IMPLICIT AND EXPLICIT BIAS AGAINST HISPANICS AMONG WHITE FEMALE COLLEGE STUDENTS ASSESSED BY INDIRECT AND DIRECT MEASURES

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ABSTRACT

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Systemic racial and ethnic biases continue to permeate the American social order, often manifesting without conscious awareness. Previous research examining implicit biases against Blacks using paradigms such as the Implicit Association Test (IAT) and startle eyeblink have found evidence of White bias towards Blacks, often in the absence of explicit biases. In the current study, we examined whether these findings are generalizable to bias against Hispanics. Twenty-seven White female participants (mean age = 21.5 years) completed an explicit measure of Hispanic bias, the IAT, and a computerized startle task. During the startle task, participants viewed color photo primes of White and Hispanic males (20 White and 20 Hispanic) while

eyeblink electromyograph (EMG) data were recorded. On 20 trials (10 White and 10 Hispanic), the prime was accompanied by an auditory startle probe (50-msec 100db white noise). Analysis of the EMG data revealed larger eyeblink amplitudes during Hispanic primes than during white primes ($F(1, 23) = 7.92$, $p = .01$). IAT reaction times were also indicative of bias toward Hispanics (i.e., Hispanic + bad trials were significantly faster than Hispanic + good trials; ($F(1, 23) = 56.85$, $p < .001$)). Correlational analyses revealed no significant relationships between the three measures of bias, suggesting that each instrument may be tapping into different aspects of ethnic attitudes. This study extends prior startle research by demonstrating that the findings from previous Black/White startle studies are generalizable across race and ethnicity.

Keywords: Startle Eyeblink, Implicit, Explicit, Hispanic Bias, Implicit Association Test

CHAPTER I: Introduction

The American social order has been shaped by a long history of racial and ethnic inequality. A ubiquitous and complex phenomenon, prejudice in the US manifests towards many groups in different ways. Due to the historical circumstances surrounding Blacks forced migration to the US, the legitimated dehumanization of this group in legal documents such as the US Constitution and Jim Crow laws, and their historical position as the largest racial/ethnic minority group in the US, Blacks have faced significant persistent and visible discrimination and violence by Whites. Because of this history, social, economic, and political intergroup relations have been largely defined by Black-White interactions that stigmatize and disadvantage Blacks (Dovidio et al., 2010). This on-going process has systemically shaped negative societal attitudes toward Blacks. As a result, a large body of psychological research examining biases has focused on understanding both explicit and implicit White bias and discrimination against Blacks (e.g., Amodio, Harmon-Jones, Devine, 2003; Amodio et al., 2004; Cunningham, Raye, & Johnson, 2004; Hart et al., 2000; Phelps et al., 2000; Vanman, Paul, Ito, & Miller, 1997). Studies employing both direct (e.g., self-report) and indirect (e.g., physiological) measures consistently find a negative bias toward Blacks among White participants, regardless of the measure. However, negative valuation is not unique to Black targets, but is also found among White participants toward other devalued minorities, including Hispanics (e.g., Weyant, 2005).

Due to the significant role of Black-White relations in U.S. history, empirical research of prejudice and discrimination has focused almost entirely on Whites interaction with, and attitudes toward, Blacks, with relatively little emphasis on other minority groups. Additionally, many current models of White attitudes toward Hispanics are based on models of White attitudes toward Blacks (Dovidio et al., 2010). Emphasizing common aspects, such as in-group versus out-group threat, these models ignore the diverse reasons that different groups experience discrimination. For example, Blacks are stereotyped by White participants as more violent, lazy, and dependent on the state than other minority groups, while Hispanics are stereotyped as more unintelligent, impoverished, and unpatriotic than other minority groups (Wilson, 1996). However, there are some similarities in the stereotype profiles held by Whites towards both Blacks and Hispanics. Whites consider both Blacks and Hispanics to be more violent, lazy, government-dependent, unintelligent, impoverished, and unpatriotic than other racial/ethnic groups (Wilson, 1996). The similarities across these two profiles may help explain why Hispanics and Blacks have common experiences of overt prejudice (e.g., housing market, criminal sentence length, prejudicial lending practices), and often experience disenfranchisement at higher rates than other minority groups in the US (Pager & Shepherd, 2008).

General racial and ethnic discrimination persists systemically in employment, housing, and consumer markets, as well as many other facets of American society (Schuman, Steeh, Bobo, & Krysan, 1997). Although biased treatment is not a new experience to Hispanic Americans, as an increasingly salient minority group, Hispanics are progressively more exposed to persistent visible bias and discrimination than in the

recent past (Markert, 2010). Partially the result of immigration patterns of Mexican migrants at the government-sponsored Bracero Program (1947-64), as well as the Immigration Reform and Control Act (1986), the rising number of Hispanic immigrants to the US has led to the expansion and institutionalization of this type of bias (Lowell, Teachman, & Jing, 1995; Zats, 1993). This discrimination towards Hispanics has been demonstrated in different forms. For example, the anti-immigration laws such as SB 1070 in Arizona and HB56 of Alabama have been described as discriminatory towards Hispanics. More overtly, Victor Saldano's Hispanic race was used as rationale to expect imminent violence in order to justify the death penalty (Garvey, 2003). These examples make it evident that a better understanding of discrimination toward Hispanics is timely and overdue. However, at present there is a paucity of psychological research that examines White bias against Hispanics. In a 2010 review of articles focusing on prejudice and discrimination from three major social psychology journals (*Journal of Personality and Social Psychology, Journal of Experimental Social Psychology,* and *Personality and Social Psychology Bulletin*), Dovidio and colleagues (2010) found that only 7% focused on Hispanics as targets of bias, while 61% focused on Blacks (Dovidio, Gluszek, John, Ditlmann, & Lagunes, 2010). Given Hispanics growing role in the US and their status as a stigmatized group, it is important to explore the psychophysiological underpinnings of ethnic bias against this group among Whites, much in the same way bias against Blacks has been explored.

This study investigated implicit (indirectly assessed) and explicit (directly measured) bias towards Hispanics. For the purposes of this study, "Hispanic" referred to Hispanics with medium skin-tone. It was necessary to exclude dark and light-skin

Hispanic exemplars, as light-skin Hispanics are often identified as White (Uhlman et al., 2002), while Black-Hispanics are often grouped into the overarching “Black” racial categorization. This restriction was needed, as it was important to isolate the effect of "looking Hispanic", and not confound this with stereotypes about Whites or Blacks. Additionally, in the current study, the term “White” referred only to non-Hispanic Whites. Furthermore, the term “bias” here was not defined as a social judgment, but rather, as the presence of a noncontrollable response indicative of a preference (i.e., a prejudice) for one classification over another. Because this discriminatory assessment is an evaluation of an object as either favorable or unfavorable, biases are defined and considered as attitudes (Fazio & Olson, 2003). The notion of discrimination as attitude, as well as models relevant to this definition of discrimination is discussed in detail in in Chapter II.

This study used both direct (explicit) and indirect (implicit) measures to investigate ethnic bias towards Hispanics. The goal of both direct and indirect measures is to quantify attitude (bias), providing researchers with the ability to compare attitudes toward different groups obtained from the same participants (e.g., White vs. Hispanic). Before continuing, some clarification is needed regarding the terms direct (vs. indirect) and explicit (vs. implicit). De Houwer and colleagues (2009) recommend examining the characteristics of the procedure when determining whether a measure is direct or indirect, while it is the features of the focus psychological attribute (i.e., attitude) that render it either explicit or implicit. If a measure requires self-assessment, and there is no deception involved in the questioning, the measure is said to be direct. If both of these conditions are not met, the measure can be considered indirect. In order for a

psychological attribute to be implicit, it must be automatic in nature and measured without awareness. Automaticity in this case refers to psychological processes that occur though participants remain unaware of their instigation. Therefore, for an implicit attitude to be measured indirectly, the participant must be unaware that the attitude is being examined (i.e., the attitude must be automatically activated outside conscious awareness; Fazio & Olsen, 2003). On the contrary, explicit psychological attributes require individual awareness of the target attitude.

Direct measures have traditionally been a popular means of measuring these attitudes (e.g., self-assessment); however, direct measures necessitate direct responses to overt queries. As such, these measures are incomplete, and fail to account for the roll of internal and external influences on behavior (Amodio et al., 2003). That is to say, responding to a direct measure of attitude is in itself a behavior, involving overt expression. Therefore, like all behaviors, responses to direct measures can be influenced by external and internal motivations to control bias, a form of social desirability bias (Amodio et al., 2003; Dovidio & Fazio, 1992). Recently, social cognition research has attempted to minimize the use of direct measures by utilizing indirect measures, as these measures theoretically mitigate the effect of internal and external influences by eliminating conscious control.

Indirect measures have a particular utility in research as they minimize response masking, eliminating participants' ability to alter their responses in ways that conform to their view of what is socially desirable. This particular confound is prevalent in research on socially sensitive topics such as race bias, where participants will often attempt to hide beliefs they deem socially unacceptable (Dovidio & Fazio, 1992). Consequently, indirect

measures are often used in research of bias as they quantify an attitude or construct without necessitating direct questioning. This is appealing for researchers because it subverts conscious control; therefore, responses to implicit measures should not be influenced by response biases (Phelps et al., 2000). A large number of indirect measures have been developed over the past 20 years. Many of these, including affective priming tasks, the Implicit Association Test (IAT), the Go/No-Go Association Task, and the Payne Weapon Identification Task have been used to measure race bias (e.g., Fazio, Jackson, Dunton, & Williams, 1995; Greenwald, McGhee, & Schwartz, 1998; Nosek & Banaji, 2001; Payne, 2001). However, many indirect measures require a behavioral response (e.g., key press). Consequently, the outcomes of these measures are not purely automatic, but are also a function of an unknown amount of controlled processes.

Eventually, the intersection of social cognition and social neuroscience led to the development of new kinds of indirect measures. Technological developments allowed researchers to advance the study of implicit social cognition through the use of physiological methodologies. A number of physiological methods (i.e., functional magnetic resonance imaging or fMRI, event-related potential or ERP, and electromyography or EMG) have been employed in research on race bias (e.g., Amodio et al., 2002; Correll, Urland, & Ito, 2006; Hart et al., 2000; Phelps et al., 2000). There are limits to what is known about how observed physiological responses influence psychological state (Cacioppo, Tassinary, & Bernston, 2000). However, the use of physiological methods allows researchers to identify neural substrates or physiological markers that accompany certain tasks (see Ito, 2010 for a discussion), allowing for further

refining of models of implicit processes. The use of appropriate physiological indices can overcome the previously discussed limitations inherent in self-report instruments.

Even with effective deception and concealment, researchers cannot preclude the possibility that participants will gain some awareness of the target attitude. The possibility of awareness must be considered a possible confound, as awareness often causes implicit-explicit dissociations, whereby results of indirect measures show bias while results of direct measures do not (Wilson, Lindsey, & Schooler, 2000). While it is possible that this dissociation is a reflection of an attitude outside the introspective scope of the participant, it is likely that dissociations reflect a reluctance to explicitly divulge an attitude deemed socially undesirable (Fazio & Olson, 2003; see also Greenwald & Nosek, 2008). This inconsistency between measures has led to scholarly discussions of which outcome measure (i.e., direct vs. indirect) reflects the "real" attitude. There is debate as to the relationship between direct and indirect measures, the cause of variability between them, and the predictive validity of these measures on explicit behavior. One of the most widely adopted theories to guide research on implicit social cognition, the Motivation and Opportunity as Determinants model (MODE, Fazio, 1990), has been referenced as a useful guide for addressing the questions that arise from implicit-explicit dissociation (Fazio & Olson, 2003).

The MODE model is a dual process model with a focus on how judgments and behavior are influenced by attitudes (Fazio & Towles-Schwen, 1999). According to the MODE model, socially sensitive attitudes are subject to internal and external motivations to control individual responses. The relationship between direct and an indirect outcome measures is said to be dependent this motivation, but also the presence of opportunity to

consciously engage control over responses. The more sensitive a topic, the more likely direct measures are to be influenced by motivational factors; this is consistent with Dovidio and Fazio (1992), who posit that social desirability concerns will often influence participant's explicit responses. Consequently, if one has motivation, as well as opportunity to deliberate, control can be exerted over explicit attitudes, leading to inconsistencies in responses to direct and indirect measures. This model helps explain implicit-explicit dissociations often reported in social cognition studies (e.g., Devine, Plant, Amodio, Harmon-Jones, & Vance, 2002; Dovidio, Kawakami & Gaertner, 2002; Fazio et al., 1995; Greenwald et al., 1998,). Dual-process models and the MODE model will be further discussed in Chapter II.

One popular indirect measure that attempts to limit opportunity to control bias is the Implicit Association Test (IAT), which was utilized in this study as a measure of automatic implicit evaluative bias toward Hispanics. The IAT is a double discrimination task developed by Greenwald et al. (1998) as an indirect measure of association strength between affective valence and attitude object, making it useful for research into race and ethnic bias. The IAT requires participants to classify stimuli representing an attitude object (either a word or a picture) into one of two categories (i.e., Word: Good or Bad; Picture: Black or White). The labels of word valence and a picture category are presented simultaneously in evaluatively congruent or incongruent combinations[1]. Greenwald et al. (1998) hypothesized that when two concepts are associated, it will be easier and take less time to respond during a classification task when the two congruent concepts have the same response (i.e., require pressing the same response key).

[1]Congruency is speculative, based on assumed bias; see Appendix III for examples of IAT trials

Conversely, it should take participants longer to respond when the association requires an evaluatively incongruent response (Greenwald & Nosek, 2001). A number of studies examining race biases toward Blacks have validated this hypothesis (e.g., Cunningham, Preacher, & Banaji 2001; Greenwald et al., 1998), showing a negative valuation among White participants, whereby White participants show faster response times to Black/bad than Black/good pairings. While the precise mechanism of the construct measured by the IAT is still debated (Fazio & Olson, 2003; Fiedler, Messner, & Bluemke, 2006), the predictive and convergent validity of the measure is empirically supported (Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Nosek, Greenwald, & Banaji, 2005). The IAT has proven to be a useful tool in research on race and ethnic bias, and will be reviewed in Chapter II.

