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THINKING, FEELING AND DISCRIMINATING:

THE ROLE OF PREJUDICE AS A MEDIATOR

BETWEEN STEREOTYPES AND DISCRIMINATION

by

JOHN PATRICK RYAN

Under the Direction of Eric J. Vanman

ABSTRACT

Relationships between implicit measures of stereotyping (using subliminal semantic priming) and implicit measures of prejudice (using facial electromyography) were examined in both Black and White participants. Race of the participant showed a trend towards moderating the relationship between priming bias scores and EMG bias to face stimuli and the relationship between priming bias scores and EMG bias. There were nonsignificant relationships between priming bias scores and differences in application ratings for Black and White applicants. The issue of statistical power is discussed as a possible explanation for nonsignificance.

INDEX WORDS: Prejudice, Social Psychology, Electromyography

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in the College of Arts and Sciences

Georgia State University

2006

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August 2006

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Introduction

When choosing job candidates, deciding among prospective students, or evaluating the abilities of an individual, most people hope that race is not a factor. Even in 2006, however, lawsuits are still being filed alleging that race played a factor in denying jobs to ethnic minorities. For over half a century, researchers have been interested in the thoughts and feelings that guide discriminatory behavior. Most commonly, this research has been aimed at measuring the attitudes of White participants and has attempted to predict behavior towards Black targets. Two main potential mechanisms guiding behavior have been identified: a cognitive component, consisting of stereotypes, and a negative emotional component, prejudice (Fiske, 1998).

Categorization, Stereotypes, Prejudice and Discrimination

When presented with any sort of stimulus, a natural response for humans is to categorize it based on its salient characteristics (Bruner, 1957). Allport (1954) proposed that this categorization process can be applied to social situations involving ethnicity and group membership. This process of perception and categorization occurs automatically (Bargh, 1989). Findings on the automaticity of race categorizations when viewing faces, however, have been mixed. Some research suggests that the categorization may be situation- and task-dependent

(Macrae, Bodenhausen, Milne, Thorne, & Castelli, 1997; Livingston and Brewer, 2002), whereas more recent work by Ito and Urland (2003), suggests that the brain may differentiate between ethnic and gender groups in early attentional processes, regardless of task. Using event-related potentials (ERPs), Ito and Urland showed that brain activity was able to differentiate between groups as early as 100 msec after stimulus presentation for racial categorizations, and 150 msec for gender categorization.

Upon assignment to a category (group), a stereotype about that group may become activated. This stereotype acts as a schema that organizes traits and associations one has with that group, and provides a theoretical framework for why the different traits are associated (Hilton & von Hippel, 1996). The activation of a stereotype from categorization may depend on conditions such as cognitive business (Gilbert & Hixon, 1991), low levels of prejudice (Lepore & Brown, 1997), the context in which information is presented (Wittenbrink, Judd, & Park, 2001), and mood (DeSterno, Dasgupta, Bartlett, & Cajdric, 2004).

The activation of a stereotype, however, does not necessarily imply an activation of prejudice (Lepore & Brown, 1999). Indeed, stereotypes, prejudice and discrimination are not perfectly correlated. Recent studies have shown that the emotions one has towards a particular group are a better predictor, relative to stereotypes, of future discriminatory behavior. In a meta-analysis of 23 studies, Dovidio et al. (1996) found that not only did prejudice correlate more strongly

with discrimination (r = .32) than did stereotypes (r = .16), but stereotypes and prejudice themselves were only moderately correlated (r = .25). More recent research by Stewart, Weeks, and Lupfer (2003) also suggests that this relationship between stereotypes and prejudice may be weaker than previously considered. In several experiments, participants completed several indices measuring spontaneous stereotyping (as indexed by item-memory for stereotypical words matched with Black or White faces) and prejudice (as indexed by the Modern Racism Scale and the Social Distance Scale). Stewarts, Weeks and Lupfer found that the correlation between stereotyping and prejudice was only r = .03. Most recently, work by Dolcos and McCarthy (2006) has shown that emotional processes can directly decrease cognitive performance through deactivation of neural areas critical to cognitive processing. This lends additional support to the hypothesis that it may be affect acting as a mediator between cognition and behavior. Specifically, this finding could potentially translate to prejudice (affect) mediating the relationship between stereotypes (cognitions) and discrimination (behavior).

