

University of Central Oklahoma

Graduate College

The Influence of Positive and Negative Mood on the Weapon Focus Effect

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN FORENSIC PSYCHOLOGY

By

COLTON HARE

Edmond, Oklahoma

2025

The Influence of Positive and Negative Mood on the Weapon Focus Effect

Jackson College of Graduate Studies at the University of Central Oklahoma

A THESIS APPROVED FOR

THE MASTER OF SCIENCE IN FORENSIC PSYCHOLOGY

By

A blue ink signature of Adam Randell, consisting of stylized cursive letters, positioned above a horizontal line.

Adam Randell, Ph.D. (Committee Chairman)

By

A blue ink signature of Alicia McLean, written in a cursive style, positioned above a horizontal line.

Alicia McLean, Ph.D. (Committee Member)

By

A blue ink signature of John Mabry, featuring a large, stylized 'J' and 'M', positioned above a horizontal line.

John Mabry, J.D. (Committee Member)

Acknowledgements

I would like to thank my family for their unwavering support throughout this journey, including my parents, John and Carrie Hare, my sister, Ashton, and my wife, Camry Kreymer. I would also like to thank my committee chairperson, Adam Randell, for his patience during my journey. Finally, I would like to thank the University of Central Oklahoma for allowing me this opportunity.

Table of Contents

Abstract.....6

Chapter One: Introduction.....7

 Weapon Focus Effect.....8

 How the WFE Might be Altered.....12

 Hypotheses.....14

Chapter Two: Methods.....15

 Participants.....15

 Apparatus.....16

 Mood Manipulation.....16

 Mood Manipulation Check.....17

 WFE Photo Task.....18

 Recall Task.....19

 Procedure.....19

Chapter Three: Results.....19

 Preliminary Analysis.....19

 Main Analyses.....21

 Figure 1: Three-Way Interaction.....22

Chapter Four: Discussion.....	24
Conclusion.....	27
References.....	28
Appendix A: IAPS Images.....	32
Figure A1: Positive Condition.....	32
Figure A2: Negative Condition.....	32
Appendix B: IAPS Descriptions and Values.....	33
Table B1: Positive Condition.....	33
Table B2: Negative Condition.....	34
Appendix C: WFE Photo Task.....	35
Figure C1: Photo Task.....	35

Abstract

This study explores the relationship between mood and the weapon focus effect (WFE), with a specific focus on how pre-existing mood influences recollection in the presence of a weapon. Two different hypotheses were tested. First, I proposed that mood would moderate the WFE by affecting how unusualness influences attention. Secondly, I hypothesized that mood might directly influence the WFE through a mood-congruence effect. A total of 301 participants' mood was manipulated and then they were exposed to different scenarios involving a threatening (vs. non-threatening) object in an unusual (vs. usual) contexts. The results provided partial support for the mood-congruence hypothesis, suggesting that negative mood increased attention to a threatening stimulus in a usual context, and subsequently leading to the WFE (i.e., reduced recollection of details about a person holding a weapon). Specifically, consistent with a mood congruence effect, in the negative mood condition, participants displayed reduced recollection for a person-target when the weapon appeared in a usual context. Unexpectedly, however, participants displayed *increased* recollection when the weapon appeared in an unusual context. These findings suggest that mood influences weapon-biased recollection. The results may have important implications for eyewitness testimony by highlighting the importance of considering pre-existing emotional states when evaluating eyewitness's memory accuracy.

Chapter One: Introduction

The weapon focus effect (WFE) occurs when the attention directed toward a weapon or object results in an individual having increased difficulty attempting to recall information about the surrounding environment or person holding the weapon (Loftus et al., 1987; Saunders, 2009). This often results in people not recalling certain details of the weapon holder and their environment and misremembering other details (Carlson, et al. 2017). Such memory failures can have important consequences. One context in which such failures are impactful is that of eyewitness testimonies. A person's recollection of an event (whether accurate or not) can put someone behind bars for years. Eyewitness testimonies are incorrect 35 percent of the time, and that number can increase as a result of many different contextual factors, including the presence of a weapon (Silver, 2015). As a result, innocent people can be imprisoned due to unintentional errors in testimony that are commonly seen as factual.

Research exploring the WFE, and the processes driving it, advance our understanding of certain memory processes. Research on memory has revealed that despite memory usually being mostly accurate, it is very common to make unintentional errors while recalling details about past events. For instance, in one study, 76 percent of participants made a small error in memory retrieval despite being generally accurate 93-95 percent of the time (Diamond, et al. 2020). While this error rate might seem low, in contexts such as those mentioned above, even a low error rate can have devastating consequences.

While research examining the WFE has helped us understand how the presence of weapons impact recollection by way of threat-induced attentional mechanisms and expectation-violation mechanisms, there remains room to explore when and how the WFE is moderated. For instance, research has yet to explore how pre-existing mood that is unrelated to the presence of

the weapon might affect individual experiences of the WFE. Given that mood can influence attention, (Huntsinger, 2013; Forster, Friedman, Ozelsel, & Denzler, 2006; Kuhl, 2000) it is important to explore how mood might affect the WFE. For instance, the attentional tuning model holds that affect can broaden or restrict the scope of people's attention. This change in attentional scope may then have consequences for how people experience the WFE; and an understanding of this relationship could further inform our confidence in eyewitness testimonies.

In what follows, I will first introduce the WFE and discuss the two dominant mechanisms by which it is thought to occur: namely, threat-induced attention narrowing and unusualness-based attentional capture. That is, I will review the effects these processes have for attention. Finally, I will discuss how the WFE might be altered by mood. After reviewing the literature, I will report a study I conducted to explore the ways by which affect influences the WFE.