In addition to the IAT, this study examined the startle eyeblink as a physiological measure of automatic implicit affective bias. The eyeblink reflex is part of the human startle response, a defensive reflex with a protective function, which also prepares the organism for response to threat (i.e., somatic reactions; Graham, 1979). The startle eyeblink is a reflection of automatic affective activation, outside of awareness or control. The eyeblink is also thought to be an indirect index of amygdala activation (Amodio & Mendoza, 2010; Phelps et al., 2000). The amygdaloid complex is an almond shaped grouping of nuclei located in the rostral medial temporal lobe. A part of the limbic system, this structural grouping is thought to play a pivotal role in emotional responses, including emotional learning and object evaluation (Adolphs, Tranel, & Damasio, 1998; Davidson & Irwin, 1999). The amygdala has a role in encoding emotion onto memory, imprinting memories with affective valence (Davis, 1992). Furthermore, this structure is

thought to be integral as a facilitator of appropriate reactions to affective stimuli, particularly important for proper responses to negative events, such as those that induce stress or are construed as a threat (Lambert & Kinsley, 2005; LeDoux, 1996).

As part of the startle response cascade, the startle eyeblink is hypothesized to be a reflection of automatically activated neural structures and pathways. The startle eyeblink reflex is a consistent observable component of this cascade of activity, which is both quantifiable and simple to induce (Lang, Bradley, & Cuthbert, 1990). The eyeblink reflex is characterized by rapid contraction of the orbicularis oculi muscle, causing the eyelid to close 30-50msec after onset of a startle probe (Lang et al., 1990). Electromyography is sensitive enough to detect activity in the muscles required to cause the eye to blink, even very weak contractions, making it a very precise measure of the human startle response (Blumenthal et al., 2005). EMG electrodes attached to the skin underneath an eye measure the electrical potential generated by the orbicularis oculi muscle controlling for eyeblink (Lang et al., 1990). Researchers can then quantify baselines and peak eyeblink amplitudes, allowing for quantitative comparison of results across many participants.

Early research utilizing EMG employed affective priming to examine both potentiation and attenuation of startle eyeblink to probes following stimuli that varied in valence (i.e., positive vs. neutral vs. negative). This startle eyeblink paradigm includes a prime, which is randomly followed by a startle stimulus (usually loud, white noise), and electromyographic (EMG) measurement of the eyeblink elicited by the startle probe. The startle eyeblink is an indirect measure of automatic implicit affective bias, and as a measure of reflex, does not require participant input. Additionally, as a reflex, the startle

eyeblink is repeatable, precisely measurable, and attenuates quickly, and has proven to be a useful tool for research on individual bias. Affective priming refers to the technique whereby participants are shown valenced pictures prior to, and extending into, the onset of the startle probe (usually a loud, unpredictable, tone). When priming participants with a negative picture, researchers observed that the startle eyeblink reflex could be potentiated, presumably because the organism would have already activated an analogous affective response prior to the startle. Conversely, startle eyeblink should be attenuated by a positive prime (Filion, Dawson, & Schell, 1998; Grillon, Ameli, Woods, Merikangas, & Davis, 1991; Lang et al., 1990; Vrana, Spence, & Lang, 1988).

This paradigm has been extended to research on race bias, utilizing Black/White exemplars as affectively polar stimuli (i.e., White: positive, Black: negative). Some research has included Asian primes along with Black and White primes as a way to investigate and control for general out-group negativity (Amodio et al., 2003), showing that Whites have similar eyeblink amplitudes to Asian faces as they do to White faces. That Whites do not have a larger startle eyeblink when primed with Asian faces (compared to White faces) supports the hypothesis that eyeblink response is not simply a result of out-group bias, but instead reflects some other underlying process (e.g., discrimination manifesting as affective bias). As the amygdala has been linked with the human response to threat (Lambert & Kinsley, 2005; LeDoux, 1996) it is possible that the (White) eyeblink reflex when primed with Black and Hispanic faces is actually a reflection of threat detection. As such, it is likely that measures utilized to research stereotypes toward Blacks are applicable in the examination of stereotypes toward

Hispanics. However, this study is the first to utilize the startle paradigm to examine White/Hispanic biases.

In addition to the IAT and the startle probe, this study used a direct measure of prejudicial attitudes, a version of Pettigrew and Meertens Prejudice scale (PMP,1995), which was adapted to assess attitudes toward Hispanics. Traditionally, prior to the development of indirect and physiological measures, researchers depended on direct measures, like this self-report scale, to determine biased attitudes. However, as mentioned previously, when researchers began comparing the results from indirect and direct measures, dissociations were often observed (see Rydell & McConnell, 2010 for a review). Theorists have attempted to explain this dissociation in terms of opportunity, motivation, and evaluative processes (Fazio & Olson, 2003; Rydell & McConnell, 2010). These concepts and this measure will be discussed further in Chapters II and III

Study Rationale and Hypotheses

A number of studies have employed direct and indirect research measures to examine White/Black race bias. The objective of the current study was to expand on extant research by using White/Hispanic exemplars to determine whether implicit biases found among Whites utilizing White/Black exemplars are generalizable to other ethnic groups. Given the extremely similar stereotype profiles between Blacks and Hispanics to Whites (i.e., violence, criminality; Wilson, 1996) the utilization of measures that have been used to examine stereotypes toward Blacks is likewise suitable in the examination of stereotypes toward Hispanics. Accordingly, four hypotheses were addressed in this study, each of which is discussed below.

The startle eyeblink is a physiological index of affective priming. Due to its status as a reflex, it is relatively invulnerable to disguise. There is little risk of influence by confounds or artifacts. As such, it is well suited for research into race and ethnic bias, wherein participants are likely attempt to mask their true beliefs, making survey and direct measures unreliable. A number of studies utilizing the startle paradigm to examine Black/White race bias have found that Black primes facilitate startle eyeblink, while eyeblink responses to White primes are attenuated (Amodio et al., 2003; Amodio et al., 2004; Cunningham et al., 2004). As Whites are seen to hold parallel stereotypes for Blacks and Hispanics (Wilson, 1996), the same pattern was hypothesized for this study, whereby White participant eyeblink responses being would be potentiated by Hispanic primes and attenuated by White primes.

As a measure of automatic evaluative attitudes, the IAT has similar benefits as the startle probe in examining bias. The IAT is a measure of automatically activated implicit evaluative bias, requiring immediate responses and minimizing conscious mediation. Previous IAT studies with White participants have shown positive associations for White faces when the exemplars consist of Black and White faces (Cunningham et al., 2001; Glaser & Knowles, 2008; Greenwald et al., 1998; Phelps et al., 2000). Specifically, White participants were faster at identifying race to affectively congruent (i.e., White + good; Black + bad) lexical pairings. Conversely, White participants were slower at identifying race to affectively incongruent lexical pairings (i.e., White + bad; Black + good). Given that Blacks and Hispanics have extremely similar stereotype profiles (Wilson, 1996), it was hypothesized that utilizing White and Hispanic faces would yield the same pattern of results as observed in previous research employing White/Black

exemplars, (i.e., similar patterns of implicit bias found in White participant preference for White faces over Hispanic faces).

Theoretically, both the IAT and startle probe are indirect measures of implicit bias. Although no studies exist that correlates IAT response latencies with startle eyeblink amplitude, as both measures are thought to be indirect (i.e., not susceptible to response bias) and quantify the same construct (i.e., biased attitudes), theoretically a convergence should exist. Therefore, it was hypothesized that these two indirect measures would be correlated: IAT scores indicative of bias for White faces (faster reaction time to evaluatively congruent lexical pairings (White + good/Hispanic + bad) should be positively correlated with startle eyeblink amplitudes showing biases for White faces (White participant eyeblink response being facilitated by Hispanic primes and attenuated by White primes). This study also utilized a direct measure of prejudicial attitudes toward Hispanics. As previously discussed, social desirability biases coupled with a motivation to control prejudice is often predictive of implicit-explicit dissociation on measures of race bias. The purpose of administering this direct measure was to determine whether there was dissonance between the direct and indirect measures used in this study. Consequently, it was hypothesized that White participant IAT reaction time scores and startle eyeblink amplitudes (indirect measures of bias) would not be correlated with or predictive of prejudice scale scores (a direct measure of bias).

Chapter II summarizes relevant research regarding attitudes, stereotypes, physiological considerations relevant to indirect measurement of attitudes, and physiological correlates that are purported to measure automatic responses. Chapter III outlines the precise methods used for administering the IAT, startle paradigm, and

prejudice scale, and the analytic strategy used to examine the data in the context of study hypotheses. Chapter IV presents the results of the analyses done to examine these hypotheses. Finally, Chapter V examines these results, considers their relevance to the fields of implicit social cognition and social neuroscience, and discusses some potential implications of this study's findings. Expanding on extant research by using White/Hispanic exemplars, the findings of this study have important implications for future research into race and ethnic biases.

CHAPTER II: Literature Review

Ethnicity-based discrimination is a common experience among Hispanics in the United States (National Survey of Hispanics, 2002). The Hispanic population in the US is growing faster than any other racial or ethnic group (US Census Bureau, 2010). Yet research into discrimination against Hispanics has not kept pace with their relative growth rate. Models of Hispanic discrimination tend to build off of previous models of Black discrimination, ignoring the unique influences on prejudice toward each group (Dovidio et al., 2010). A comprehensive model of the dynamics of discriminatory attitudes will include the distinctive elements of bias against Hispanics in conjunction with elements of bias common throughout racial and ethnic bias more generally. Discrimination can be conceptualized as having three main facets: implicit affective, implicit evaluative, and explicit. These attitudes interact to shape behavior, the most observable characteristic of discrimination. This study looked at these concepts by examining stereotypes against Hispanics, using the startle paradigm and IAT to quantify implicit bias and a direct prejudice scale to examine the convergence of measures.

This chapter will summarize relevant research regarding attitudes, stereotypes, and physiological underpinnings of implicit bias, including measures that are purported to measure automatic responses. A brief look at modern discrimination, as well as discrimination against Hispanics, will be presented first. Subsequently, a selection of literature considering attitudes (both explicit and implicit) will be summarized, as well as

distinctions between stereotypes and attitudes. In particular, this review will focus on the MODE model of attitude-behavior associations (Fazio, 1990), which is relevant to a number of questions in bias research. An attempt will be made to bridge the connection between attitudes and behavior, as well as a consideration of when and the circumstances under which direct and indirect measures are predictive of behavior. Next, the background of the Implicit Association Test will be described and its value to this study will be established. A review of relevant research using the startle paradigm (i.e., the startle response and eyeblink reflex) as an effective noninvasive measure of affective evaluation will be presented. The effect of priming on amygdala potentiation and studies of affective valence and fear potentiation will be reviewed. Finally, a selection of studies utilizing this paradigm to investigate underpinnings of race and ethnic bias will be discussed. Combined, these sections provide the background and rationale for the current study.

Modern Discrimination

While White attitudes about race have become more liberal since the end of World War II and the final elimination of Jim Crow segregation in 1965, race is still a socially and politically divisive issue (Schuman et al., 1997). For example, in 1988, George H. W. Bush invoked the image of Black criminal Willie Horton as the archetype of criminality (Mendelberg, 2001); in 1996, Proposition 209 in California declared affirmative action illegal; anti-immigration laws such as SB 1070 in Arizona and HB56 of Alabama affect Hispanics disproportionately; and controversy regarding confederate symbols on state flags persists to this day (Reingold & Wike, 1998). In 1997, President Bill Clinton announced his President's Initiative on Race, a program based on the premise

that racism was still a problem in the U.S. The resulting Race Advisory Board concluded that racism is a divisive social force whose legacy continues to influence policy, creating disparities between Whites and other minority groups (Advisory Board to the President's Initiative on Race, 1998). They further concluded that these inequalities are systemic, rendering them invisible to many people. In other words, most White Americans do not recognize the advantages they have due to their race. Additionally, there is a large wage gap between Whites and both Blacks and Hispanics, unemployment among minorities is continually greater than among Whites, and Blacks and Hispanics make up the preponderance of prison inmates (US Census Bureau, 2010). Although the overt nature of manifestations of discrimination (e.g., verbal slurs) co-evolve with the social unacceptability of prejudice, discrimination pervades almost every societal domain, clearly visible in employment, housing, and consumer markets, to name a few (Bertrand & Mullainathan, 2004; Pager, 2007; Schuman et al., 1997; Zhao, Ondrich, & Yinger, 2006).

A model of minority status stress developed by Slavin et al. (1991) argues that minority groups are exposed to unique and excess stress as a result of their minority status. This stress is supplemental to the general stress to which members of all groups are exposed. This model expands on the cognitive appraisal model developed by Lazarus and Folkman (1984) by including elements salient in minority cultural experience. While Lazarus and Folkman (1984) examined cultural influences in the broad context of how the individual interacts with society in general, Slavin et al. (1991) further contend that visible minority status, lower socioeconomic status, and unique cultural customs contribute to the experience and frequency of ethnic discrimination. Consequently, all

minority groups in the US experience some incomparable stress above and beyond that experienced by the majority White group. Stress level has a direct impact on health outcomes, and groups with high chronic stress have predictably worse health profiles (Flores et al., 2008; Jackson, Kubansky, & Wright, 2006). As a result of this unique stress, minority groups more commonly suffer negative psychological, social, and health consequences (Flores et al., 2008; Jackson et al., 2006). In order to reduce the frequency and negative consequences of discrimination, it is necessary that research be conducted to examine the existence and physiological manifestation of racial and ethnic bias. Research into the physiological and implicit underpinnings of bias will inform future attempts to reduce bias at both the societal and individual level.

Discrimination against Hispanics.

Hispanics, like all minority groups, are more exposed to discriminatory stressors than Whites. According to the National Survey of Hispanics (2002), 87% of respondents reported that they perceived discrimination as a stifling influence on their progress in life. Seventy-eight percent reported discrimination was occurring in their workplace, while 75% reported it as a problem at schools. Over one-third of those surveyed reported either personally experiencing or having personal knowledge of someone else experiencing explicit discrimination because of their ethnicity. As perceived discrimination is known to cause stress (Flores et al., 2008), these numbers indicate that perceived discrimination is a commonplace and chronic stressor for Hispanics.