Measurement Issues

Measuring stereotypes and prejudice is often not easy. One of the earliest and most direct ways to measure attitudes on racial issues was through self-report questionnaires. Over time, corresponding to changes in societal attitudes toward

prejudice, responses to questionnaires changed and more people reported less prejudiced attitudes. For example, the percentage of Whites reporting a willingness to vote for a Black President of the United States rose to 81% in 1983, up from only 37% in 1958 (Schuman, Steeh, & Bobo, 1985). Unfortunately, these changes in overt endorsement of more progressive racial attitudes do not appear to have been accompanied by a reduction of more subtle discriminatory behavior (Crosby, Bromley, & Saxe, 1980). In an attempt to understand the dissociation between overt endorsement of nonprejudiced attitudes and discriminatory behavior, researchers developed questionnaires that assessed Whites' views on social policy decisions (McConahay & Hough, 1976), ambivalence towards the issues facing African-Americans (Katz & Hass, 1988), and aversion to Whites' own prejudiced feelings (Gaertner & Dovidio, 1986).

By the end of the 1980s, the focus of social psychologists began to shift towards an attempt to monitor the automatic activation of stereotypes and prejudice in an effort to overcome the confound of social desirability. To measure stereotype activation, for example, Gilbert and Hixon (1991) used a word-fragment completion task with words commonly associated with Asians. The experimenters found an increase in fragments being completed with stereotypic Asian traits when an Asian research assistant (compared to a Caucasian) administered the experiment. Wittenbrink, Judd and Park (1997) used a subliminal priming paradigm to measure stereotype activation. They found that

White participants were facilitated in response time to positive traits that were primed with the word “White,” or negative traits that were primed with the word “Black.” Furthermore, the amount of facilitation was positively correlated with the scores of the participants on explicit questionnaires regarding prejudice. The priming method was later modified into a sequential priming task where it was shown that presentation of a Black photograph facilitates identification of a weapon, relative to a White photograph (Payne, 2001).

Recently, psychophysiological methods have come into use as a means to measure individuals’ affective responses to stimuli. One of the older psychophysiological methods developed to measure affect is facial electromyography (EMG). As humans smile or frown, distinct sets of muscles are activated in order to accomplish the movement. For smiling, one of the major muscle groups that are activated is the *zygomatic major* group that pulls the corner of the lip towards the ear. Frowning involves the *corrugator supercilii*, which furrows the brow, pulling the eyebrows together. Brown and Schwartz (1980) found that participants who imagined sad situations showed increased activation of the *corrugator* muscles whereas happy imagery activated the *zygomatic* group. These findings were extended to include reactions to visually presented stimuli intended to evoke positive or negative emotions (Cacioppo, Petty, Losch, & Kim, 1986). Vanman, Paul, Ito, and Miller (1997) expanded the use of EMG to socially relevant situations. White participants were asked to

imagine working with a partner of either the same race or a different race as they read various scenarios describing group projects. In some situations, the grade the participant would receive depended on the work of both team members. In other trials, the grade was independent of the other person's work. If the participant scored as highly prejudiced on previous surveys, EMG data showed bias against Blacks when imagining the group task. Facial EMG activity has predicted discriminatory behavior against Blacks by low-prejudiced Whites, as well (Vanman, Saltz, Nathan, & Warren, 2004). In separate testing sessions, participants first completed the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) and an application selection task involving applicants for a teaching fellowship, then a face-viewing task while EMG was recorded. The authors found that EMG bias (as indicated by *zygomaticus* activity) predicted bias against the outgroup applicant, but the applicant selection was unrelated to IAT bias.

Measuring discrimination has also had to assume a covert form in response to ethical considerations and issues of social desirability. Researchers have had to resort to measurement techniques such as seating distance (Hendricks & Bootzin, 1976), coding of videotaped interactions between White participants and Black experimenters (McConnell & Leibold, 2001), and selection of applicants for a teaching fellowship (Vanman et al., 2004).