Weapon Focus Effect

The weapons focus effect is thought to occur due to individuals focusing on weapons or other threatening items, while disregarding non-threatening objects in sight or even those holding threatening objects (e.g., perpetrators of violent crime). Traditionally, the WFE has been attributed to threatening objects, such as guns, capturing observers' attention. Threat is thought to decrease people's recollection for anything other than the threatening object.

In most cases, it is thought that threat causes arousal in individuals who observe a threatening object. This arousal is then interpreted as either fear or stress. Christianson (1992) argues that fear typically causes attention to narrow due to the attention demanded by the central, threatening, stimulus causing the arousal. As a result, the observer focuses on the stimulus, to the exclusion of other stimuli in the surrounding environment.

Indeed, work demonstrates just such an effect. For instance, in a classic study, Johnson and Scott (1976) examined whether threatened individuals recalled less information about an actor than did unthreatened individuals. They found that participants who had witnessed a person walking by with a pen recalled significantly more information about that individual than did participants who observed them holding a threatening weapon. More recently, in a meta-analytic review of WFE research, Steblay (1992) found evidence that the typical difference between weapon-absent and weapon-present conditions, wherein those assigned to weapon-absent conditions perform better on recollection assessments than do those assigned to weapon-present conditions, was indeed reliable across study.

However, recent research has revealed that the WFE is more involved. Specifically, this work has revealed that the context in which a weapon is seen plays an important role. For instance, the surprise caused by noticing a weapon in an inappropriate context can accentuate the WFE (Pickel, 1999). That is, when a weapon or object is observed in a surprising, or unusual, context, the observer may experience a more pronounced WFE. For instance, Pickle (2009) found that people were more likely to experience the WFE when a weapon was held by a female person of interest than when held by a male person of interest. Pickle argued that because people stereotypically expected men to be more likely to hold guns than they expected women to hold guns, participants displayed a more pronounced WFE for women. That is, they argued that participants were more surprised by seeing women holding weapons than by seeing men holding weapons.

Indeed, expectations based on stereotypes other than gender stereotypes have demonstrated similar moderating effects for the WFE. Specifically, when having participants watch a video of a white or black male holding the same weapon, Pickel and Sneyd (2018) found

a weaker WFE among those who watched a black male holding a weapon than among those who watched a white man holding a weapon. People remembered as much about the black target regardless of whether the target was holding a weapon or not. However, participants remembered far less about the white target when they were seen holding a weapon compared to when they were not holding a weapon. As black males are more stereotypically associated with weapons than are white males, Pickle held that participants were more surprised to see a white man holding a weapon than they were surprised to see a black man holding a weapon. These results were amplified whenever black male targets were shown in clothing strongly associated with the black male stereotype. Though these findings reflect a troubling, yet persistent racial association, they further demonstrate how the unusualness of an object can alter how well an observer recalls past events.

What is more is that some work suggests that unusualness contributes more to the WFE, than does how threatening the weapon is (Pickel, 1999). For instance, Pickel (1999) examined the impact that context and threat can have on the WFE by assigning participants to four different conditions in which participants watched a two-minute-long video depicting a different version of an event. The four videos displayed a woman getting robbed in a different manner by a young white male with a weapon. The researchers manipulated how expected the presence of a weapon was (i.e., unexpected - baseball field vs. expected - shooting range), and how threatening it was (i.e., high threat - weapon pointed at the woman vs. low threat - weapon pointed away from the woman). Therefore, participants observed a person of interest pointing a gun at a victim (threat) outside of a baseball game (unexpected), a person of interest pointing a gun away from a victim (no threat) outside of a baseball game (unexpected), a person of interest pointing a gun at

a victim (threat) outside of a shooting range (expected), and a person of interest pointing a gun away from a victim (no threat) outside of a shooting range (expected).

After viewing the videos, the participants were asked to complete a recollection assessment of the person of interest, as well as pick out the person of interest in a five-person lineup. During recollection, the condition in which participants watched the man rob the woman near a baseball field remembered significantly less information about the person of interest than did those who watched the woman get robbed outside of a shooting range (i.e., an effect of unusualness), however, this study did not reveal a significant difference in recollection due to threat.

On the other hand, some recent research suggests that unusualness *and* threat may both contribute to the WFE (Mansour, Hamilton, & Gibson, 2019). For instance, Hope and Wright (2007) found that threat was a stronger predictor of the WFE than was unusualness when participants were cognitively busy. They made participants cognitively busy by asking them to attend to a secondary task while observing a robbery. Participants were separated into three different conditions (weapon, unusual, control), in each of which they were instructed to observe a computer slide sequence. This sequence contained 13 slides which displayed a male entering a grocery store. The slides were the same in all three conditions, with the exception of the eleventh slide. On this eleventh slide, those in the weapon condition observed the person of interest removing a handgun from his jacket, those in the unusual condition watched the person of interest unveil a blue feather duster, and those in the control condition observed the same person removing a wallet from his jacket. Participants were then asked to freely recall what they saw the person of interest pull from their jacket, (i.e., weapon, wallet, feather-duster), as well as indicate whether they remembered each of 22 items from the slides.

Participants recalled the weapon best (93% compared to 67% who recalled the feather-duster, and 60% who remembered the wallet), but recognized fewer of the objects in the surrounding area (i.e., the WFE). Interestingly, however, participants did not recognize significantly fewer situation details in the unusual condition (i.e., seeing the man pull a feather duster from his jacket) than in the threat condition. They did, though, remember fewer items in the unusual condition than in the control condition. Although, it should be highlighted that Hope and Wright's (2007) weapon condition confounded threat and unusualness as a gun in a grocery store is both threatening and unusual, this study suggests that unusualness and threat may both contribute to the WFE.

Whether it is a weapon's threatening or unusual nature, the WFE is principally thought to be a phenomenon of top-down processing. Top-down processing relies more heavily on one's prior knowledge and motives (Cavanagh, 1991). Threatening objects are relevant to one's goal to remain safe (Flowe, Hope, & Hillstrom, 2013). Additionally, to determine if an object is unusual, we have to rely on our past experiences concerning what is usual (Pickel, 2009). But other pre-existing factors can influence attention as well.