Unfortunately, there is a relative deficiency of empirical work on the topic of discrimination against Hispanics in the field of psychology. In a 2010 review of articles focusing on prejudice and discrimination from three major social psychology journals,

only 7% of published research focused on Hispanics as targets of bias, while 61% focused on Blacks (Dovidio, Gluszek, John, Ditlmann, & Lagunes, 2010). Much of this research has found extensive systemic bias in employment, credit, housing, and consumer markets (e.g., Del Campo, Jacobson, VanBurren, & Blancero, 2011; Pager & Shepherd, 2008; Roscigno, Karafin, & Tester, 2009). Hispanics have reported perceived lower quality health care due to their ethnicity (Sorkin, D., Ngo-Metzger, & De Alba, 2009). Many Hispanics feel like they have been passed over for a promotion due to their ethnicity (Pager & Shepherd, 2008). Additionally, Hispanics experience discrimination when attempting to locate housing, which is manifested in the form of fewer offers to see units, less information given about the units, being disproportionately guided to less affluent, disproportionately minority communities, and being offered less financial assistance (Ross & Turner, 2005). Furthermore, Hispanics seeking mortgages are rejected at higher rates than Whites with similar credit qualifications (Ross & Yinger, 2002). Discrimination has been found in consumer markets in the forms of increased surveillance, higher prices, and longer wait times before being helped (Harris, Henderson, & Williams, 2005). Discrimination is also found in occupational wage scales, as Hispanics earn on average seventy-five cents for every one dollar earned by a White individual (US Census Bureau, 2010). While much is known of the explicit manifestations of discrimination, further research is needed into the individual facets of bias that lead to discriminatory behavior.

As the largest and most rapidly growing minority group in the United States (US Census Bureau, 2010), Hispanics are an increasingly salient minority group. Consequently, Hispanics are more frequently the target of biases than in the past

(Markert, 2010). Unfortunately, as theories on Black discrimination were already established and robustly researched, many theories regarding Hispanics discrimination have grown out of preexisting models (Dovidio et al., 2010). As a result, this practice ignores the underlying dynamics that give rise to discriminatory attitudes unique to each target, yielding an incomplete theory. The conceptual nature of Black-White relations is shaped by the legacy of slavery, and by the relatively extensive history of Blacks in the United States. This narrative includes shared language, political destiny, and national history (Dovidio et al., 2010). Hispanics, however, are not seen by Whites to share this national history, considered diverse from Whites due to their perceived different language and disparate historical narrative. Though, regardless of the origins of bias, Blacks and Hispanics are seen share very similar stereotype profiles (Wilson, 1996), and stereotypes regarding both groups are prevalent among Whites in the US. To Whites, Blacks and Hispanics are typecast as more violent, lazy, government-dependent, unintelligent, impoverished, and unpatriotic than many other racial/ethnic groups (Wilson, 1996).

Moreover, sociopolitical concerns about illegal immigration are a considerable contributing factor to these attitudes (Dovidio et al., 2010). Of the roughly 12 million undocumented immigrants in the US, Hispanics make up roughly 80% (Hoefner, Rytina, & Baker, 2009). This has led to the portrayal of this group as the prototypical undocumented immigrant in the debate and criticism on undocumented immigrants (Deaux, 2006). According to a 2007 national survey, 62% of Americans consider the issue of illegal immigration of great importance, with 43% believing that the government has gone backward in dealing with the issue. Concurrently, large numbers of respondents believe that illegal immigrants are to blame for lost American jobs, low wages, and

higher unemployment. These issues were seen as causes of generally higher personal burden to the respondent (Deaux, 2006). The issue has become so salient in American sociopolitical theater that the delineation between legal and undocumented Hispanic immigrants, as well as Hispanic nationals, has been muddled. In addition to the general out-group biases that lead to Hispanic discrimination, a dimension of foreignness is also contributory. These beliefs are part of the unique underlying causes of hostility toward Hispanics (Markert, 2010), which will be discussed in the next section.

Dimensions of discrimination.

Research on discrimination is essentially the study of attitudes. Attitudes are complex, with a number of unique fundamental characteristics. Researchers have attempted to characterize and deconstruct the fundamentals of discriminatory attitudes by using the "prototypical American" as an exemplar of "American-ness" (Devos & Banaji, 2005; Dovidio et al., 2010; Pehrson, Vignoles, & Brown, 2009). This research focuses on what it means to be considered "American" in order to explore the unique influences that shape discrimination against Hispanics and other minority groups. Specifically, two dimensions of nationalism have been identified, *ethnic* and *civic* (Pehrson et al., 2009). *Ethnic nationalism* considers ancestry, language, physical appearance, and heritage as requisites for national inclusion. This form of nationalism delineates ethnic and racial groups along a continuum of biological similarity, with the standard for biological American-ness equating to Whiteness. Alternatively, *civic nationalism* perceives American ideals and standards as things that define what it means to be a member of the national grouping of Americans (Pehrson et al., 2009). Together, these concepts form the central dimensions of nationalistic expression.

Devos and Banaji (2005) explored this dichotomy in a factor analysis using a measure defining what it means to be "American". Their analysis revealed that items relating to *civic nationalism* (i.e., "be patriotic") loaded on different dimensions than items relating to *ethnic nationalism* (i.e., "being born in America"). Subsequent research has attempted to determine how various minority groups differ from the American prototype, as well as from Whites themselves. Dovidio et al. (2010) explored how different minorities compared to the prototypical American on the two previously discussed dimensions, hypothesizing that (to Whites) each minority group would have unique distances from the American prototype with respect to the two dimensions. Blacks were expected to rate more dissimilar to the American prototype than were Hispanics on ethnic dimensions, due to perceived genetic heterogeneity. Conversely, Blacks should be less dissimilar to the American prototype than Hispanics on the civic dimension due to Whites perception of Blacks larger role in American history. Consistent with their hypothesis, multidimensional scaling showed that Whites were the closest to the American prototype on both dimensions. Hispanics deviated substantially from Whites on the ethnic dimension (Dovidio et al., 2010). Blacks were further from Whites than Hispanics on ethnic nationalism, and more proximal to the American prototype on civic nationalism (See Figure 1). This is consistent with previous research showing that Whites stereotype Hispanics as unpatriotic (Pager & Shepherd, 2008).

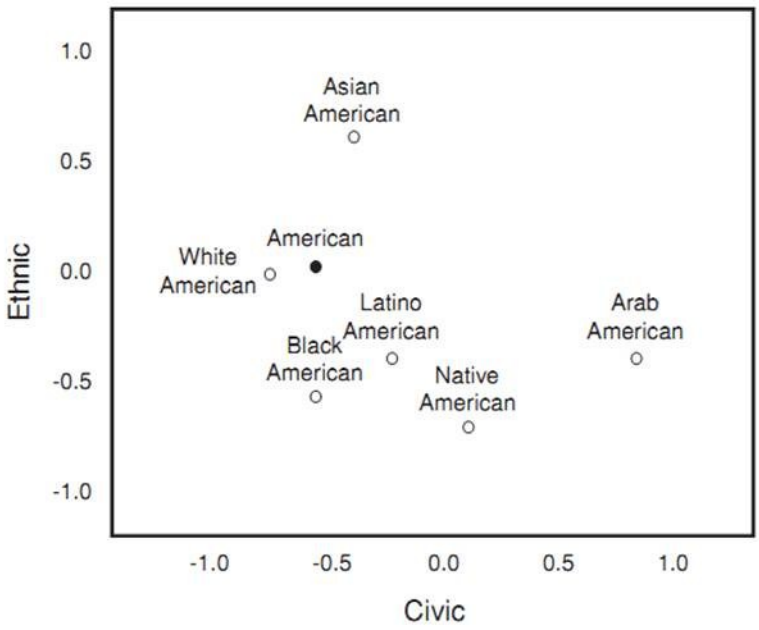


Figure 1. Multidimensional scaling of Americans and six American racial/ethnic groups along ethnic and civic dimensions (Dovidio et al., 2010)

These findings help to clarify the fundamental differences in the some of the underlying causes of White animus toward different minority groups. The distances from the prototypical American on these two scales underscore the differing nature of bias expressed toward diverse minority groups. Blacks, Asians, Arabs, Hispanics, and Native Americans all vary in distance from Whites on both *ethnic nationalism* and *civic nationalism*, highlighting the necessity for further group-specific research of this type. It is interesting to note that Blacks and Hispanics ("Latino Americans") are actually relatively close together in the concept space depicted in Figure 1. This closeness is congruent with the similar stereotype profile shared by Blacks and Hispanics (Wilson, 1996).

The MODE Model of Attitude-Behavior

Building on the previous section regarding the fundamental characteristics of Hispanic discrimination, this section will examine how and when attitudes influence

behavior. As previous research has discussed (see Greenwald et al., 2002; Greenwald & Nosek, 2008 for discussion), dissociation between indirect and direct measures is predictable when the subject matter is sensitive in nature. Social desirability bias is common in direct measurement, as participants often try to hide perceived undesirable attitudes (Fisher, 1993). This study adopts the Motivation and Opportunity as Determinants (MODE) model of attitude-behavior (Fazio & Olson, 2003) to explain this dissonance. This model, how it relates to memory formation and recall, and its relevance to this research with respect to inconsistencies between explicit and implicit attitudes is briefly explored.

The MODE model is a dual process model of memory, proposing that two processes of memory and recall occur simultaneously. The MODE model (Fazio & Olson, 2003) provides a useful framework for examining racial and ethnic discrimination. This model utilizes dual process theories by focusing on the influence of attitudes, specifically how attitudes exert effect on judgments and behavior. The MODE model hypothesizes two processes by which attitudes exert influence on behavior: spontaneous and deliberative. Spontaneous processing influences judgments and behaviors by shaping them in response to an individual's immediate construal of a stimulus. This immediate perception is a reflection of automatically activated attitudes that are triggered when a stimulus is encountered (Fazio & Olson, 2003). Conversely, deliberative processing necessitates analysis of the value of engaging in one behavior over another. As the acronym succinctly states (MODE - Motivation and Opportunity as Determinants), it is both motivation and opportunity that determine whether the process by which attitude influences behavior will be primarily spontaneous or deliberative.

Principally, motivation is necessary to encourage deliberative processing, as this is effortful in nature. In addition, the opportunity to engage in this effortful deliberative processing must exist. In the absence of either opportunity or motivation, spontaneous attitudes are likely to be the main influence on judgment and behavior. Additionally, there is the possibility for a "mixed" attitude-behavior process; a semi-spontaneous, semi-deliberative process that is both part automatic and part controlled (Fazio & Olson, 2003).

The MODE model and implicit-explicit dissociations.

The MODE model is particularly relevant when discussing dissociation between direct and indirect measures often observed in research on race and ethnic biases. When discussing socially sensitive issues, such as race bias, motivational factors will increase as sensitivity increases. As motivation increases, the influence of motivational factors on directly measured responses rises, affecting the validity of such measures. Consequently, the relationship between direct and indirect measures should be absent or minimal under conditions of high motivation and opportunity. According to MODE theory, the degree of correlation between direct and indirect measures is directly dependent on these concepts of *motivation* and *opportunity* (Fazio & Olson, 2003). If, at the time of the direct measure, either motivation to control prejudice reactions or the opportunity to exercise control is low, there should be a high correlation between the direct measure and the indirect measure. Conversely, if at the time of the direct measure motivation and opportunity are high, there it is less likely there will be a high correlation to the indirect measure (see Figure 2).

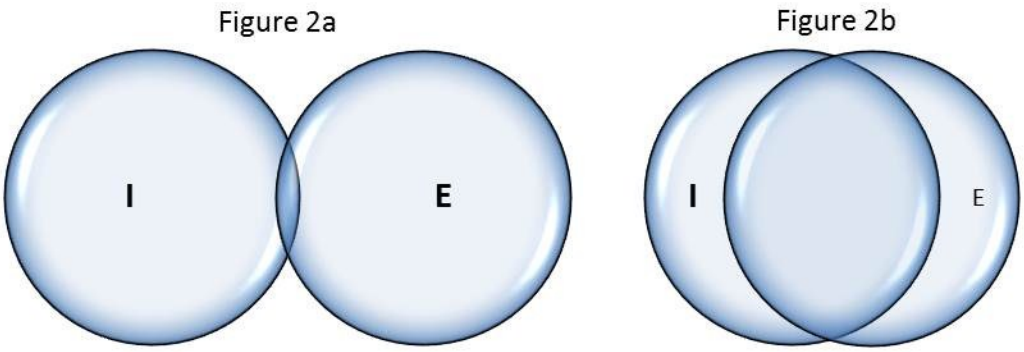


Figure 2. Correlation Between Implicit (I) and Explicit (E) Measures. Figure 2a shows the correlation between implicit and explicit measures when both motivation and opportunity are high. Figure 2b shows the correlation between implicit and explicit measures when either motivation and/or opportunity are low.

A number of studies exploring the MODE model hypothesis have utilized a motivation to control prejudiced reactions scale to investigate motivation as a moderating factor in racial and ethnic biases (Dunton & Fazio, 1997; Fazio, Jackson, Dunton, & Williams, 1995; Olsen & Fazio, 2002; Towles-Schwen & Fazio, 2002). These studies observed moderating effects of motivation on a number of measures, including the Modern Racism Scale, assessments of a "typical" Black male, first impression ratings of a Black individual, and observed comfort when interacting with a Black confederate. Consistent with the MODE hypothesis, individuals with low scores on motivation to control prejudiced reactions had judgments that could be predicted by their indirectly measured attitudes. However, as motivation increased, this relationship weakened. This pattern held true across these studies, with an interesting caveat: highly motivated participants who also had high scores on indirect measures of implicit negative attitudes tended to overtly respond in a more positive manner than did participants whose implicit activation was positive (Dunton & Fazio, 1997; Olson & Fazio, 2002; Towles-Schwen & Fazio, 2002). In other words, in a situation of race-related judgment, high-bias

participants with a high motivation to control prejudiced reactions overcorrected their negative attitudes. Wegener and Petty (1995) explained this in terms of the Flexible Correction Model, whereby individuals overcompensate as a function of their overestimation of the behavioral influential of their biases. Accordingly, with regard to prejudicial attitudes, what constitutes a "real" attitude may be relative to what it is that is being discussed, as both indirect and direct measures have been found to be predictive of behavior under certain circumstances (Dovidio et al., 1997); the measure that will prove predictive of explicit behavior depends on the presence of motivation to control prejudiced responses as well as the opportunity to do so.

Consequently, when undertaking research on bias, it is essential to consider that the moderating influence of motivation and opportunity can obscure correlations between measures. It is important to note that the absence of a statistical relationship between direct and indirect measures is not necessarily proof that the measures lack construct validity. Instead, one must take response biases into account when assessing this relationship, or risk reaching the spurious conclusion that none exists. The IAT and startle probe are examples of indirect measures designed to minimize participants opportunity to engage in deliberative processing. The Pettigrew and Meertens measure of prejudice (1995) is an example of a direct measure that will be more susceptible to response masking effects. In the current study, participants were assumed to have motivation to control prejudiced responses; additionally, the direct measure afforded them the opportunity to do so, while the indirect measures did not. Accordingly, it is because of these factors that dissociation between the direct and indirect measures used in this study was expected.