Although there has been a significant amount of discussion and research on the creation and validation of implicit measurement methods for stereotypes, prejudice and discrimination, minimal research thus far has investigated the relationships between the three concepts with regard to their implicit measurement. Given the findings presented above, subliminal priming and facial EMG show promise as valid implicit measures of stereotypes and prejudice. The purpose of the current study is to begin an investigation of relationships between these implicit measures and discriminatory behavior. By examining the relationship between implicit measures of stereotyping, implicit measures of prejudice and discrimination we can begin to understand the constructs underlying the differences in behavior and the processes involved in discrimination based on ethnicity. For example, if we determine that prejudice serves as a mediator between stereotypes and discrimination, it would be most beneficial to target people's feelings about a particular group rather than change their cognitions. Conversely, if cognitions and affect both have a direct role in determining behavior, but as separate constructs, interventions can be designed to separately target cognitions and affect. Through understanding these processes, and the ways they influence each other, we will be able to develop more effective intervention strategies for reducing discriminatory behavior.

The present study examines relationship between stereotypes, prejudice and discrimination in African-American and White participants.

Implicit measures of prejudice and stereotyping are used to examine cognitions and affect, and participants complete an application-selection task to index discrimination based on race.

Method

Participants

One hundred fourteen participants were recruited from an introductory Psychology course in exchange for partial fulfillment of course credit. A total of 96 participants were female, of whom 42 identified themselves as African-American. Nineteen participants were male, of whom six identified as African-American. The remaining participants all identified themselves as "White with no Hispanic background."

Materials

Self-report Measures. Three folders containing modified application materials from graduate students applying for a teaching fellowship were used to measure discrimination. Application packets were identical to those used by Vanman et al. (2004). In that experiment, pilot testing of the materials showed the photographs to be of equivalent attractiveness and all materials were developed in that experiment to be rated equally in terms of qualifications for a graduate teaching fellowship. Application packets included a letter from a

professor, standardized test scores, and a history of teaching and class experience. In addition, each folder included a photograph of either a White or Black individual that was the same gender of the participant. Two photographs matched the race of the participants, and one folder had a photograph of a different race student. Photographs were counterbalanced across participants. Each application folder also contained a "Candidate Rating Survey," similar to that used by Dovidio and Gaertner (2000). A copy of the survey is shown in Appendix A. Participants completed the rating survey after looking over each of three applications.

Participants were presented with a questionnaire packet containing a demographic questionnaire, the Motivation to Control Prejudiced Reactions Scale (MCPRS; Dunton & Fazio, 1997), Internal and External Motivation to Control Prejudiced Reactions Scale (IMS/EMS; Plant & Devine, 1998), and The Social Distance Scale (Bogardus, 1933). Copies of all surveys are shown in Appendices B, C and D. The MCPRS was included to assess potential interactions between motivations for controlling prejudiced reactions and relationships between stereotypes, prejudice and discrimination. Similarly, the IMS and EMS scales were used to examine potential differences between high and low IMS (or EMS) individuals in how stereotypes and prejudice guided their behavior. The Social Distance Scale was included as a measure to predict people's behavior towards people of a different race in various social situations.

Priming. Stimulus presentation was performed using DirectRT software (Empirisoft, 2005) on a Dell desktop computer with flatscreen monitor. Primes consisted of color photographs of White men (n = 8) and Black men (n = 8). All photos were 1 cm x 1cm in size and 300 dots per inch resolution. The priming control stimulus was a scrambled black and white photograph of a house, identical to the masking stimulus. All primes were presented for 20 msec in the center of the computer screen, approximately sixty centimeters from the participant.

Target stimuli consisted of words that were reported by undergraduates of Georgia State University the previous year to be common stereotypes of White men and African-American men. A sample of the words is shown in Table 1. Words were gathered from lists in previous research (Stewart, Weeks, & Lupfer, 2003; Wittenbrink, Judd, & Park, 1997) and from suggestions from students working in the lab. Students enrolled in a previous semester participated in a separate experiment where they were presented with sentences such as "According to most people, what percentage of African-American men are _____?" The blank was filled in with one of the stereotype words and participants were asked to estimate percentages for each word. The decision was made to use these words as stereotypes in the current experiment because they would be more reflective of common stereotypes held by students who were participating in the experiment. Estimates were collected for African-American

men, African-American women, White men and White women in counterbalanced order. All words used in this experiment were estimated to be significantly higher for one race compared to the other with no interaction for gender. Targets were presented in size 20 font at the center of the screen and remained on the screen until the participant made a response. Participants were told they would see strings of letters and were instructed to indicate whether or not the letters composed a word (a lexical decision task).