How the WFE Might Be Altered

Some work demonstrates that a person's attention can be tuned to a broad or narrow array of perceptual and conceptual stimuli by their mood (Huntsinger, 2012). Specifically, it has been suggested that a positive (benign) mood state can broaden the scope of attention, while a negative (threatening) mood state can constrict it (Friedman & Forster, 2010; Fredrickson, 1998; Huntsinger, 2013). In particular, the broadening or narrowing of attention is assumed to occur because positive and negative mood states provide information about the surrounding environment that tunes both the cognitive and perceptual system to meet the expected demands

of the situation (Huntsinger, 2013). Whenever a negative stimulus signals the presence of a problem, we narrow our focus onto a perceived problem to determine how to best resolve it. In contrast, a positive stimulus signals a safe environment, which facilitates observing our surroundings in a broader manner.

These differences in attentional scope facilitate the performance of different types of behavior. For instance, research regarding how a negative mood can restrict our scope of attention suggests that narrowing attention facilitates the pursuit of specific actions such as running and fighting, as these actions typically involve intense focus (Fredrickson, & Branigan, 2005). In contrast, a positive mood's broadening effects on attentional scope facilitate behaviors that involve a wider range of thoughts and movements such as exploring and playing (Fredrickson, 1998; 2001). This allows for an individual who is experiencing a positive mood state to be more aware of stimuli in the surrounding environment.

While mood can alter one's scope of attention, it can also influence what the observer is inclined to look at. Specifically, mood facilitates selectively focusing on mood-congruent stimuli (Tamir & Robinson, 2007). For instance, a positive mood can increase the likelihood of selectively focusing on desirable stimuli, while a negative mood can lead to selectively focusing on negative stimuli (Wadlinger & Isaacowitz, 2006). For instance, Wadlinger and Isaacowitz induced positive mood in half of their participants by showing them a bag of candy and asking them to wait to eat it until after the experiment was concluded. Those in the control condition were also given a bag of candy, but not until after the study. Next, participants were shown a 25-trial slideshow, each trial of which included three images that ranged in valence (i.e., highly negative to highly positive) in one of three positions on the screen. Wadlinger and Isaacowitz then used an eye tracker to measure participants' attention to each of these three areas. The

results revealed that individuals in a positive mood looked at positive images longer than did individuals not in a positive mood.

Hypotheses

The influence that mood has on the breadth of our attentional scope may have consequences for the WFE. Alternatively, mood might bias the detection of certain mood-congruent stimuli, also potentially affecting the WFE. Therefore, past literature suggests at least two different hypotheses concerning how mood might affect the way individuals experience the WFE. First, it is possible that mood amplifies unusualness through broadening (in the case of positive mood) and restricting (in the case of negative mood) scope of attention. However, the WFE might be affected differently if the observer experiences a mood-congruence effect.

Hypothesis 1

Prior research regarding the impact that mood state has on the scope of attention suggests that mood may moderate the WFE by way of moderating how unusualness affects attention to stimuli. As a positive mood broadens the scope of attention, this broader scope of attention may better allow observers to attend to and process the contextual information provided by the surrounding scene. This may not necessarily improve the processing of details in the surrounding scene, as gist perception precedes detail perception (Fei-Fei, Iyer, Koch, & Perona, 2007), but awareness of the context may then facilitate noticing the contrast between that context and an unusual object. Accentuating this contrast may then amplify the WFE. On the other hand, a person with a more restricted scope of attention due to a negative mood state may process less about the context. This may then obscure the contrast between a context and an unusual object. This may then have the consequence of attenuating the WFE.

Hypothesis 2

Alternatively, however, mood may have a more direct, but different, effect on the WFE. Namely, the effect of seeing something threatening could be magnified if the observer is already experiencing a negative mood state. That is, a mood congruence effect may occur. This effect may lead a person in a negative mood state to selectively attend to the negative or threatening visual stimuli, such as weapons, thereby accentuating the WFE. However, the WFE might be minimized among those experiencing a positive mood, such that a positive mood state may reduce attention to the negative or threatening visual weapon stimuli.

Chapter Two: Methods

Participants

An a-priori power analysis was done to determine the number of participants needed for this study, which suggested that a minimum of 180 participants was required. I was able to collect a sample of 301 participants from an online research platform called Prolific. I compensated each online participant at a rate of \$1.96 for completion.¹

¹ Due to researcher error, the specific amount varied slightly; however participants were compensated at a rate of \$11.76/hr.

Apparatus

I constructed materials using an online instrument called PsyToolKit. PsyToolKit is an online service used for designing and distributing experiments that require timing-sensitive methodologies (e.g., timed presentation, timed responses), such as our current experiment. This tool was used to specifically control the timing of stimuli, as well as to measure the timing of participants' responses.

Mood Manipulation

After providing consent and demographic information, and to manipulate both positive and negative mood, participants were shown a series of pictures from the International Affective Picture System (IAPS) database. Those assigned to the positive condition observed 10 images that depicted happiness or pleasant scenes (see Figure A1 in Appendix A), while the negative condition contained 10 images that depicted sadness or negative scenes (see Figure A2 in Appendix A). Additionally, as a cover for why they were seeing these images, participants in both conditions rated how pleasant each photo was on a scale of 1-10.