The Implicit Association Test

The Implicit Association test was one of the indirect measures utilized in this research. The IAT was developed by Greenwald et al. (1998) as an implicit measure of association strength, making it useful for research into race bias. The IAT is a double discrimination task designed to measure an implicit attitude or stereotype toward one categorization in direct opposition to another categorization. In the test portion of this task, participants are presented with valenced words that are either positively or negatively valenced (e.g., good: love, happy, rainbow; bad: cancer, violence, death), or category stimulus in the form of a photograph. Participants are tasked with classifying the word or picture presented into a category (e.g., Words: Bad, Good; Photos: White, Hispanic; see Appendix III for example). Participants are required to press a key that corresponds to the category word that identifies the target stimuli (i.e., press key corresponding with Hispanic if a picture if a Hispanic person is presented). Greenwald and Nosek (2001) hypothesized that when two concepts are associated, it will be easier (i.e., faster) for participants to respond to a classification task when the two congruent concepts have the same response (*compatible blocks)*; conversely, it will be more difficult (i.e., slower) to respond when the association requires an affectively incongruent response (*incompatible block)*. Though it can be hypothesized prior to data collection, compatibility can only be determined through examination of IAT results. For example, a *compatible block* would require the same key press for White faces and good words; an *incompatible block* would require the same key press for Hispanic faces and good words. A number of studies have validated this hypothesis (Cunningham et al., 2001; Greenwald

et al., 1998; Weyant, 2005), showing a negative valuation among White participants to devalued exemplars (i.e., faster response times to Hispanic + bad/White + good pairings), with test-retest reliability of .6 or higher (Greenwald & Nosek, 2001).

The precise mechanisms underlying the IAT are still debated, with a number of mechanisms having been proposed. While a full discussion regarding the IAT controversy is beyond the scope of this study, there are a few main process models that are often put forward. Brendl et al. (2001) proposed that slower response times on incompatible mapping trials are a result of incongruent response requirement producing a *shift in response criteria (i.e., Random-Walk Model)*, meaning more information is needed before participants can respond, causing a slowed response to both attribute and target. This theory purports that participants adapt response criterion to the combined block as perceptually more difficult. Additionally, Rothermund and Wentura (2001) posit that IAT results are a reflection of *figure-ground asymmetry*, whereby participants perceive each category word (e.g., Hispanic or White, Good or Bad) in contrast to the opposite response. In this case, participants will focus on only one set of the category words (e.g., Hispanic and Bad), reducing the task to a unipolar search for the presence or absence of just one category. This hypothesis suggests that IAT compatibility effects are a result of which target category and attribute the participant regards as the "figure" and which is considered the "ground" (see also Houben & Wiers, 2006; Rothermund & Wentura, 2001, 2004). Lastly, Mierke and Klauer (2001, 2003) postulate that *task switching* affects both IAT test blocks asymmetrically through the compatibility or incompatibility of the target and valence. In the compatible block, the target and valence overlap where negativity is shared by one set of targets and words, and positively is

shared by the other. In this block valence is mapped to a single key (e.g., 1-key = positive, 2-key = negative). As such, categorizing a positive word or target requires a uniform key press (and vice versa), simplifying the response, facilitating faster responses. Conversely, during the incompatible block, there are not overlapping characteristics of target and word mapped to a single key. During this incompatible block category valence must be ignored when categorizing a target, but must be accounted for when categorizing a word, requiring a task switch. Such task switches are associated with reduced performance (Rogers & Monsell, 1995), and therefore result in slower response times. This theory, however, is insufficient to explain individual differences in reaction times. To that end, cognitive abilities and intelligence have been put forth as possible confounding variables influencing the effect of task switching (Gawronski, 2002).

While the exact underlying mechanisms remain unclear, the predictive and convergent validity of the IAT is empirically supported. For example, in a study by McConnell and Liebold (2001), participants first interacted with a White confederate, followed by direct measures of race bias, and a race bias IAT, after which participants interacted with a Black confederate. The confederates, as well as observers, rated the interactions on a number of micro-behaviors (i.e., friendliness during interaction, curtness of responses, eye contact). Results showed that IAT scores were highly correlated with these ratings; higher IAT scores were significantly related to less smiling, a reduced amount of extemporaneous dialogue, less overall speaking time, more vocal hesitation, as well as more speech errors in the interaction with the Black experimenter. Additionally, an fMRI study by Phelps et al. (2000) correlated the IAT with amygdala activation, a brain region that has been associated with affective evaluation. Their results indicated

that White participant amygdala activation to Black face primes was positively correlated with race bias as measured by the IAT. The IAT has been repeatedly supported as a measure of automatic evaluative evaluations (e.g., biases), making it a useful tool in the examination of ethnic biases.

However, the IAT is not purely a measure of automatically activated attitudes, as it requires a behavioral response (e.g. key press). While the IAT is described (and titled) as a measure of "implicit" attitudes, there is a measure of control in the IAT that must be considered. As such, the IAT is more accurately regarded as a measure of automatic bias influenced by an unknown amount of controllability (Fazio & Olson, 2003). In contrast to physiological measures, the IAT does not measure automatically activated reaction to stimuli, but an evaluative response of association between stimuli and category labels. This distinction is subtle, but important; while both the IAT and startle measures are considered indirect, there is a degree of behavioral influence on the IAT not present in startle quantification. This is in direct contrast to physiological measures, which attempt to quantify an automatically evoked implicit bias by using priming to influence the affective state of the participant, while the IAT attempts to measure the association between a stimulus and an evaluative attitude (e.g., positive or negative) by pairing a stimulus with a valenced word, forcing the participant to respond to both category and valence. While both are measures of bias, the IAT is seen as a measure of implicit evaluative bias, while physiological measures are considered measures of implicit affective bias (Amodio & Mendoza, 2010). The research discussed in subsequent sections will examine some of these physiological measures, with an emphasis on the startle probe paradigm.

The Startle Response and the Eyeblink Reflex

Recently, researchers have used a number of physiological measures in an attempt to identify the underlying mechanisms of bias. While some of these measures focus on different sympathetic responses to stimuli (such as heart rate, pupil dilation, skin conductance), others have attempted to identify the neural substrates involved in these responses (e.g., fMRI, startle probe), with specific focus on the amygdala. The amygdala is thought to have a key role in encoding emotion onto memory, giving memories affective valence, and facilitating appropriate reactions to affective stimulus (Lambert & Kinsley, 2005). Furthermore, the amygdala is thought to have a role in the evaluation of the emotional significance of a stimulus, assessing it as either approach- or avoid-related, as well in the initiation of appropriate physiological and psychological responses (McGaugh & Cahill, 2003). If a stimulus is judged to be avoid-related or dangerous, this affective tone facilitates encoding of the emotional stimulus, allowing for categorization and quick recall of potentially life-saving information (Lang et al., 1990). Animal studies have shown that neural firing in the amygdala is altered after pairing of a neutral stimulus with an aversive event, supporting the hypothesized role of this structure in emotional learning and memory (Applegate, Frysinger, Kapp, & Gallagher, 1982; Henke, 1983; Pascoe & Kapp, 1985). The amygdala is also known to have a role in the sympathetic response cascade, of which the startle-eyeblink is a part (Applegate et al., 1982). Specifically, research has identified projections from the amygdala to the nucleus reticularis pontis caudalis (sensorimotor interface, located in caudal pons), which is thought to mediate potentiation of the startle eyeblink reflex (Hitchcock & Davis, 1991).

Furthermore, the amygdala has a role in processing information related to aversive stimuli, specifically responding to stress and the detection of threat (Lambert & Kinsley, 2005; Ledoux, Cicchetti, Xagoraris, & Romanski, 1990). As Black and Hispanic primes may be activating a threat response, the startle probe paradigm may have utility in the study of racial or ethnic bias as an indirect index of threat detection.

The human startle response has a number of stable characteristics, with sympathetic (galvanic skin arousal, pupil dilation, blood pressure elevation), respiratory (panting), neuronal (elevated dopamine, norepinephrine, and acetylcholine), and reflexive (increased startle, eyeblink reflex) components, as well as others (Davis, 1992). The startle response is a defensive reflex with a protective function (of which the eyeblink is a part), while also preparing the organism for response to threat (e.g., somatic reactions; Graham, 1979). Of these defensive components, the eyeblink reflex is the first and most consistent element in the sequence of events that comprise the startle response. The startle eyeblink reflex has been found to be a consistent observable component of this cascade, both quantifiable and simple to induce (Lang et al., 1990). The consistency of the eyeblink reflex has been replicated using diverse types of startle stimuli. Further, it has been shown that the eyeblink reflex may occur as a reaction to stimuli not powerful enough to provoke other components of the startle response (Lang et al., 1990). Eyeblink reflex is characterized by rapid contraction of the orbicularis oculi muscle, which circumscribes the eye socket and covers the eyelids and part of the temple, and is responsible for closing the eyelid. It is because of this consistent, predictable, and measurable response that the eyeblink startle reflex originally became a popular technique for research into classical conditioning (Lang et al., 1990).

Early startle eyeblink research utilized a number of methods to measure the amplitude of the human eyeblink, including high-speed photography, pendulum-photochronograph, and electrooculography (Gormezano, 1966; Landis & Hunt, 1939). However, the development of electromyography (EMG) allowed researchers to use sensitive electrodes to measure the amplitude of the electrical potential generated by the orbicularis oculi muscle during eyeblink (Lang et al., 1990). As the blink reflex dishabituates quickly, it is possible to evoke the response repeatedly during a relatively short experimental period, making it a particularly useful tool to researchers (Lang et al., 1990). Early research into the human startle eyeblink reflex used painful shocks to induce startle while simultaneously measuring eyeblink reflex amplitude (e.g., Ross, 1961; Spence & Rundquist, 1958). Modern researchers have developed less invasive methods of eliciting the startle response. Contemporary studies typically employ an acoustic white-noise or simple tone burst delivered through headphones as the startle stimulus. More recently, this technology has been used by researchers interested in the human startle reaction, specifically the potentiated startle eyeblink (Filion et al., 1998; Grillon et al., 1991; Lang et al., 1990; Vrana et al., 1988). In these studies, participants were affectively primed (the mechanisms of which will be discussed in the next section) with affectively valenced pictures. Researchers hypothesized that the startle eyeblink reflex would be potentiated by a negative prime, and inhibited by a positive prime (Lang et al., 1990; Vrana et al., 1988). The potentiating effect of negative primes has been replicated and is generally accepted (e.g., Amodio et al., 2003; Filion et al., 1998; Grillon et al., 1991; Phelps et al., 2000), while the inhibiting effect of positive primes is disputed

(Dillon & LaBar, 2005). Studies utilizing the startle probe in combination with priming are discussed in the next section.

Priming in combination with startle probe.

Researchers have hypothesized that the startle eyeblink reflex could be potentiated by a negative prime and attenuated by a positive prime, (e.g., Filion et al., 1998; Grillon et al., 1991; Lang et al., 1990; Vrana et al., 1988, but see Dillon & LaBar, 2005). These researchers presupposed that participants could be affectively primed by being exposed to stimuli with either a positive or negative valence (e.g., photographic primes), as the prime activates associated automatic affective states. This work built on early theory of affective valence as reflective of an organism's disposition, which can be either positive approach or negative avoid (e.g., Schneirla, 1959). According to this paradigm, the human startle reaction is interpreted as a withdrawal response, sharing psychological components of avoidance behaviors. Consequently, the startle response should be potentiated by a negatively valenced prime. For example, if primed with a picture of a Hispanic individual, a participant with an aversive affective evaluation of Hispanics will be primed to respond more strongly to the startle stimulus (startle probe), potentiating the eyeblink response.

This hypothesis was tested in a seminal study on startle reflex by Vrana, Spence, and Lang (1988). This study examined affective valence (pleasant or unpleasant) as a predictor of eyeblink amplitude, using acoustic stimuli and photographic primes. This was the first study to examine startle eyeblink response while controlling for affective valence of the prime. As a method of affective priming, Vrana et al. (1988) showed participants positively (e.g., opposite sex attractive nudes, smiling children, appetizing

food), neutral (e.g., a hairdryer, book, fork), and negatively (e.g., mutilated bodies, spiders, guns) valenced slides. At random intervals, an acoustic stimulus was played through headphones at a decibel level sufficient to elicit a startle response. Results showed that startle responses were smallest when the probe occurred during pleasant slides and largest in response to probes occurring during negative slides, with responses to neutral slides falling in between. The authors concluded that negative visual primes facilitated the startle reflex, relative to neutral and positive primes. While there is debate regarding attenuation of startle eyeblink to positive primes (Dillon & LaBar, 2005), enhancement of the startle eyeblink to probes during negative primes is a consistent finding across experiments.

As a follow up, Lang, Bradley, and Cuthbert (1990) replicated the study by Vrana et al. (1988), with a few modifications. Lang et al. (1990) hypothesized that individual reactions and reflexes to external stimuli reflect conditioned sets of responses. Furthermore, as an additional index of affective priming, these authors recorded skin conductance during slide viewing, as a measure of central nervous system arousal, in order to isolate the effects of valence from those related to arousal. Lang et al. (1990) rated slides on valence (pleasant, neutral, unpleasant), while additionally rating slides on arousal (excited, neutral, calm). Consistent with Vrana et al. (1988), Lang et al. (1990) found a monotonic relationship between prime valence and startle eyeblink amplitude, whereby startle responses were smallest when the probe occurred during pleasant slides and largest in response to probes occurring during unpleasant slides, with intermediate responses to neutral slides. They also found that the valence-startle relationship was independent of arousal: skin conductance responses (SCR) were equivalent during

positive and negative primes, and SCR responses to both positive and negative primes were greater than to neutral primes, suggesting that SCR responds to emotionally salient stimuli, regardless of valence. From these results, Lang et al. (1990) concluded that humans organize and classify information into basic categories of affect (positive or negative), and that the startle response is an accurate reflection of an activated affective state.

Eventually researchers hypothesized that affective priming could be expanded to the study of race biases. These studies postulated that (to Whites) Black primes would be categorized as avoid-related, resulting in potentiation of the startle response relative to that elicited by White faces. Conversely, White primes would be categorized approach-related, attenuating eyeblink reflex (Amodio et al., 2003; Amodio et al., 2004; Cunningham et al., 2004). This hypothesis has been supported by a number of studies, some of which will be discussed in the next section. A selection of studies utilizing other physiological measures to examine affective state will also be discussed.