Electromyography. Participants were shown photographs black and white photographs of African-American and White men. All photographs were 300x300 pixels in size with a resolution of 75 dots per inch. Photographs were shown individually on the screen for five seconds and followed by a rating scale that asked the participant to rate the general attractiveness of the individual in the picture. Ratings were made using a Likert-type scale (1 = very unattractive, 4 = neutral, 7 = very attractive). After making a rating, a 500 msec intertrial interval occurred.

EMG signals were relayed through a BioPac150CE wideband preamplifier/integrator using a pass band of 10 Hz to 5 kHz and amplified at a gain of 500. Data were collected on-line on a laboratory computer and digitized at a rate of 200 Hz. During the session, EMG signals were displayed in real-time on a computer screen and event-markers were automatically marked whenever a stimulus was shown to the participant. All data were stored on a hard disk.

Procedure

Upon arriving to the lab, participants completed an informed consent form explaining that they were taking part in a study aimed at "increasing our understanding of what kinds of thoughts people have as they see people from different ethnic racial groups." Participants were then presented with three application packets for a fictional teaching fellowship. They were told each packet contained a photograph of the applicant, a letter of recommendation and an information sheet. They were asked to look over each packet and complete the Candidate Rating Survey inside the folder with their opinions about the applicant. Upon completing the three rating surveys, they were told to fill out an attached questionnaire asking them to rank the applicants in order of preference for receiving the fellowship.

After completing the rating surveys, the experimenter removed the folders and the participant was given a packet of "social issues surveys." The packet included a demographics questionnaire, the Social Distance Scale, a "Personal Attitudes Questionnaire" (the Motivations to Control Prejudiced Reactions Scale) and a "Personal Motivations Survey" (the Internal and External Motivations Scales). The participant was also given a computer task and told the computer would show them the instructions for the task. Participants were told they would be seeing strings of letters and their task was to decide whether the letters

composed a word or not (a lexical decision task). The experimenter left the room and the participant completed the surveys and the word tasks.

After completing the questionnaires and lexical decision task, the experimenter returned and applied the EMG electrodes to the participant's forehead, right eyebrow and right cheek, corresponding to the *corrugator* and *zygomaticus major* regions, respectively, based on the guidelines of Fridlund and Cacioppo (1986). The skin at the application site of each electrode was cleaned with soap and water, alcohol and then lightly abraded. Electrodes were then attached and impedances were checked to ensure the impedance was less than 10 μOhms. The electrodes were allowed to stabilize for approximately two minutes, and then the participant began the memory task.

The participant was shown instructions on a computer screen informing them that they would be seeing photographs of people from a high school yearbook. They were then shown a rating scale and told they would be rating the faces on how attractive they were. Upon making a rating, there would be a short break and then the next face would come up. They were also told that in a later part of the experiment they would be tested for memory of the faces by being shown faces and saying whether the face was "old" or "new." This part of the task was added to get participants to pay attention to the photographs. The experimenter then left the room and the participant completed the task. EMG signals were collected and observed in real-time from an adjacent room.

After the task was completed, the participant was given another computer task, this time to ostensibly measure their memory for the faces they had just seen. The participant was told to press one key if the face was “old” (i.e., already seen) and another key if it was a “new” face. No EMG was recorded during this session. Stimuli were identical to those the participant had just seen (i.e., all were “old” faces) and consisted of 35 black-and-white photographs. The experimenter left the room and returned when the task was completed. EMG electrodes were then removed, the participant’s face was cleaned with a wet wipe and the participant was debriefed.

Results

Data Acquisition and Reduction

Self-report Measures. Items from the Candidate Rating Surveys were summed into a composite score such that a higher score corresponded to higher preference for the applicant. Applicant ratings were then recoded as “outgroup” or “ingroup” based on the race of the participant compared to the race of the applicant. Each participant rated two ingroup candidates (the same race as the participant) and one outgroup candidate (a different race from the participant). An average score was computed for outgroup ratings and a difference score was calculated by subtracting the total score for the outgroup from the total score for

the ingroup (such that more positive scores would indicate more discrimination against the outgroup candidate).