The images were similar in content across both conditions in that they contained human figures, animals, and real-world settings. IAPS norms images on valence (pleasant – unpleasant), arousal (calm – excited), and dominance/control (in control – dominated). I primarily used images that were high (i.e., positive condition) or low (i.e., negative condition) on the valence dimension to evoke a positive or negative emotion. The specific normed valence, dominance, and arousal values can be seen in Appendix B. The images I chose for the positive-mood condition had significantly more positive valence ($M = 6.369$, $SD = 0.978$) than did the images I chose for the negative-mood condition ($M = 4.25$, $SD = 0.598$), $t(18) = 5.846$, $p < .001$. These two

sets of images did not vary, however, significantly in their arousal ratings, ($t(18) = 0.805, p = 0.22$). However, an oversight on my part led to my selecting images that did differ in their dominance, $t(11.520) = 3.045, p = 0.011$, such that the positive images ($M = 5.668, SD = 0.189$) were more dominant than were the negative images ($M = 5.154, SD = 0.499$).

Mood Manipulation Check

In the present study, I used the Profile of Mood State (POMS) and the Positive and Negative Affect Scale (PANAS) to check that our mood manipulation was effective, before and after the photo task. POMS is a standard validated psychological test that contains 65 words or statements that describe the feelings that people have. I used 8 of the 65 words/statements in the current study (i.e. friendly, tense, angry, clear-headed, sad, active, grouchy, helpful), which asked participants about their mood in the past week and today.

Additionally, a second mood check (PANAS) was used to ensure that participants in the threatening condition were not emotionally influenced by the image of the weapon. PANAS is commonly used to measure both positive and negative affect. This scale typically has participants rate the extent to which they feel each of 20 emotion states in a given amount of time. In the present study, I asked participants to respond to 10 words/statements (i.e. interested, distressed, excited, upset, strong, scared, hostile, enthusiastic, proud, irritable) with how they were feeling at the specific moment they completed the measure.

Participants responded using a 5-point Likert scale ranging from 1 (Not at all) to 5 (Extremely). To analyze the results, the participants' ratings were aggregated separately for the positive and negative items, and these scores were then analyzed independently.

Weapons Focus Effect Photo Task

I modified a method used in prior work to assess the WFE (Hope & Wright, 2007). Participants in the current study were randomly assigned to one of four conditions. In each condition, participants observed one of two sets of 10 pictures that depicted either a person walking into a grocery store or into a shooting range. On the last slide in each condition (the critical slide), the participants viewed a person with either a threatening object (a gun) located in a usual context (a shooting range) or an unusual context (a grocery store), or a non-threatening object (banana) located in a usual (a grocery store) or an unusual context (a shooting range). See Appendix C.

These images were embedded in a slideshow of other images that were used to manipulate the context. However, the nature of the object determined whether the location is usual or unusual. For instance, a gun would be considered usual in a shooting range, but unusual in the grocery store, while the opposite was true of a banana. The pictures depicting either a shooting range or grocery store contained a combination of images both inside and outside the building. The person of interest appeared in five of these images, while interacting with a victim only on the critical slide. Additionally, the item that the person of interest was holding was only observable on the critical slide.

The images in these slideshows consisted of a total of ten digital photographs. To match the methodology used by Hope and Wright (2007), each image was displayed on a computer screen for 4 seconds each, with no delay between slides in all conditions. Each picture was centered horizontally on the screen within an 18 cm by 15 cm frame.

Recall Task

Participants completed a recollection task, which was modeled from a robbery response kit used across banks in Oklahoma. The robbery kit includes a questionnaire which asks participants to recall information about the person of interest. Here, participants were asked to remember as much as they could about the person of interest's body type, race, gender, hair style/color, age, clothing, and any other items that they were holding. In order to score this recall task, I coded for accuracy. That is, I counted each correct detail recalled by each participant and subtracted each incorrect detail from the overall total.

Procedure

Participants were able to participate online by following a link that I provided. After accessing this link, the participants completed the mood manipulation. After completing the mood manipulation, the participants were asked to rate the extent to which they felt specific emotions. When this was completed, the participants were then randomly assigned to view one of the four scenes that result from crossing the two threat conditions (threatening-gun vs. non-threatening-banana) with the two context conditions (grocery store vs. shooting range). Next, participants reported their mood a second time. Finally, participants were given the recall task, followed by a debriefing, thanks and dismissal.

Chapter Three: Results**Preliminary Analyses**

A one-way between-subjects ANOVA was conducted to analyze the effect of our mood manipulation on the first mood check (POMS) separately for the negative and positive POMS items. The analysis revealed a significant effect of the mood manipulation on negative POMS

scores, $F(1, 302) = 5.017, p = .026$), which indicated that participants who were in the negative mood condition reported more negative mood on the negative POMS items than did those in the positive mood condition. However, when analyzing the positive POMS scores, the effect of the mood manipulation was not significant, $F(1, 302) = .682, p = .410$).

A similar analysis was conducted to determine if the mood manipulation retained its effect on participants' mood after observing the photo-task. Here, we examined the mood manipulation's effect on participants' responses to the PANAS. Again, though, we examined the mood manipulation's effect on the negative and positive items separately. The results suggested, however, that negative PANAS scores did not significantly differ between the positive or negative mood manipulation conditions, $F(1, 302) = .437, p = .509$. Additionally, the positive PANAS scores did not significantly differ between either of the conditions, $F(1, 302) = 2.500, p = .115$. This suggests that the mood manipulation did not retain its impact on participants' reported mood scores after the threat was experienced.

A one-way between-subjects ANOVA was conducted to analyze the effect of threat manipulation on the second mood check (PANAS). The analysis revealed that threat had a significant effect on the participants' negative PANAS scores, $F(1, 302) = 16.755, p < .001$. Participants in the threat condition ($M = 2.077, SD = 0.977$) reported significantly more negative mood compared to the participants in the non-threat condition ($M = 1.653, SD = 0.768$). In contrast, the effect of threat on the positive PANAS scores did not reach significance, $F(1, 302) = 0.247, p = .619$.