Physiological measures to examine race bias.

Research using a number of physiological measures has been employed in the study of implicit racial bias. Using psychophysiological measures to investigate race bias is attractive to researchers because these technologies minimize control and response biases (Phelps et al., 2000). Building on the priming models, a number of studies have hypothesized that the approach-avoidance distinction is useful in the examination of White bias against Blacks. This research presupposes that due to racist cultural constructs and stereotypes, some individuals have conditioned negative affective response when exposed to Black individuals (avoid: negative valence), compared to White individuals

(approach: positive valence). Using photographs of Black and White faces, this hypothesis has been supported by a number of studies employing fMRI, ERP, and startle probe methodologies (e.g., Amodio et al., 2003; Amodio et al., 2004; Cunningham et al., 2004; Hart et al., 2000; Phelps et al., 2000).

Utilizing ERP, Amodio et al. (2004) assessed neural activity attributed to conscious control by specifically examining error-related negativity (ERN). The ERN is a component of an ERP waveform that is hypothesized to have origins in the anterior cingulate cortex (ACC), a brain region believed to play a role in the regulation of attention (Botvinick, Nystrom, Fissel, Carter, & Cohen, 1999). Furthermore, functional neuroimaging studies have identified the ACC as an area of heightened activity when attempting to control conflicting attitudes (Botvinick et al., 1999). Large ERN waves are thought to be predictive of this type of control (van Veen & Carter, 2002). In the Amodio et al. (2004) study, participants completed a sequential priming task while electroencephalography data was recorded. The sequential priming task was designed to induce race-biased responses, with Black or White faces briefly appearing, followed by a handgun or a hand-tool. Participants were required to classify the object as quickly and accurately as possible as either a handgun or a hand-tool. Results showed that participants were faster at identifying guns preceded by a Black face, and more often incorrectly identified a tool as a gun after a Black prime. ERP results showed larger ERN waves during Black-face trials. Additionally, ERN waves were significantly larger during Black-face trials where a tool was mistakenly classified as a gun than during White-face trials where a tool was mistakenly classified as a gun. This was interpreted as being reflective of greater implicit conflict, indicative of automatic race-bias, as

participants attempted to reconcile automatic bias with explicit attitudes. In addition to ERP studies, functional imaging technologies have become a staple of implicit bias research, a selection of which will be subsequently discussed.

Research using fMRI has shown increased amygdala activity when viewing Black faces relative to White faces (Hart et al., 2000; Phelps et al., 2000). From these results, researchers have hypothesized that amygdala activation in White participants is directly related to the perceived race of the stimulus. Cunningham et al. (2004) showed participants pictures of Black and White faces for either 30 milliseconds (ms) or 525 ms. During the 30 ms presentation, amygdala activation was greater during viewing of Black faces than White faces. Conversely, during the 525 ms presentation, this difference was significantly diminished, while regions of the frontal cortex showed greater activation. The activation of regions of the frontal cortex was interpreted as indicating the presence of control processes (Cunningham et al., 2004). These researchers hypothesized that during prolonged exposure trials, participants engaged in conscious control of prejudiced responses, which attenuated amygdala activation, and heightened activation in the frontal cortex. This hypothesis is congruent with the previously discussed MODE model, whereby participants were afforded the opportunity to control prejudice (through protracted trials), which in conjunction with motivation to control prejudiced responses caused the pattern of activation seen during longer trials.

The startle eyeblink has been used as an index of affective state in research on race bias. Amodio, Harmon-Jones, and Devine (2003) utilized the startle paradigm to examine White race bias against Blacks. This study examined the possibility that startle eyeblink potentiation was a result of general out-group negativity by including Asian

faces in their prime set. This inclusion also accounted for general unfamiliarity with minority groups, as it was expected that most White participants would be no more familiar with Asians than they are with Blacks. Results showed that White participants eyeblink was facilitated by Black primes, with no statistically significant difference between amplitudes during White and Asian primes. Amodio et al. (2003) explained this result by suggesting that stereotypes of Asians are not generally driven by negative attributions (i.e., threatening, violent; Niemann, Jennings, Rozelle, Baxter, & Sullivan, 1991). The results of this study suggest that the startle eyeblink is not uniformly potentiated by general out-group bias, but is reflective of specific affective state (i.e., threat detection).

Combining a number of methods, Phelps et al. (2000) examined neural activity during the startle paradigm with Black and White primes and during a bias IAT. Startle eyeblink magnitudes and IAT response times were also recorded. Results showed that IAT response latencies increased when exposed to Black stimuli and positive valence words, reflecting an affective incongruity, indicative of implicit race bias. In addition, startle probe results showed significantly greater eyeblink amplitudes when participants were primed with Black faces. Furthermore, biased responses on two measures were positively correlated with amygdala activity (Phelps et al., 2000). Additionally, while activation in the amygdala was correlated with both startle eyeblink potentiation and IAT reaction times, it was not related to performance on the Modern Racism Scale (MRS), an explicit measure of race bias (see Figure 3).

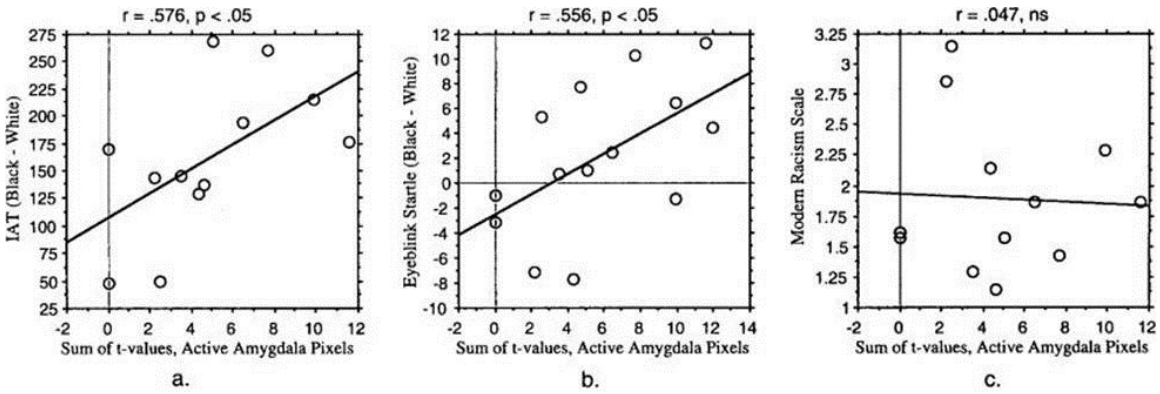


Figure 3. Correlations between magnitude of amygdala activation to Black-versus-White faces measured by fMRI and the IAT (a), eyeblink startle response (b), and Modern Racism Scale (c) (Phelps et al., 2000)

As the IAT effect reflects implicit evaluative bias and the startle eyeblink reflects implicit affective bias, while the MRS is an explicit self-report measure, the relationship found in this study is an example of the previously discussed implicit-explicit dissociation. The pattern of amygdala activation correlated with biased indirect measure results shows activity in brain regions (i.e., amygdala, insula, cingulate cortex) known to have a role in the processing of affectively salient, conflicting, or threatening stimuli, suggesting the presence of complex underlying mechanisms. The results of this study, and their relevance to the results of the present study, are further discussed in Chapter V.

Summary

This chapter has provided an overview of the present state of modern discrimination, including models of the attitude-behavior relationship, and some indirect measures used to examine them. There is currently no similar research examining these phenomena with White/Hispanic attitudes utilizing physiological methods. The IAT and startle paradigm were presented as measures of automatic attitudes and stereotypes. Their underlying mechanisms and value in bias research was explored. Further, this chapter summarized relevant research explaining the dissonance between indirect and direct

measures, and the predictive validity of these measures on behavior. The foundation of certain indirect measures was examined with respect to possible amygdala involvement, and a number of methodologies were introduced, with an emphasis on priming models and the startle probe paradigm, as well as the IAT. Previous research utilizing priming and the startle paradigm was presented as justification for the methodology this study. This study expands on this prior research by using these methodologies to examine bias against Hispanics.

The research presented in this review is the basis for the logic behind the four hypotheses of this study. To summarize, to Whites, Blacks and Hispanics have extremely similar stereotype profiles (Wilson, 1996); therefore it was expected that patterns seen in previous studies on White/Black bias would present in this study. Specifically, previous startle probe research has found White/Black race bias in the form of larger eyeblink amplitudes when startled during Black primes (Amodio et al., 2003; Phelps et al., 2000). The same pattern of results was anticipated in this study, with White participant eyeblink response facilitated by Hispanic primes and attenuated by White primes. Additionally, IAT studies have shown evidence for implicit race and ethnic biases towards devalued groups (e.g., Cunningham et al., 2001; Greenwald et al., 1998; Nosek, Banaji, & Greenwald, 2002; Weyant, 2005); likewise, the same pattern was expected to be seen in this study, with White participants being faster at responding to Hispanic + bad/White + good pairings. Furthermore, both the startle probe and the IAT are indirect measures of bias, and have been indirectly correlated via amygdala activation (Phelps et al., 2000); therefore, it was expected that these two measures would be positively correlated. Finally, implicit-explicit dissociation is often observed in studies of socially sensitive

subjects (Phelps et al., 2000), and race bias is a socially sensitive topic. Therefore, it was expected that neither the IAT nor startle probe would relate to of be predictive of scores on the direct prejudice scale.

CHAPTER III: Research Design and Methods

This chapter describes the research design and methodology for the current study. Specifically, it describes the methods utilized for participant recruitment, research instruments employed (e.g., stimuli, tasks, scales), the research procedure (including the recording and quantification of EMG data obtained during the startle probe task), and strategies used for analysis of the data. The purpose of this study was to examine the existence of implicit bias against Hispanics on the part of Whites through use of the startle probe, the IAT, the relationship between these two indirect tasks, and the correlation of these two measures to a direct measure of Hispanic attitudes. The primary objective of this study was to expand on previous research on racial stereotypes utilizing a similar design, but using White/Hispanic prime exemplars.

Participants

The subject population consisted of 36 participants (non-Hispanic Caucasian females) from undergraduate psychology courses at Texas State University. This population restriction was necessary as the purpose of this research was to expand on previous research with White participants by using White/Hispanic exemplars. The data collected from 9 participants was excluded from analysis due to medication use (n = 4; antidepressant or antianxiety), nonresponse to startle probe (nonresponder; n = 2), data storage error (n = 1), error during administration of the experiment (n = 1), and extreme scores on both indirect measures (> 3.0 standard deviations above the mean for all

participants; *n* = 1). Of the remaining 27 participants (*M* age = 21.5 years, *SD* = 2.6), 3 were left-handed, and 2 were ambidextrous. Participants were screened for normal or corrected-to-normal vision, hearing impairments, and acoustic sensitivity. In return for their participation, participants received extra course credit. The procedures and instruments described were approved by the Institutional Review Board at Texas State University–San Marcos.

Research Instruments

This study utilized a number of instrument and paradigms to examine implicit race bias towards Hispanics. The startle paradigm, which encompasses the startle probe, EMG and photographic primes, was used as a physiological indirect measure of eyeblink reflex. The study also included the IAT, an indirect measure of automatically activated evaluative associations to Whites versus Hispanics. Finally, this study utilized a direct, self-report measure of prejudice against Hispanics. These measures are described in further detail below.

The Implicit Association Test.

The IAT version used in this research followed the conventional design (Greenwald, Nosek, & Banaji, 2003), with a focus on ethnic bias, employing White and Hispanic faces as exemplars. Participants were seated approximately 18 inches from a 16 inch computer monitor. The stimuli consisted of 5” x 3.86” color photographs of twenty Hispanic and twenty White male faces that were equated for contrast and luminance. Only male faces were used to control for variability in stereotypes as a function of sex. All faces had neutral expressions, and were chosen from the Face Recognition Technology (FERET) database (Phillips, Wechsler, Huang, & Rauss, 1998) and the Vital

Longevity Face (VLF) database (Minear & Park, 2004). The FERET database is a widely used collection of 2,413 facial stills, distributed by the National Institute of Standards and Technology (NIST), and available for public use on the agency website. The VLF database was created at the University of Michigan and contains faces ranging age and ethnicity and organized by facial expression.

The IAT consisted of 7 total blocks, 5 of which were habituation blocks and 2 of which were test blocks (see Table 1 for sequence of trial blocks). Participants began with three habituation blocks. The first habituation block (block 1) consisted of 20 trials asking participants to categorize faces seen as either Hispanic or White (half White, half Hispanic). Hispanic and White face pictures appeared at the center of the screen, and category labels were present at the top left and top right. Participants were asked to press either the 1-key to identify White faces, or press the 2-key to identify Hispanic faces. The second habituation block (block 2) consisted of 20 trials asking participants to classify valenced words as either good or bad (equal proportion of good and bad). Positively valenced (good) words were: joy, love, peace, wonderful, pleasure, glorious, laughter, happy, fun, and beautiful. Negatively valenced (bad) words were: agony, terrible, horrible, nasty, evil, awful, failure, hurt, disaster, and toxic. A positive or negative word appeared in the center of the screen, while the words “good” and “bad” were present in the top left and right of the screen, respectively; participants were instructed to press the 1-key to identify good (positive) words, or press the 2-key to identify bad (negative) words. The third habituation block (block 3) contained 20 trials (half White, half Hispanic), and combined the White/Hispanic and good/bad responses onto one screen. Participants were instructed only to identify group membership or

valence, depending on whether an image (i.e., White or Hispanic face) or word (i.e., good or bad word) was presented. During habituation block 3, each trial contained one photograph (White or Hispanic) or one word (positive or negative), with "White or good" assigned to the 1-key, and "Hispanic or bad" assigned to the 2-key.

The first test (block 4) was a duplicate of block 3 in terms of the trial formation, but containing 40 trials. Test block 4 was followed by two more habituation blocks, with the 1 and 2 choices reversed. Habituation block 5 was a duplicate of block 1 in content, but with "Hispanic" assigned to the 1-key, and "White" assigned to the 2-key. Habituation block 6 was a duplicate of block 3 in content, but with "Hispanic or good" assigned to the 1-key, and "White or bad" assigned to the 2-key. The second test (block 7) was a duplicate of habituation block 6, but containing 40 trials (see Appendix III for sample stimuli; see Table 1 for sequence of IAT trial blocks). During all trials, participants were required to press either the 1 or 2-key depending on the correct answer, and were not presented with the next trial until a response was provided.