Priming. Data were examined for each participant, and all responses with a reaction time greater than 1500 msec were removed from the analysis (approximately 7% of the trials). This specific cutoff value has the effect of removing positively-skewed outliers that are present in reaction time data without a significant reduction in power (Ratcliff, 1993). Data were sorted by category (Black face – Black stereotype, White face – White stereotype, Black face – White Stereotype, White face – Black Stereotype, Mask – Black Stereotype, Mask – White Stereotype, nonword trials) and reaction times were averaged to compute a mean reaction time for each category. For each participant, mean reaction time to congruent stimuli (e.g., Black face – Black stereotype) was subtracted from the mean reaction time to control stimuli (house prime – Black stereotype) in order to control for word frequency and word length differences. This procedure is similar to that used by Wittenbrink, Judd and Park (1997), but deals with categories of stimuli rather than individual words. Thus, we were able to compute the amount of difference in reaction time caused by the priming-by-race-face alone. Priming bias scores were then computed by subtracting White difference scores (the amount of priming of White stereotypes by White faces) from Black difference scores (the amount of priming of Black stereotypes by Black faces). By computing scores in this manner, more negative scores were the result of stronger

White stereotypes (more priming of White stereotypes than Black stereotypes) and more positive scores were the result of stronger Black stereotypes (more priming of Black stereotypes than White).

Electromyography. When performing the EMG memory task, participants rated the photos for attractiveness. Average attractiveness ratings were computed for each stimulus and any stimulus with an attractiveness rating less than 3 or greater than 5 was removed from analysis (this resulted in the removal of six stimuli from the analysis). Thirteen white faces and sixteen black faces remained in the stimulus set.

Data were reduced using the Mindware EMG program (Mindware Technologies Ltd., 2006). Muscle activity was examined for the 5-second interval period while the stimulus was on the screen. Outliers (>15 μV) were recoded to equal 15 μV. This allowed us to keep the data in the distribution relative to all other data points, but without exerting undue influence on analyses. Trials were sorted by stimulus type (Black or White) and an average was computed for *zygomatic* and *corrugator* activity to each stimulus type. Difference scores were then computed by subtracting the mean activity to Black stimuli from the mean activity for White stimuli.

Memory Data. Because the memory task was used only in an attempt to get participants to pay attention to the stimuli, data from the memory task were

not analyzed. The task itself only included 38 target stimuli and zero distracter stimuli, which is not sufficient to detect memory effects.

Data Screening

Although 114 people participated in the experiment, due to the variety of measurements used, the number of participants included in each analysis varied. The application rating data from 13 participants were not included due to participants not completing the ratings in entirety. The *zygomatic* and *corrugator* activity were not included for six participants due to equipment failure. Priming bias scores were not included for two participants due to equipment failure.

Of the seven variables of interest, only priming bias scores and application difference scores were normally distributed. Three outliers (participants with data more than three standard deviations from the mean) were removed from *corrugator* difference scores and two outliers were removed from *zygomatic* difference scores. This had the effect of normalizing the distribution for EMG difference scores.

Race of the participant was contrast coded as +1 or -1. In order to explore the role of race as a potential mediator between the variables, priming bias scores, *corrugator* difference scores, *zygomatic* difference scores and application difference scores were all centered before proceeding with analyses (i.e., the mean of each variable was subtracted from each data point) to prevent effects of

multicollinearity. Relationships between all variables were investigated using hierarchical regression. The centered independent variable was entered in the first step, the centered race variable was entered in the second step, and the product of the IV and race variables was entered in the third step. R^2_{change} was then examined for each step to determine significance. For all analyses, alpha was .05 and two-tailed tests were used unless otherwise noted.

The mean of each variable split across the race of the participant is shown in Table 2. A correlation matrix of all variables regardless of participant race is shown in Table 3.