Main Analyses

I conducted a three-way between-subjects ANOVA to examine the effects of threat (threat vs. no threat), unusualness (usual vs. unusual), and mood (positive vs. negative) on memory performance. Results revealed no significant main effects for any of the three independent variables. Specifically, the main effect of threat was not significant, $F(1, 294) = 0.217, p = .642$, indicating that participants in the threat ($M = 7.89, SD = 4.666$) and non-threat ($M = 7.83, SD = 3.947$) conditions did not significantly differ in their memory for the target. Although, the main effect of unusualness was not statistically significant, $F(1, 294) = 2.879, p = .091$, a marginal trend appeared in which participants in the unusual condition ($M = 8.21, SD = 4.303$) exhibited slightly higher memory recollection compared to those in the usual condition ($M = 7.51, SD = 4.406$). Finally, the main effect of mood was not significant $F(1, 294) = 1.530, p = .217$, indicating that being in the positive mood condition ($M = 8.21, SD = 4.303$) versus the negative mood condition ($M = 7.51, SD = 4.406$) did not significantly influence memory performance.

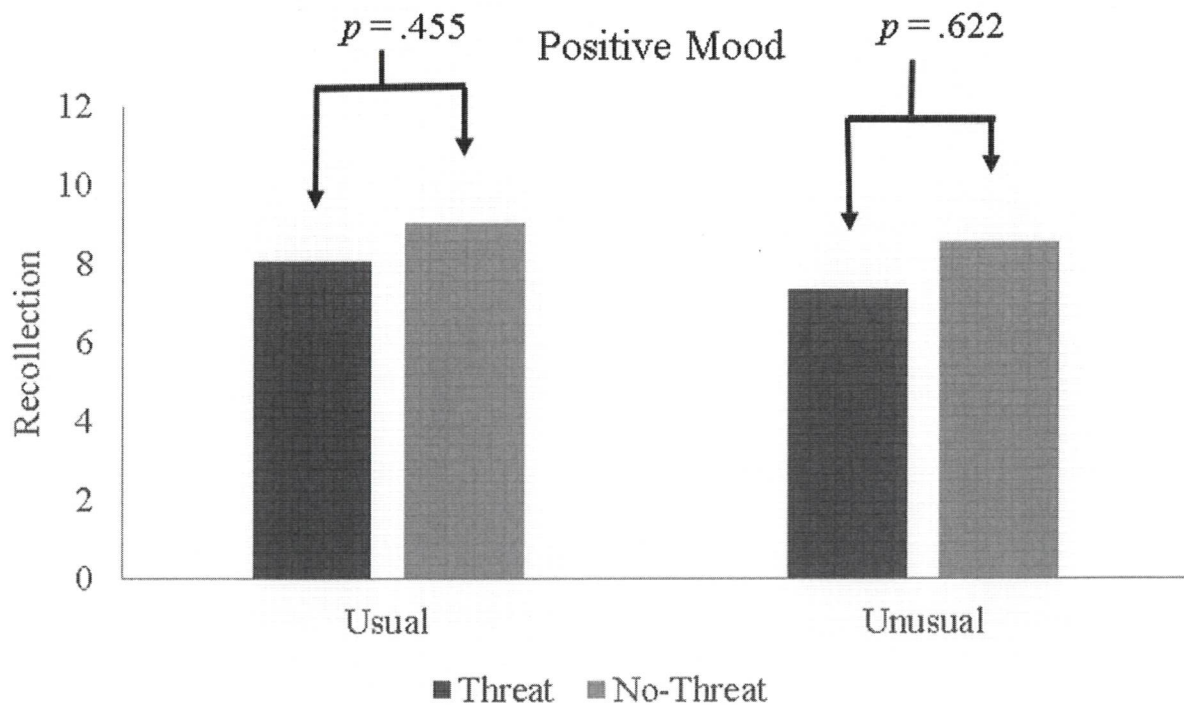
I next examined the two-way interactions between threat, unusualness, and mood. The threat x mood interaction was not significant $F(1, 294) = 0.760, p = .465$. Similarly, the unusualness x mood interaction was not significant $F(1, 294) = 0.373, p = .647$. However, the threat x unusualness interaction was marginally significant $F(1, 294) = 2.749, p = .056$. This effect reflected the fact that for those in the usual condition, memory performance was slightly better in the non-threat condition ($M = 7.77, SD = 0.53$) than in the threat condition ($M = 7.15, SD = 0.43$). In contrast, however, for those in the unusual condition, participants remembered more in the threat condition ($M = 8.98, SD = 0.52$) than in the non-threat condition ($M = 7.77, SD = 0.54$). While neither of these contrasts were statistically significant, the reversed pattern of

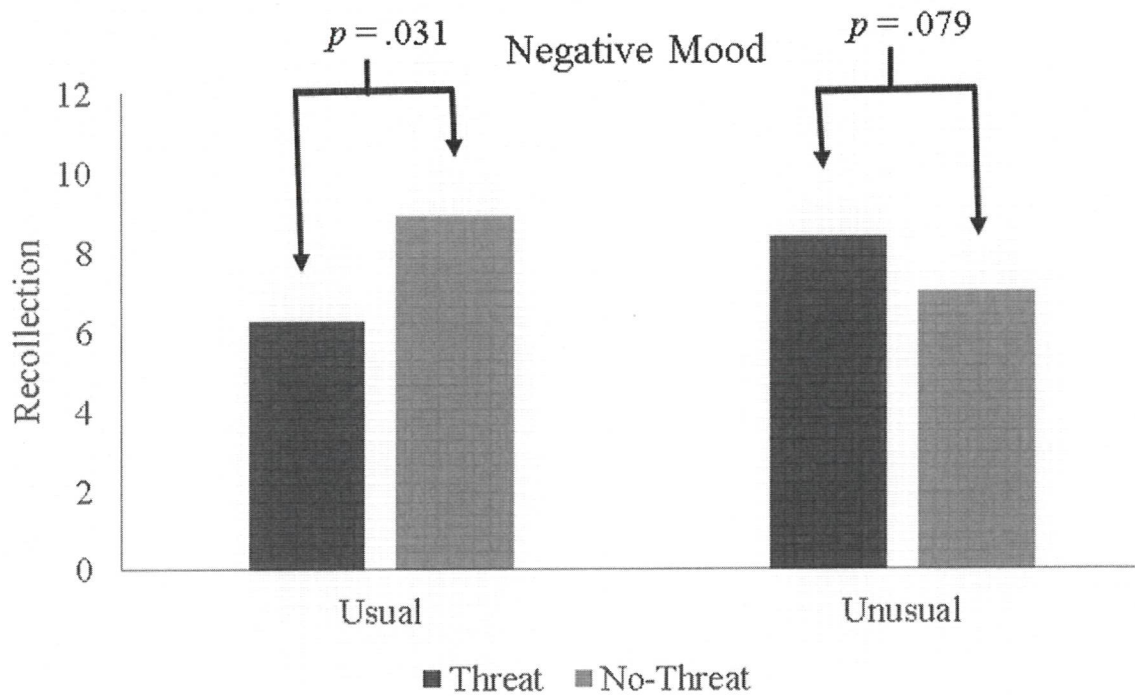
differences between the threat conditions for each of the unusualness conditions contributed to the observed interaction.