Table 1

Sequence of IAT Trial Blocks

Block	Number of Trials	Function	Items assigned to 1-key response	Items assigned to 2-key response
1	20	Practice	White images	Hispanic images
2	20	Practice	Good words	Bad words
3	20	Practice	Good words + White images	Bad words + Hispanic images
4	40	Test	Good words + White images	Bad words + Hispanic images
5	20	Practice	Hispanic Images	White image
6	20	Practice	Good words + Hispanic images	Bad words + White images
7	40	Test	Good words + Hispanic images	Bad words + White images

Only data from test blocks 4 and 7 were used for analysis. Using mostly the conventional IAT scoring algorithm, prior to data analysis trials with reaction time latencies +/- 2.5 standard deviations from the intraparticipant mean were eliminated (White + good: 2%, White + bad: 3.1%). The first two trials of each block were dropped because they often have lengthened latencies. All trials associated with incorrect responses were removed (White + good: 7.3%, White + bad: 12.2%). The measure of ethnic bias was evaluated by comparing the mean difference in latency responding to congruent block 4 (White + good/Hispanic + bad pairings) to the response latencies to incongruent block 7 (White + bad/Hispanic + good). Longer reaction times responding

to incongruent block 7 relative to congruent block 4 were considered evidence of ethnic bias.

The startle paradigm.

Following the committee report by Blumenthal et al. (2005), as well as the Phelps et al. (2000) model, two Ag-AgCl electrodes were placed on the skin over the orbicularis oculi muscle under the participants' left eye, while a third electrode was placed in the center of the forehead as a reference. A mild abrasive was applied to the skin prior to electrode placement to help reduce impedance levels. The same set of forty White and Hispanic face photographs (20 White, 20 Hispanic) used during the IAT was utilized as primes for the startle paradigm. The startle probe was presented during a randomized stimulus subset (containing ten White and ten Hispanic primes). A single photograph of a White or Hispanic male was presented on a computer screen for six seconds (see Appendix I for sample primes). Two to four seconds after presentation of the photograph, the acoustic startle probe occurred. There was an intertrial interval that ranged from 14 – 18 seconds between conclusion of the prime and the onset of the next fixation. The startle probe was a 50-ms burst of 1000Hz, 100-dB white noise (.wav file), with near instantaneous rise time, rendered binaurally through stereo headphones. Startle probe volume was calibrated using a sound pressure level meter at the beginning of each session. A startle eyeblink was the calculated amplitude difference between the baseline mean activity measured by the EMG during the 50 milliseconds prior to the probe and peak amplitude occurring within 120 milliseconds of the probe.

Eyeblink amplitude was measured using the BioPac EMG100C electromyogram amplifier in combination with AcqKnowledge 2.0 software (Biopac, Goleta, CA). The

raw EMG data was amplified with a gain of 5000, with frequencies below 10Hz and above 500Hz filtered online by the amplifier. Acquisition sample rate was set at 2000 samples/second. Additional band stop (57-63Hz) and band pass (HP = 28Hz, LP = 500Hz) filters were set up via AcqKnowledge. Raw EMG data was rectified, and fully integrated, averaged over 20 samples utilizing the root mean square. Intraparticipant EMG amplitudes were standardized (T = z (10) + 50) to control for individual differences in baseline and startle eyeblink amplitude that are independent of the startle response (Amodio et al., 2003; Phelps et al., 2000).

Of the 20 startle eyeblinks recorded per participant, an average of 1.55 (7.7%) were removed prior to analysis due to nonresponse, baseline noise, eyeblink during baseline, or startle eyeblink three or more standard deviations above intraparticipant average. These removals left an average of 18.45 startle eyeblinks processed per participant (max = 20, min = 16).

Pettigrew and Meertens Prejudice Scales.

This study also used an explicit measure of prejudice, the Pettigrew and Meertens Prejudice scales (PMP; 1995). The PMP is made up of two 10-question subscales; one subscale measures blatant prejudice, the other subscale measures subtle prejudice. Within the subtle and blatant scales are five subscales: threat and rejection (blatant), intimacy (blatant), traditional values (subtle), cultural differences (subtle), and positive emotions (subtle). The alpha internal consistency estimates of these two scales have been shown to be .88 for the Blatant subscale and .78 for the Subtle subscale (Pettigrew & Meertens, 1995). Similar reliability scores were obtained from the sample in this study, with alpha internal consistency scores found to be .84 for the blatant subscale and .71 for

the subtle subscale. Support for the convergent validity of these scales was also presented in Pettigrew and Meertens (1995). Separate total scale scores for the blatant and subtle scales were used as direct measures of race bias, although the individual question sub-scale information were retained for possible future use. Items on the PMP scale are measured with a 4-point Likert-type scale; responses were scored 1, 2, 3, and 4. Results were tabulated and standardized (z-scores), with higher scores indicative of more prejudicial responding.

Procedure

The study took place in the Psychophysiology Lab (PSY 314) in the Department of Psychology at Texas State University. Prior to data collection, participants signed an informed consent form. The study consisted of a computerized IAT, a startle eyeblink paradigm, and a self-report survey of prejudice toward Hispanics. Once consent was obtained, participants were assigned to first complete either the Implicit Association Test (IAT) computerized task or the startle paradigm electrophysiological measure. In addition to the IAT and electrophysiological measure, participants ultimately completed the PMP scale via SurveyMonkey.com.

The Implicit Association Test consisted of seven blocks of trials, five practice and 2 test, with participants instructed to press a 1 or 2-key, depending on the correct answer. As an indirect measure of ethnic bias, response latency to Hispanic + good/White + bad pairings were compared to Hispanic +bad/White + good pairings. To control for task-order effects, the implicit measures were counterbalanced; if the IAT was completed first, it was followed by the startle paradigm, and vice-versa.

The startle paradigm consisted of a prime, startle probe, and electromyographic eyeblink measurement. After placement of the electrodes, participants were sat approximately 25” from a 16” computer screen. Participants were shown the same 40 primes used during the IAT (20 White, 20 Hispanic). A single photograph was presented on a computer screen for six seconds (see Appendix I for sample primes). A startle probe occurred two-to-four seconds after presentation of the prime during a randomized stimulus subset of ten White and ten Hispanic primes. EMG data were continuously collected.

Data Analytic Strategy

Mean reaction times to correctly respond to White + good/Hispanic + bad and White + bad/Hispanic + good pairings during the IAT were analyzed using a mixed ANOVA with IAT trial type (Congruent: White/good vs. Incongruent: White/bad) as the within subjects factors, and task order (IAT first vs. IAT second), and task version (IAT version 1 vs. IAT version 2) as between subjects factors. This was done in order to compare the mean difference in speed in responding to the White + bad/Hispanic + good and White + good/Hispanic + bad pairings, and to rule out task order and version effects. A main effect of IAT trial type was evidenced by shorter response latencies during White + good/Hispanic + bad trials relative to White + bad/Hispanic + good trials, indicative of evaluative bias. A mixed ANOVA with prime type (White vs. Hispanic) as within subjects factors, and task order (startle first vs. startle second), and task version (startle version 1 vs. startle version 2) as between subjects factors was used to compare startle eyeblink amplitude during probes potentiated by White prime with probes potentiated by Hispanic primes, and to rule out task order and version effects. A main effect of prime

type was evidenced by larger average startle eyeblink amplitude during Hispanic primes, relative to average startle eyeblink amplitude during White primes, indicative of automatic affective bias.

In order to explore bivariate correlations between indirect measures and to conduct regression analyses, difference scores were computed from IAT results by subtracting mean latencies for congruent trials from mean latencies for incongruent trials. Difference scores were also calculated for startle probe data by subtracting mean *t*-scored eyeblink amplitude during Hispanic primes from mean *t*-scored eyeblink amplitude during White primes. Using these difference scores, bivariate correlations were computed exploring the predictive relationship between the IAT, startle measure, and both PMP subscales (blatant and subtle). Additionally, two multiple regression analyses examined the relationships between IAT latency, startle eyeblink amplitude, and the PMP subscales (blatant and subtle). In this case, either the blatant or subtle PMP subscale served as the dependent measure for each regression.

CHAPTER IV: Results

The Implicit Association Test

A mixed ANOVA with IAT trial type (White/good vs. White/bad) as within subjects factor, and task order (IAT first vs. IAT second), and task version (IAT version 1 vs. IAT version 2) as between subjects factors conducted on IAT mean reaction times revealed significantly faster responses to Hispanic + bad/White + good trials than to Hispanic + good/White + bad trials, $F(1, 23) = 56.85$, $p < .001$, $\eta_p^2 = .712$ (see Figure 4). Participants took significantly less time to correctly classify White or Hispanic pictures and good or bad words during Hispanic + bad/White + good trials. There was no effect of IAT version ($F(1,23) = 1.86$, $p > .05$) or task order (IAT first vs. IAT second; $F(1,23) = .30$, $p > .05$). Additionally, no interactions with trial type (White/good vs. White/bad) were found for task order ($F(1,23) = .45$, $p > .05$) or IAT version ($F(1,23) = .01$, $p > .05$).

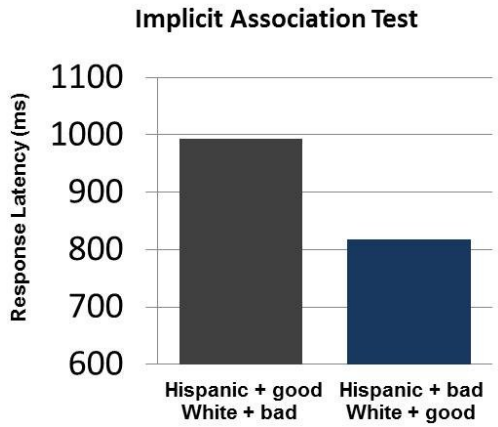


Figure 4. Mean IAT response latency to Hispanic + good/White + bad and Hispanic + bad/White + good.

The Startle Paradigm

A mixed ANOVA with prime type (White vs. Hispanic) as within subjects factor, and task order (startle first vs. startle second), and task version (startle version 1 vs. startle version 2) as between subjects factors of the EMG data revealed significantly larger eyeblink amplitudes during Hispanic primes than during white primes, $F(1, 23) = 7.92$, $p = .01$, $\eta_p^2 = .256$ (see Figure 5). Startle eyeblink amplitudes recorded during Hispanic primes showed significant potentiation compared to startle eyeblinks recorded during White primes. There was no effect of startle version ($F(1,23) = .33$, $p > .05$) or task order (startle first vs. startle second; $F(1,23) = .71$, $p > .05$). Additionally, no interactions with prime type (Hispanic vs. White) were found for task order ($F(1,23) = .32$, $p > .05$) or startle version ($F(1,23) = .03$, $p > .05$).

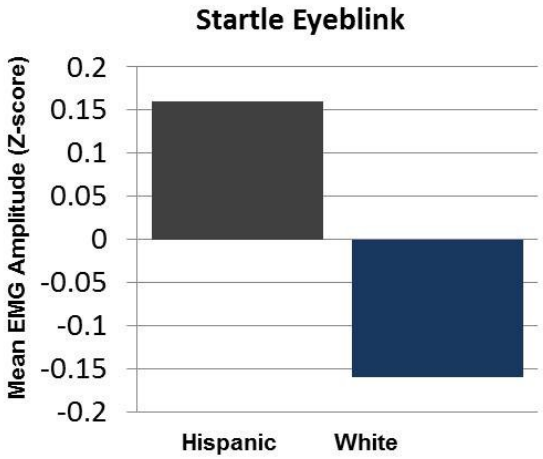


Figure 5. Mean startle eyeblink EMG amplitude to Hispanic and White faces.

Correlational Analyses and Regression

IAT response latencies were not predictive of startle eyeblink amplitudes, $r(27) = -.12$, $p = .56$. Additionally, bivariate correlations revealed no significant relationships between indirect measures and the subtle/blatant prejudice scales (See Table 2). There

was a trend whereby participants with greater Hispanic startle eyeblink bias (positive difference score) tended to score higher on the subtle PMP sub-scale, though this did not reach significance, $r(27) = .32$, $p = .10$.

Table 2

Bivariate Correlations (N = 27)

	1. Startle Eyeblink	2. Blatant Score	3. Subtle Score	4. IAT
1. Startle Eyeblink	----			
2. Blatant Score	.268	----		
3. Subtle Score	.321	.776***	----	
4. IAT	-.118	.249	.071	----

Note. ***$p < .001$

Two, separate multiple regression analyses were conducted whereby either blatant or subtle prejudice subscale served as the dependent variable, while indirect measures IAT and startle served as independent variables. The overall model predicting scores on the blatant subscale did not account for a significant amount of variance, $R^2 = .15$, $F(2, 24) = 2.15$, $p = .139$. Neither startle eyeblink amplitudes ($\beta = .30$, $p = .124$) nor IAT response latencies ($\beta = .29$, $p = .146$) proved to be significant predictors of blatant prejudice scores. Likewise, the overall model predicting scores on the subtle subscale did not account for a significant amount of variance, $R^2 = .12$, $F(2, 24) = 1.56$, $p = .231$, as neither startle eyeblink amplitudes ($\beta = .33$, $p = .097$) nor IAT response latencies ($\beta = .11$, $p = .573$) proved to be significant predictors of subtle prejudice scores.

CHAPTER V: Discussion

Discrimination towards Hispanics manifests in a number of different ways, often expressed without explicit awareness by the offender. However, much of what is known of underlying mechanisms of discriminatory attitudes is still theoretical. While there are a number of studies employing indirect and physiological measures to examine implicit White/Black racial biases (e.g. Amodio, et al., 2003;Amodio et al., 2004; Cunningham et al., 2004; Greenwald et al., 1998; Hart et al., 2000; Phelps et al., 2000), there is a paucity of studies that use these methods to explore White/Hispanic ethnic bias. Given that Hispanics and Blacks have comparable stereotype profiles (i.e. violence and criminality, Wilson, 1996), it is logical to assume that certain implicit associations towards Blacks will also be present towards Hispanics. The present study attempted to validate this assumption by utilizing White/Hispanic exemplars in the investigation of implicit and explicit bias. In reference to the startle paradigm and the IAT used in this study, analogous automatic cognitive appraisals of Blacks and Hispanics should result in startle eyeblink patterns and IAT response latencies indicative of bias toward Hispanics similar to those seen in previous studies on Blacks. That supposition was supported in the present study. Implicit bias against Hispanic was found for both the startle and IAT tasks, as indicated by potentiated startle to Hispanic primes, and longer IAT response latencies to evaluatively incongruent trials. Consequently, this study effectively expands

previous research on stereotyping, while contributing novel findings on automatic affective cognition.

