conduct of this research are listed below.

Regulatory and other findings:

The IRB determined that this study involves minimal risk to participants.

Approval Conditions:

Appalachian State University Policies: All individuals engaged in research with human participants are responsible for compliance with the University policies and procedures, and IRB determinations.

Principal Investigator Responsibilities: The PI should review the IRB's list of PI

responsibilities. The Principal Investigator (PI), or Faculty Advisor if the PI is a student, is ultimately responsible for ensuring the protection of research participants; conducting sound ethical research that complies with federal regulations, University policy and procedures; and maintaining study records.

Modifications and Addendums: IRB approval must be sought and obtained for any proposed modification or addendum (e.g., a change in procedure, personnel, study location, study instruments) to the IRB approved protocol, and informed consent form before changes may be implemented, unless changes are necessary to eliminate apparent immediate hazards to participants. Changes to eliminate apparent immediate hazards must be reported promptly to the IRB.

Approval Expiration and Continuing Review: The PI is responsible for requesting continuing review in a timely manner and receiving continuing approval for the duration of the research with human participants. Lapses in approval should be avoided to protect the welfare of enrolled participants. If approval expires, all research activities with human participants must cease.

Prompt Reporting of Events: Unanticipated Problems involving risks to participants or others; serious or continuing noncompliance with IRB requirements and determinations; and suspension or termination of IRB approval by an external entity, must be promptly reported to the IRB.

Closing a study: When research procedures with human subjects are completed, please log into our system at https://appstate.myresearchonline.org/irb/index_auth.cfm and complete the Request for Closure of IRB review form.

Appendix F