I then examined the three-way interaction which revealed that the marginal threat x unusualness interaction was qualified by a three-way interaction with mood, $F(1, 294) = 4.695, p = .038$. To further investigate this interaction, we split the data file and examined the simple threat x unusualness interaction in the positive and negative mood conditions separately (see Figure 1). In the positive mood condition, the interaction between threat and unusualness was not significant, $F(1, 156) = .015, p = .903$. However, in the negative mood condition, the interaction between threat and unusualness was significant, $F(1, 146) = 7.713, p = .006$.

Figure 1

Mood x Threat x Unusualness Interaction





To explore this simple interaction, I examined the simple main effect of threat within the usual and unusual conditions among participants in the negative condition. The results indicated that in the usual condition, participants remembered significantly fewer details in the threat condition ($M = 6.24$, $SD = 0.61$) than in the non-threat condition ($M = 8.40$, $SD = 0.786$), $t(294) = 2.173$, $p = 0.031$. In the unusual condition, the opposite trend was observed with participants recalling more correct details in the threat condition ($M = 8.892$, $SD = 0.708$, than in the non-threat condition ($M = 7.00$, $SD = 0.80$), $t(294) = -1.772$, $p = 0.079$.

Discussion

The main objective of this study was to explore the relationship between mood and recollection when weapons are present (i.e., the weapons focus effect). Specifically, I examined how pre-existing mood influences the weapon focus effect (WFE) by testing two predictions. The first hypothesis was that an individual's mood state might moderate the WFE by influencing how unusualness affects attention. A positive mood tends to broaden attention, potentially increasing awareness of contextual contrast and we suspected this would enhance the WFE. In contrast, a negative mood narrows attention, which may reduce an individual's ability to process contextual information. Therefore, we predicted that negative mood might attenuate the WFE. Alternatively, though, we offered an alternative, second hypothesis that mood might directly affect the WFE through a mood congruence effect. A positive mood might reduce attention to threatening stimuli, while a negative mood could increase attention to such stimuli, increasing the WFE. The reported findings provide only partial support for the second of these hypotheses.

Although no main effects of threat, unusualness, or mood were found, the results suggest a more complex interaction between these three variables. This interaction revealed that in the negative mood condition, the effect of threat on memory performance differed depending on unusualness. Participants in a negative mood remembered more details about a target person when experiencing a threatening object in an *unusual* context. However, participants in a negative mood remembered fewer details when experiencing a threatening object in a usual context (i.e., the WFE). This was the only condition in which the WFE was observed, providing partial support for the mood congruence effect. Specifically, it was observed that a negative mood appeared to increase attentional focus for a mood-congruent, threatening, stimulus, but only when the object was expected (usual). In contrast, participants in the positive mood condition did not display the

WFE, which suggests that positive mood might reduce sensitivity to threat or broaden attention in a way that reduces an individual's ability to detect threatening stimuli. The observed effects in the positive mood condition may not be fully representative, as exposure to a threatening weapon could have overridden the intended positive mood induction, creating a possible limitation for the current study. Taken together though, this suggests that pre-existing mood states may play a critical role in shaping when the WFE occurs.

One limitation of this study concerns the limited observed occurrence of the WFE, which was only observed in the negative mood and the usual context condition. Despite the methodology being modeled after prior research, the WFE was not consistently found across conditions where it was expected to be observed. Indeed, I most frequently found the opposite of what we would expect had the WFE occurred. A possible explanation for this discrepancy is that mood might have influenced attentional distribution in a manner that affected memory encoding. Participants in a positive mood might have experienced a broadened attentional scope (Huntsinger, 2013), which could have led them to process a wider range of contextual details and delayed their noticing the weapon. In contrast, a negative mood is known to narrow attention (Friedman & Forster, 2010), which could have caused the participants to concentrate more on specific locations where the object might be (such as the hip or hand of the person of interest). This effect may have only emerged when seeing the threatening object in a usual context (i.e., gun range) because participants relied on familiar scene schemas, guiding the participants to look at expected areas for a weapon. This interaction may have amplified the WFE due to the weapon being observed in an expected context and possibly funneling the participant's focus toward the object or where they might expect the object to be.

However, in the unusual condition, the absence of a scene schema that would have directed participants' attention to a place where the threatening object might be may have left participants without any clues as to where to focus their attention. This could have led to participants displaying a more evenly distributed search of the scene, potentially mitigating the WFE. Future studies could address this by incorporating eye-tracking into their methodology, which might allow for a better assessment of how mood and context influence visual attention.