Startle EMG results were indicative of a heightened negative affective reaction to Hispanic primes, as evidenced by potentiated startle during Hispanic primes relative to White primes. These results are consistent with previous studies showing larger average eyeblink amplitude to devalued group primes relative to White primes among White participants (i.e. Amodio et al., 2003; Phelps et al., 2000). When theorizing on the implications of potentiated startle responses to Hispanic primes, previous research on Black/White bias is the natural foundation. Pictures of human violence or instruments of violence have been shown to potentiate the startle response. Therefore, it is possible that findings of startle potentiation to Black faces (Phelps et al., 2000) are reflective of an automatically activated affective threat state. Furthermore, Phelps et al. (2000) linked amygdala activation to biased IAT and startle eyeblink responses. This finding is congruent with previous research linking the amygdala with the human response to threatening stimuli (Lambert & Kinsley, 2005; LeDoux, 1996). Functional imaging research has revealed the left superior amygdala as the area most highly correlated with negative evaluation of Blacks (Phelps et al., 2000), a region that has been seen to be active when viewing fearful faces (Breiter et al., 1996). This study's finding of potentiated eyeblink to Hispanic primes, as affectively threatening stimuli, may be indirectly reflective of amygdala activation resulting from automatically activated threat appraisal. Taken in conjunction, the research presented on discrimination, cognition, and neuroimaging suggest that the activation of affective threat state could explain the results noted during startle experiments. However, it should be noted that the underlying causes

of the noted amygdala activation are still being explored. Future research utilizing physiological measures could further elucidate these mechanisms by indexing activation patterns using male and female participants and novel affective stimuli (e.g. female exemplars). Though by no means definitive proof, this study lends credence to the idea of threat as an important influence on the results of physiological studies of bias.

Further supporting this threat hypothesis, previous research has shown no potentiation of the startle eyeblink to Asian face primes (compared to White faces) suggesting that potentiated startle eyeblink is not simply a result of intergroup bias, but a result of unique cognitive assessments (Amodio et al., 2003). As Asians are also stereotyped negatively by Whites, if potentiated startle was simply a result of negative affective state, one would expect to see potentiation to Asian as well as Black primes. Therefore, it can be assumed that it is not solely negative affect which potentiates startle, but a uniquely negative affective state. Like Blacks, Hispanics are commonly stereotyped by Whites as violent (Wilson, 1996). Previous research on startle, the amygdala, and prior physiological studies, combined with the results of the present study, suggests that findings of potentiated eyeblink during Black primes (e.g., Amodio et al., 2003; Phelps et al., 2000) and Hispanic primes, used in the current study, is likely a reflection of a cognitive threat appraisal. However, it must be noted that the Hispanic primes used in this study were not assessed by participants for threat. Future research that directly investigates this issue is required. For example, future studies can account for the possibility of conscious threat appraisal by including participants' ratings of exemplars on a threat scale as a possible moderating variable.

On a related note, this study focused exclusively on White female responses to Hispanic male stimuli, ignoring the interactive role of race and sex. A recent study by Plant et al. (2011) utilizing a decision to shoot paradigm showed that White participants were more hesitant to shoot White female suspects compared to White male suspects. Furthermore, White participants were more likely to shoot Black men compared to both Black women and Whites, regardless of sex. These results indicate an interaction between race and sex that was beyond the scope of the present study. Future research should attempt to parse out the influence of threat activation and sex as the underlying mechanisms behind potentiated startle to Blacks or Hispanics by altering the priming paradigm to include Hispanics primes of both sexes along with other negative primes, both threatening and nonthreatening, as well as using a subject cohort of both men and women. Doing so would allow for the examination of correlations between potentiation to Hispanic vs. threatening negative and Hispanic vs. unthreatening negative primes, while being able to explore sex interactions.

IAT results also showed a negative bias toward Hispanics, consistent with previous studies showing an automatic negative association toward devalued groups among White patrons (e.g. Dasgupta, McGhee, Greenwald, & Banaji, 2000; Phelps et al., 2000; Weyant, 2005). The IAT is an indirect measure hypothesized to gauge strength of implicit associations between attribute categories (e.g. good vs. bad) and target categories (e.g. Hispanic vs. White). Participants in the present study took longer to identify photos of Hispanics during trials where the target category “Hispanic” was paired with the attribute category “good” (relative to Hispanic + bad), suggestive of an automatic and implicit negative evaluative association toward Hispanics, relative to Whites. However,

interpreting this bias is difficult, as there is much debate as to what the processes underlying the IAT actually are, as well as whether the IAT is a measure of personal bias or a reflection of society level stereotypes (Brendl et al., 2001; Fiedler et al., 2006). Additionally, the Phelps et al. (2000) study correlated a pattern of amygdala activation with biased IAT responses, suggesting a possible role of the amygdala in evaluative processing (Amodio & Mendoza, 2010). An attempt to reconcile the IAT with the noted neural activation is discussed in subsequent paragraphs. Notwithstanding the debate over underlying processes, the IAT is generally held as an effective measure of evaluative associations regarding bias and stereotypes, with the present study showing a negative evaluative bias toward Hispanics.

Although both indirect measures indicated bias amongst the participants, there was no correlation between the two. The startle method has been utilized as a measure of affective bias towards Blacks. Likewise, the IAT has shown to be an effective measure of automatically activated evaluative bias. As both indirect measures quantify bias, it was hypothesized that startle eyeblink and IAT results would reflect similar patterns of implicit bias against Hispanics, and would therefore positively relate. Additionally, IAT and startle responses indicative of bias were seen to share certain patterns of neural activation (Phelps et al., 2000). Though the areas correlated with biased IAT and startle did not precisely overlap, both tasks elicited activations in the left amygdala, suggesting that they may share some fundamental or early processing. However, no previous studies could be located that directly correlated the IAT with startle eyeblink. Therefore, in an attempt to explain the present dissociation, this study drew from the literature on cognitive neuroscience and implicit social cognition, as well as the hypothesized

characteristics underlying the IAT and startle eyeblink methods.

The IAT is purported to be a measure of dichotomized evaluative associations, possibly reflecting general societal stereotypes, though not necessarily an index of the strength of that association. On the other hand, the startle eyeblink reflex is thought to be an indirect index of amygdala activity reflective of learned affective associations (Davis, 2006; Phelps et al., 2000). The disparate mechanisms underlying these two measures can be looked at in the context of the tripartite model of attitudes (Eagly & Chaiken, 1998). According to this model, attitudes are a reflection of cognitive, affective, and behavioral processes. The IAT, as a measure of semantic associations between category targets and category attributes, is reflective of the cognitive component. On the other hand, the startle, as an index of affective response to stimuli, reflects the affective component. This delineation is congruent with the aforementioned view of the IAT as a measure of *implicit evaluative bias*, and the startle as a measure of *implicit affective bias* (Amodio & Mendoza, 2010). The mechanisms underlying these different forms of bias, as well as further insight into the results of the present study, may be derived from the results of Phelps et al. (2000) study of implicit and explicit bias.

In Phelps et al.'s (2000) study, fMRI blood oxygen level responses correlated with biased responses to both IAT and startle, though only left superior amygdala activation was common to both measures. Left amygdala activation in the presence of fearful faces has been reported, as well as correspondingly increasing activity to increasingly fearful stimuli (Dolan & Morris, 2000; Vytal & Hamann, 2010). More specifically, the left amygdala has been identified as an area of enhanced activation to threating stimuli, relative to stimuli classified as safe (Phelps et al., 2001). IAT response

latency was also correlated with activity in the right amygdala and right anterior cingulate cortex (ACC). The right amygdala is thought to be a detector of general affective change, regardless of valence. Though, it must be noted that there are demonstrated lateralized differences in amygdala activation patterns between men and women dependent on the stimuli (Hamann, 2005; Hardee, Thompson, & Puce, 2008). The ACC is seen to be activated during the experience or mental representation of emotion (Barrett, Mesquita, Ochsner, & Gross, 2007). Furthermore, it has been hypnotized that the ACC may play a role in signaling the need to consciously process mental contents for the purpose of gaining control over them or to reduce internal conflict (Barrett et al., 2007; Botvinick et al., 1999; Lane & McRae, 2004). The neural activation pattern to biased IAT results during the Phelps et al. (2000) study are consistent with the hypothesized evaluative judgments of polar affective categories (i.e. good vs. bad) necessitated by the IAT.

To the contrary, startle eyeblink amplitude difference correlated only with the left amygdala and right insular cortex (Phelps et al., 2000). The left amygdala and insula are two areas known to be active during the processing of threat detection. The insula has been indicated as a contributing structure during emotional recall (Lane, Reiman, Ahern, Schwartz, & Davidson, 1997; Reiman et al., 1997), as well as the experiential, expressive, or evaluative facets of implicit emotion (Phan, Wager, Taylor, & Liberzon, 2004). Once evoked by emotionally salient stimuli, the insula conveys interoceptively generated information to the amygdala (Craig, 2002). Moreover, recent study has found the insula to be active during the processing of generally aversive or threat-related stimuli (Schienle et al., 2002). The correlation between left amygdala and insula activity and bias evident startle results seen in Phelps et al. (2000) is consistent with what is known of

these areas role in the evaluation of emotional significance, including threat detection. Exploring *implicit evaluative bias* and *implicit affective bias* in the context of the neural activation patterns seen in Phelps et al. (2000) may help explain why these two measures were not correlated in the present study.

The absence of a relationship between the startle and IAT results may indicate that these two types of indirect measures quantify fundamentally different underlying characteristics of discrimination. The IAT effect is thought to be a product of individual's *implicit evaluative bias*. In other words, the cognitive component of the IAT may be a semantic association between the stimulus target and the individual's conceptual model of good or bad (Amodio & Mendoza, 2010). Moreover, the IAT is purely a measure of evaluation, not of affective response (Amodio & Mendoza, 2010). The IAT effect is a reflection of the reaction time difference between two tasks: responding to bias-incongruent trials (controlled processing), and responding to bias-congruent trials (automatic associations). Therefore, the IAT effect may not be a purely implicit measure, but rather, it may be more aptly described as the result of a combination of automatic and controlled processes. In that regard, the IAT neural activation patterns observed in Phelps et al. (left and right amygdala, ACC; 2000) could reflect an automatic cognitive dissonance by which participants attempt to implicitly rectify an incongruence experienced during incompatible trials, whereby automatic stereotypes toward target stimuli are in conflict with category stimuli of opposite valence.

In contrast, the neural pattern of activation related to bias startle eyeblink response (left amygdala and insula) could be reflective of a more basic physiological response to threatening stimuli. This activation pattern found by Phelps et al. (2000) may

represent the pathway by which individuals process *implicit affective bias*. Just as the IAT is thought to measure semantic (conceptual) form of implicit bias, the startle probe is thought to measure the affective form. The defining feature of the affective response is the accompanying autonomic arousal (Amodio & Mendoza, 2010). As such, the startle eyeblink may reflect amygdala activity as a consequence of affective arousal, and is capable of assessing these changes within only a couple hundred milliseconds of stimulus onset. For these reasons, startle methods are thought to be capable of indexing affective bias independent of semantic evaluations (Amodio and Mendoza, 2010). In this regard, startle eyeblink could be utilized as a measure of affective response to threat inducing stimuli. The startle eyeblink has been utilized to identify implicit affective bias that is independent of semantic evaluation. Consequently, the startle neural activation patterns observed in Phelps et al. (left amygdala, insula; 2000), and the presence of potentiated startle to Black primes (or Hispanic), as threat-inducing stimuli, is congruent with what is known of the left amygdala and insula as areas significant in the analysis of and response to affectively threatening stimuli.

By exploring the neural substrates identified during IAT and startle, a picture develops regarding the underlying characteristics of each task. Threat detection via the amygdala is a relatively low-level psychological mechanism, and therefore may be activated during both IAT and startle in response to Black and Hispanic stimuli. Right amygdala & anterior cingulate cortex activity were exclusively correlated with biased IAT results, while insula activity was exclusively correlated with biased startle eyeblink responses. Bias IAT responses appear to cause the activation of areas known to play a role in the processing of affectively salient stimuli, threatening stimuli, as well as conflict

resolution (Phelps et al., 2000), consistent with the view of the IAT as a measure of *implicit evaluative bias*. Conversely, biased startle responses seem to cause activation of areas known to support affective responses to threatening stimuli, consistent with the view of the startle eyeblink as a measure of *implicit affective bias*. Taken together, identified localization of threat detection in conjunction with enhanced left amygdala activity during biased Black/White IAT and startle eyeblink tasks suggests that neural mechanisms underlying biased reactions to these two measures may share some partial overlap. However, the results of the present study indicate that even though Phelps et al. (2000) showed that bias IAT and startle eyeblink share a common neural substrate, either this overlap is not sufficient to cause correlation, or the areas of activity unique to each measure are more influential on response outcomes than the area they have in common. The known functions of these regions may help to explain why IAT and startle responses were not significantly correlated. Furthermore, the aforementioned difference in neural activation pattern may be a result of the hypothesized different forms of bias measured by IAT and startle methods, indicating that these measures seemingly differ on levels of processing related to higher functioning.

While cognitive and affective processes function simultaneously, the different ways in which implicit evaluative bias and implicit affective bias are processed may represent distinctive psychological and physiological processes, though possibly sharing some fundamental or early processing mechanism. Consequently, while the IAT and startle eyeblink are both measures of bias, they are not perfectly analogous in terms of the aspect of bias being measured. The IAT is a measure of implicit evaluative bias, requiring semantic knowledge, and the resolution of affectively incongruent stimuli. On

the other hand, the startle eyeblink is an indication of implicit affective bias, reflective of autonomic activation to perceived threat in the target stimuli. The different mechanism by which participants respond to these two indirect measures helps to explain the lack of correlation found herein between two indexes of bias. Failing to find an association between the IAT and startle suggests that these two measures could be tapping into different aspects of bias, with the startle tapping into early stages that are more automatic in nature, while the IAT taps into more controlled processes, including semantic processing. Bias is a multifaceted and complex attitude, necessitating the need for future research rectifying how these processes might synergistically interplay to influence behavior. Further research using physiological (e.g., startle, EEG, PET, fMRI) technology, in conjunction priming tasks (e.g., IAT, lexical priming, weapon paradigm) can help delineate the processes underlying these measures, allowing for the development of theory regarding the interaction of affective and cognitive processes.