Another important limitation to this study concerns the selection of images that I used to induce mood states. While the positive and negative images were significantly different in valence, they were also different in their dominance. Though this was not intended, it is feasible that it could have influenced participants' emotional responses independently of valence. Dominance can impact emotional and cognitive processes (Hadar et al., 2023). However, it is important to note that current research has yet to directly link dominance to recollection or attention. As a result, while the systematic variation of dominance with my manipulation of valence remains a possible threat to the current study's internal validity, its' impact is uncertain. Future research should ensure that stimuli is more carefully selected to limit differences in dominance.

These findings could have implications in forensic settings, primarily for the confidence placed in eyewitness testimony. Eyewitnesses often experience a wide range of emotions in realistic environments, and our results indicate that pre-existing mood might influence how they encode and recall specific details surrounding the event. The threat, unusualness, and mood interaction found here suggests that a negative mood state could enhance memory for targets carrying weapons in unusual contexts (e.g., weapons in grocery stores). Instead, weapons may only impair memory for perpetrators when eyewitnesses are already in a negative mood. Together, this suggests that it might be important to consider the eyewitness's emotional state prior to their

experience of events witnessed involving weapons, as their mood could alter how they process contextual information at the time of the event. Having a clearer understanding of how mood can influence the accuracy of memory could inform forensic techniques by minimizing recollection errors due to mood biases.

Future studies might also consider participants' prior exposure or experience with weapons. Individuals with a military or law enforcement background might perceive and recall threatening stimuli differently, as their experiences may lead to a less heightened response to such objects, potentially resulting in differences in recollection compared to those with lesser exposure. Fortunately, in the present study, participants were asked to record their occupation, and none indicated a background where this exposure might occur.

Conclusion

The current study adds to the growing literature on the WFE by demonstrating that mood, threat, and unusualness can interact to influence how individuals recall certain events. Despite mood not affecting memory performance independently, it influenced how threat and unusualness operate. That is, when participants pre-existing mood was negative, they experienced the WFE in contexts where weapons were usual, but they experienced the opposite of the WFE in contexts where weapons were unusual. These results show the importance of considering the mood-state of an eyewitness when recalling events that might be unusual and/or threatening to the observer. Future research is needed to better understand the findings reported here.

References

- Carlson, C. A., Dias, J. L., Weatherford, D. R., & Carlson, M. A. (2017). An investigation of the weapon focus effect and the confidence–accuracy relationship for eyewitness identification. *Journal of Applied Research in Memory and Cognition*, 6(1), 82–92.
- Cavanagh, P. (1991). What's up in top-down processing? In A. Gorea (ed.) *Representations of Vision: Trends and tacit assumptions in vision research*, 295–304.
- Christianson S. A. (1992). Emotional stress and eyewitness memory: a critical review. *Psychological bulletin*, 112(2), 284–309. <https://doi.org/10.1037/0033-2909.112.2.284>
- Diamond, N. B., Armson, M. J., & Levine, B. (2020). The Truth Is Out There: Accuracy in Recall of Verifiable Real-World Events. *Psychological science*, 31(12), 1544–1556.
- Fei-Fei, L., Iyer, A., Koch, C., & Perona, P. (2007). What do we perceive in a glance of a real-world scene? *Journal of vision*, 7(1), 10.
- Flowe, H. D., Hope, L., & Hillstrom, A. P. (2013). Oculomotor examination of the weapon focus effect: does a gun automatically engage visual attention? *PloS one*, 8(12), e81011.
- Förster, J., Higgins, E. T., & Idson, L. C. (1998). Approach and avoidance strength during goal attainment: Regulatory focus and the "goal looms larger" effect. *Journal of Personality and Social Psychology*, 75(5), 1115–1131

- Förster, J., Friedman, R.S., Özelsel, A., & Denzler, M. (2006). Enactment of approach and avoidance behavior influences the scope of perceptual and conceptual attention. *Journal of Experimental Social Psychology*, 42, 133-146.
- Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, 2(3), 300-319.
- Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition & emotion*, 19(3), 313-332.
- Fredrickson B. L. (2001). The role of positive emotions in positive psychology. The broaden-and-build theory of positive emotions. *The American psychologist*, 56(3), 218-226.
- Friedman, R. S., & Förster, J. (2010). Implicit affective cues and attentional tuning: an integrative review. *Psychological bulletin*, 136(5), 875-893.
- Hadar, A., et al. (2023). How is social dominance related to our short-term memory? An EEG/ERP investigation of encoding and retrieval during a working memory task. *Frontiers in Psychology*, 14, 11408820.
- Hope, L., & Wright, D. (2007). Beyond unusual? Examining the role of attention in the weapon focus effect. *Applied Cognitive Psychology*, 21(7), 951-961.
- Huntsinger J. R. (2012). Does positive affect broaden and negative affect narrow attentional scope? A new answer to an old question. *Journal of experimental psychology. General*, 141(4), 595-600.
- Huntsinger, J. R. (2013). Does Emotion Directly Tune the Scope of Attention? *Current Directions in Psychological Science*, 22(4), 265-270.

- Johnson, C., & Scott, B. (1976). *Eyewitness testimony and subject identification as a function of arousal, sex of witness, and scheduling of interrogation.*
- Kaya, E. M., & Elhilali, M. (2014). Investigating bottom-up auditory attention. *Frontiers in human neuroscience*, 8, 327.
- Kuhl, J. (2000). A functional-design approach to motivation and self-regulation. *Handbook of Self-Regulation*, 111–169.
- Loftus, E.F., Loftus, G.R., & Messo, J. (1987). Some facts about 'weapon focus'. *Law and Human Behaviour*, 1, 55–62.
- Mansour, J.K., Hamilton, C.M., & Gibson, M.T. (2019). Understanding the weapon focus effect: The role of threat, unusualness, exposure duration, and scene complexity. *Applied Cognitive Psychology*.
- Pickel, K. L., & Sneyd, D. E. (2018). The weapon focus effect is weaker with Black versus White male perpetrators. *Memory (Hove, England)*, 26(1), 29–41.
- Pickel K. L. (2009). The weapon focus effect on memory for female versus male perpetrators. *Memory (Hove, England)*, 17(6), 664–678.
- Pickel, K. L. (1999). The influence of context on the "weapon focus" effect. *Law and Human Behavior*, 23(3), 299–311.
- Saunders, J. (2009). Memory impairment in the weapon focus effect. *Memory & Cognition*, 37(3), 326–335.
- Silver, C. (2015, May 12). *When Eyewitness Testimony Goes Horribly Wrong*. Center for Law, Brain & Behavior.

- Stebly, N.M. A meta-analytic review of the weapon focus effect. *Law Hum Behav* **16**, 413–424 (1992).
- Tamir, M., & Robinson, M. D. (2007). The Happy Spotlight: Positive Mood and Selective Attention to Rewarding Information. *Personality and Social Psychology Bulletin*, 33(8), 1124-1136.
- Wadlinger, H. A., & Isaacowitz, D. M. (2006). Positive mood broadens visual attention to positive stimuli. *Motivation and emotion*, 30(1), 87–99. <https://doi.org/10.1007/s11031-006-9021-1>
- Zsidó, A. N. (2024). The effect of emotional arousal on visual attentional performance: A systematic review. *Psychological Research*, 88(1), 1–24

Appendix A

IAPS Images and Descriptions for Both Conditions

This appendix consists of ten images selected from the IAPS database. The images in Figure A1 will be used in the positive condition, and the images in Figure A2 will be in the negative condition.

Figure A1

IAPS Images and Descriptions for the Positive Condition

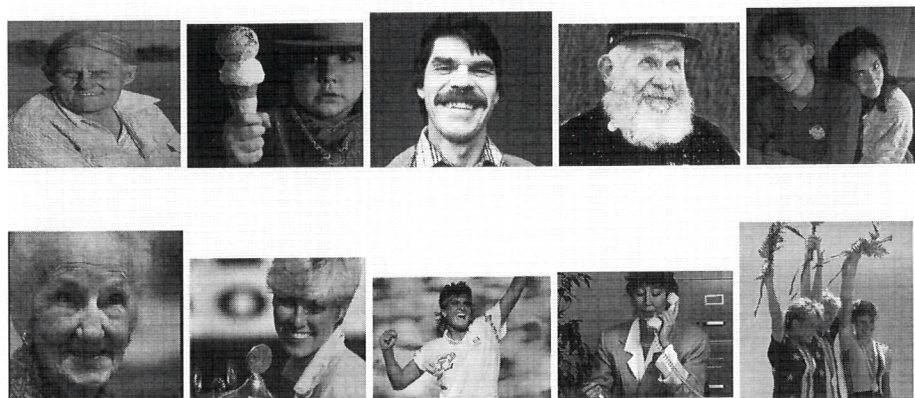


Figure A2

IAPS Images and Descriptions for the Negative Condition



Appendix B

IAPS Descriptions and Values

This appendix contains the descriptions of all of the pictures in Appendix A followed by their valence. The corresponding IAPS number is also included as it appears on the IAPS database.

Table B1

IAPS Descriptions and Values for the Positive Condition

Image Description	IAPS Number	Average Valence	Arousal	Dominance
OLD LADY	2516	4.90 (1.43)	3.50 (1.88)	5.54 (2.04)
BOY	2650	7.27 (1.67)	4.28 (2.41)	5.74 (1.86)
MUSTACHE	2020	5.68 (1.99)	3.34 (1.89)	5.99 (1.89)
OLD MAN	2500	6.16 (1.54)	3.61 (1.91)	5.57 (1.57)
COUPLE	4700	6.91 (1.94)	4.05 (1.90)	5.35 (2.05)
GRANDMA	2510	6.91 (1.91)	4.00 (2.10)	5.46 (2.08)
WINNER	8330	6.65 (1.39)	4.06 (2.28)	5.56 (1.59)
TENNIS	8350	7.18 (1.56)	5.18 (2.28)	5.78 (1.76)
SECRETARY	2383	4.72 (1.36)	3.41 (1.83)	5.75 (1.89)
ATHLETES	8540	7.48 (1.51)	5.16 (2.37)	5.88 (1.91)

Note. Values outside of the parenthesis are the means. Values inside the parenthesis are the standard deviations.

Table B2*IAPS Descriptions and JValues for the Negative Condition*

Image Description	IAPS Number	Average Valence	Arousal	Dominance
BOY FROWNING	2280	4.22 (1.54)	3.77 (1.89)	5.70 (2.01)
RUNNER	8010	4.38 (1.86)	4.12 (2.08)	5.17 (2.08)
ANGRY WOMAN	2130	4.08 (1.33)	5.02 (2.00)	5.10 (2.00)
ANGRY MAN	2100	3.85 (1.99)	4.53 (2.57)	5.05 (2.57)
GIRL	2385	5.20 (1.32)	3.64 (1.81)	5.86 (1.73)
UPSET MAN	2110	3.71 (1.82)	4.53 (2.25)	4.66 (2.25)
WOMEN	2700	3.19 (1.56)	4.77 (1.97)	4.44 (2.04)
RAIN	9210	4.53 (1.82)	3.08 (2.13)	4.55 (1.90)
SCREAMING	2810	4.31 (1.65)	4.47 (1.92)	5.69 (2.29)
MALE FACE	2220	5.03 (1.39)	4.93 (1.65)	5.32 (1.77)

Note. Values outside of the parenthesis are the means. Values inside the parenthesis are the standard deviations.

Appendix C

Photo Task

This appendix contains the images used in the photo task for all conditions. Participants are randomly assigned to each condition (shooting range – gun, shooting range – wallet, grocery store – gun, grocery store – wallet).

Figure C1

WFE Photo Task