Neither the startle nor the IAT was found to be predictive of scores on the blatant or subtle PMP subscales (1995). The implicit-explicit dissociations found between the indirect and direct measures may be due to the susceptibility of the explicit measure to social desirability concerns. On explicit measures that deal with socially sensitive topics, such as prejudice, participants are often aware of what is socially acceptable and what is not, leading to responses in line with societal expectations, often masking their true attitudes. The resulting implicit-explicit dissociation leads to nonsignificant correlations between the direct and indirect measures. This dissociation became common in research on bias, and its detection and subsequent replication was one of the chief causes of the rapid expansion in the development of indirect measures (Amodio & Mendoza, 2010;

Crosby, Bromley, & Saxe, 1980; Devine, 1989). Most participants were expected to be aware of the unacceptability of prejudice toward Hispanics. For that reason, the dissociation found in this study was expected, and serves as another example of the unreliable nature of self-report measures of socially sensitive issues.

The practical applications of research such as this have yet to be fully realized. Social cognition researchers theorize that affect and cognition interact at an implicit level, before explicit processing (Amodio, Harmon-Jones, & Devine, 2003). Further, research suggests that cognition is guided by preceding implicit affective processes (Zajonc, 1980). Therefore, it is likely that automatically activated race and ethnic biases affect behavior, contributing to discriminatory and prejudicial actions. Utilizing physiological measures to link affective processes to race and ethnic bias supports the theory that automatic affective reactions are an underlying cause of racial biases (Amodio et al., 2003; Mackie & Smith, 1998). However, it is paramount to consider that these are measures of attitudes, not prejudicial behavior. These methods can measure racial and ethnic bias, but not discrimination, which is an explicit behavior. Nonetheless, it is intuitive that implicit biases affect explicit behavior. For example, White negative attitudes toward Hispanics have been shown to have a negative effect on support for welfare, whereby more negative attitudes are predictive of less support (Fox, 2004); Hispanic criminals are seen to receive harsher sentences than either Whites or Blacks for similar crimes (Steffensmeier & Demuth, 2006); and Hispanics have less access to mortgages than Whites with similar credit histories (Ross & Yinger, 2002). These are just a few examples of overt representations of discrimination that most likely have implicit roots. Future research must work to establish the relationship between indirect

measures of racial/ethnic bias and overt behavior by examining the relationship between overt expressions of bias and indirect measures of bias.

Amodio et al. (2003) suggest that if research can successfully link physiology with automatic affective race bias, our understanding can move from mostly theoretical psychological models to the delineation of the neuroanatomical mechanisms underpinning bias. Amodio et al. (2003) further postulate that neural mechanisms of emotional learning may be the root cause of difficulty altering prejudicial attitudes. Specifically, the amygdala is known to have a large role in the learning of conditioned fear, whereby stimuli become associated with affective responses through experience (LaBar, Gatenby, Gore, LeDoux, & Phelps, 1998). To support this belief, they draw on the work of Rolls (2000), who demonstrated that plasticity at the amygdala-level requires a significant amount of time and reinforcement, in comparison to the prefrontal cortex, which alters rapidly in response to learning. Additionally, research has shown that the amygdala reacts to stimuli prior to the structures in the prefrontal cortex (LeDoux, 1996). The difficulty instigating plasticity at the amygdala level coupled with the amygdala's placement as first-responder to affectively salient stimuli indicate that unlearning prejudice will be difficult task. Devine et al. (2002) have suggested that unlearning prejudice on an affective level will involve replacing ingrained negative associations (i.e. stereotypes) with positive ones. Suggestions for how to do so are very much vague and theoretical, but Devine et al. (2002) suggest that through internalization of individual motivation to control prejudice, responses will be more effectively unbiased and self-determined. Amodio et al. (2003) built on this idea by suggesting that internalization through practice over time may cause an alteration in biased responses in individuals on a

deeper subcortical level, suggesting longitudinal startle eyeblink studies could index changes in affective responses over time. Though these hypotheses have not been empirically tested, they do suggest that effortful control of explicit behavior may be necessary to control bias until the bias is unlearned at a deeper implicit level.

Limitations and Future Directions

The present study assessed implicit and explicit bias among White females towards Hispanic males. There are a couple of limitations that must be considered when interpreting the results of this study. First and foremost, the subject cohort was exclusively female college students and exclusively male exemplars, potentially limiting the generalizability and applicability of these results. It is possible that there was an unaccounted for sex interaction whereby female participants were responding not only to the ethnicity of the prime but also the sex. Additionally, the images used as exemplars were photographs of Hispanic and White males taken from publicly available databases. However, these photos were not part of a previously standardized stimuli set (e.g., IAPS), and were therefore not rated for salience or arousal, which are known to influence startle responses. However, as all primes were adjusted for luminance and contrast, and were all of neutral facial expressions, salience and arousal are unlikely to have influenced the outcome.

However, despite its limitations, the present study demonstrates implicit bias towards Hispanics among the noted population. Future studies may be able to address the methodological limitations presented by using only female participants and male exemplars by using larger participant cohorts and mixed sex exemplars. Doing so would allow for the examination of sex by ethnicity interactions. Additionally, utilizing the

same techniques with a large set of mixed sex and mixed race exemplars could allow for the control of multiple influences. Furthermore, employing other indirect measures of bias (i.e. other sequential priming tasks), and physiological measures (i.e. fMRI or EEG) in conjunction with startle can further elucidate the processes underling the startle eyeblink and bias towards Hispanics. Combining these paradigms with measures of overt expressions of bias (i.e. a decision to hire or criminal sentencing task) could work to reveal the connection between implicit bias and explicit behavior.

Conclusion

Racial and ethnic bias continues to be a pervasive problem in the US. While Black/White race bias has been extensively studied, Hispanic/White ethnic bias has been largely overlooked. This study is the first to use startle eyeblink measures in conjunction with the IAT to study Hispanic/White ethnic bias. Hispanics are an undervalued population in the US, and are frequently stereotyped by Whites as violent. It was expected that this study could demonstrate negative implicit affective bias towards Hispanics through use of the startle paradigm. This hypothesis was supported, as the results of this study showed significant potentiation of eyeblink to Hispanic primes. Further, a negative automatic evaluative bias was found on the IAT measure. Contrary to expectations, there was no correlation found between startle eyeblink amplitudes and IAT response latencies, signifying the possibility that these two measures tap into different aspects of bias. Additionally, the lack of a predictive relationship between each indirect measure and the direct prejudice scale was indicative of the anticipated implicit-explicit dissociation. The goal of this study was to expand on and contribute to the small body of research on implicit bias against Hispanics in an effort to better understand the

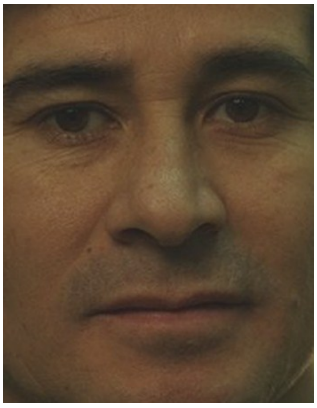
complexities of the mechanisms underlying racially and ethnically based bias. Taken as a whole, the results of this study suggest that implicit bias towards Hispanic can be measured using indirect measures, like the startle eyeblink. This study builds on previous work linking bias to affective processing at a basic level, extending previous startle studies by using Hispanic/White exemplars. While the use of exclusively female participants and male exemplars limits the generalizability of this study, the results presented herein effectively contribute to the body of research examining race and ethnic bias at the intersection of neurological, affective, and social implicit cognition. There is still much work yet to be done in terms of generalization of results to Hispanic/White prejudice, as well as other racial and ethnic groups. In order to combat discrimination against racial/ethnic minorities, researchers must continue to explore the social, psychological, and physiological etiologies of bias.

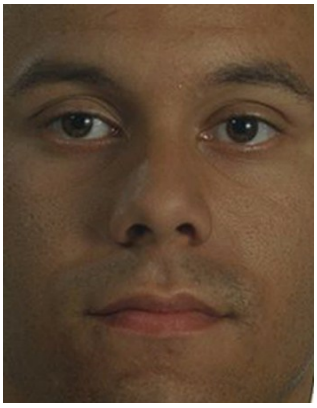
APPENDICES

Appendix I

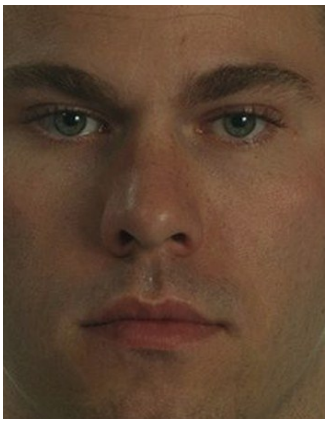
Sample stimuli

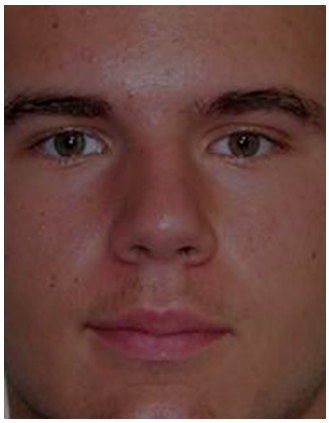
Hispanic:





White:





Appendix II

Pettigrew and Meertens Prejudice Scale
Taken from: Pettigrew, T., & Meertens, R. (1995) Subtle and blatant prejudice in western Europe. *European Journal of Social Psychology, 25,* 57-75

(please circle one)
Threat and Rejection Items (Blatant Prejudice)
1. Hispanics have jobs that Americans should have.

Strongly Disagree	Disagree	Agree	Strongly Agree

2. Most Hispanics living here who receive support from welfare could get along without it if they tried

Strongly Disagree	Disagree	Agree	Strongly Agree

3. Americans and Hispanics can never be really comfortable with each other, even if they are close friends.

Strongly Disagree	Disagree	Agree	Strongly Agree

4. Most Politicians in the US care too much about Hispanics and not enough about the average American person.

Strongly Disagree	Disagree	Agree	Strongly Agree

5. Hispanics come from less able races and this explains why they are not as well off as most Americans.

Strongly Disagree	Disagree	Agree	Strongly Agree

6. How different or similar do you think Hispanics living here are to other Americans like yourself – in how honest they are?

Very Similar	Somewhat Similar	Somewhat Different	Very Different

Intimacy Items (Blatant Prejudice)

7. Suppose that a (future) child of yours had children with a person of very different color and physical characteristics than your own. How do you think you would feel if your grandchildren did not physically resemble the people on your side of the family?

Not bothered at all	Bothered a little	Bothered	Very bothered

8. I would be willing to have a sexual relationship with a Hispanic person.

Strongly Agree	Agree	Disagree	Strongly Disagree

9. I would not mind if a suitably qualified Hispanic person was appointed as my boss.

Strongly Agree	Agree	Disagree	Strongly Disagree

10. I would not mind if a Hispanic person who had similar economic background a mine joined my close family by marriage.

Strongly Agree	Agree	Disagree	Strongly Disagree

Traditional Values Items (Subtle Prejudice)

11. Hispanic living here should not push themselves where they are not wanted.

Strongly Disagree	Disagree	Agree	Strongly Agree

12. Many other groups have come to the US and overcome prejudice and worked their way up. Hispanics should do the same without special favor.

Strongly Disagree	Disagree	Agree	Strongly Agree

13. It is just a matter of some people not trying hard enough. If Hispanics would only try harder they could be as well of as other Americans.

Strongly Disagree	Disagree	Agree	Strongly Agree

14. Hispanics living here teach their children values and skills different from those required to be successful in the US.

Strongly Disagree	Disagree	Agree	Strongly Agree

Cultural Differences Items (Subtle Prejudice)

15. How different or similar do you think Hispanics living here are to other Americans like yourself in the values that they teach to their children?

Very Similar	Somewhat Similar	Somewhat Different	Very Different

16. How different or similar do you think Hispanics living here are to other Americans like yourself in their religious beliefs and practices?

Very Similar	Somewhat Similar	Somewhat Different	Very Different

17. How different or similar do you think Hispanics living here are to other Americans like yourself in their sexual values or sexual practices?

Very Similar	Somewhat Similar	Somewhat Different	Very Different

18. How different or similar do you think Hispanics living here are to other Americans like yourself in the values in the language they speak?

Very Similar	Somewhat Similar	Somewhat Different	Very Different

Positive Emotions Items (Subtle Prejudice)

19. How often have you felt sympathy for Hispanics living here?

Very often	Fairly often	Not too often	Never

20. How often have you felt admiration for Hispanics living here?

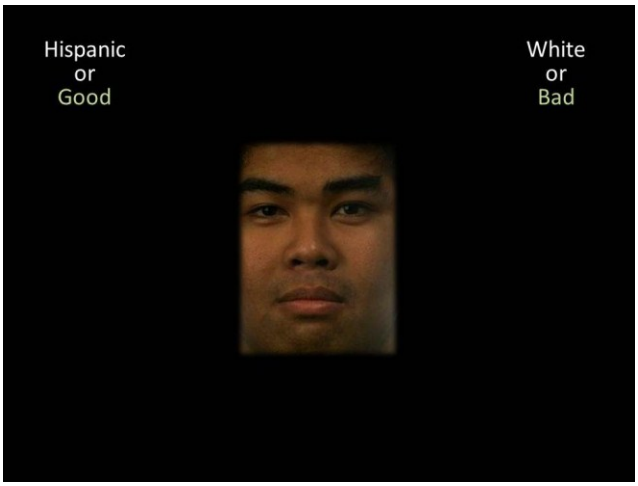
Very often	Fairly often	Not too often	Never

Appendix III

Instructions: In the next task, you will be presented with a set of words or images to classify into groups. Try to classify as quickly as you can without making mistakes. But, do not go too slow, as responses that are too slow are not interpretable. This part of the study will take about 15 minutes. The following is a list of labels that you will see as part of this task.

The slides presented here are indicative of slides that will be presented during test blocks 4 and 7 (as well as practice blocks 3 and 6). Practice blocks 1, 2, and 5 will show either race/ethnicity stimulus or valenced word stimulus. Stimulus categories are listed below.

Stimulus Categories
Good: Joy, Love, Peace, Wonderful, Pleasure, Glorious, Laughter, Happy, Beautiful, Fun
Bad: Agony, Terrible, Horrible, Nasty, Evil, Awful, Failure, Hurt, Disaster, Toxic
Hispanic: faces of Hispanics
White: faces of Whites



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