Relationships between priming and discrimination

Application Ratings. Previous research has shown a relationship between subliminal priming of race stereotypes and explicit questionnaire measures, such as the Modern Racism Scale. We were interested in seeing how priming bias scores relate to a "real-world" situation, such as selection of a job application. The relationship between priming bias scores and application discrimination is shown in Figure 1. Priming bias showed a trend towards application discrimination, $R^2_{change} = .02$, $p = .14$ with no interaction with the race of the participant, $R^2_{change} = .005$, $p = .46$. The direction of the relationship was such that higher priming bias scores (indicating stronger stereotypes of African-Americans than White Americans) were somewhat related to lower ratings for the

ingroup applicant. Specifically, for African-American participants, stronger stereotypes of African-Americans relative to stereotypes of Whites were related to increased preference for hiring the White candidate, but for White participants, stronger stereotypes of African-Americans relative to stereotypes of Whites were related to increased preference for hiring the African-American candidate.

Social Distance. In order to replicate previous research, we attempted to examine the relationship between priming bias scores and explicit questionnaire measures using the Social Distance Scale. Due to a ceiling effect of the social distance score data, there was significant negative skew. This skew remained after attempts at transformation using inverse, logarithmic and natural log transformations. Because of this skew, regression analyses would be inappropriate. Therefore, social distance ratings were analyzed using bivariate correlation. However, this had the effect of preventing examination of interactions with the race of the participant.

The data were split by race of the participant and then the data for African-Americans and Whites were examined separately. For White participants, priming bias scores predicted social distance ratings, $r(66) = -.22$, $p = .03$ (one-tailed). The social distance ratings were broken into two subscales (distance and intimacy) and the relationship between priming bias and social distance was present on the distance subscale, $r(66) = -.23$, $p = .03$ (one-tailed), but not intimacy, $r(66) = -.12$, $p = .17$ (one-tailed). These relationships ($r = -.22$ and $r = -$

.23) were both in the predicted direction such that higher priming bias scores (reflecting stronger stereotypes of African-Americans) were associated with lower social distance ratings (reflecting less willingness to engage with African-Americans). For African-American participants, there was no relationship between priming bias scores and social distance ratings, r(48) = -.09, p = .52 (two-tailed).

Relationships between priming and electromyography

One of the goals of the present study was to examine relationships between implicit measurements of stereotypes (using subliminal priming) and implicit measurements of prejudice. In order to measure prejudice, facial EMG was monitored while participants viewed photographs of Black and White men. Mean voltages for *zygomatic* and *corrugator* activity were transformed into difference scores (activity to White stimuli – activity to Black stimuli). These difference scores were then centered and regressed onto priming bias scores. Priming bias scores failed to predict differences in *zygomatic* activity (n = 106, R^2_{change} = .001, p = .80) or *corrugator activity* (n = 105, R^2_{change} = .000, p = .82). However, there was a trend towards a significant interaction with the race of the participant for both *zygomatic* (R^2_{change} = .03, p = .09) and *corrugator* activity (R^2_{change} = .03, p = .06).

In order to examine the nature of these suggested interactions, simple slopes of each group (Black or White participants) were examined. Race was

recoded into dummy codes, first such that Black = 0 and White = 1. Hierarchical regression was re-run and the *b* for the bias term was examined. For African-American participants, priming bias scores failed to predict *zygomatic* difference scores, b = 9.065 x 10-4, t (103) = 1.14, p = .26, and priming bias scores failed to predict *corrugator* difference scores, b = 5.14 x 10-4, t (102) = 1.24, p = .21 (Figure 2). For White participants, priming bias scores failed to predict *zygomatic* difference scores, b = -9.51 x 10-4, t (103) = 1.14, p = .19, and failed to predict *corrugator* difference scores, b = -5.30 x 10-4, t (102) = -1.42, p = .16 (Figure 3).

Relationships between electromyography and discrimination

Application difference scores. To examine the relationship between implicit measures of prejudice and explicit measures of discrimination, we examined the relationship between facial EMG and questionnaire ratings of the fellowship applicants. Application difference scores were first regressed on *zygomatic* difference scores and no significant relationship was found, R^2_{change} = .001, p = .78, and there was no interaction with the race of the participant, R^2_{change} = .02, p = .15. Application difference scores were then regressed on *corrugator* difference scores and again no significant relationship was found, R^2_{change} = .000, p = .93. Again there was no interaction with the race of the participant, R^2_{change} = .007, p = .41.

Social Distance Ratings. Again, as mentioned above, the amount of skew in the social distance ratings prohibited the use of regression analyses. Thus, data

were split by race of the participant and bivariate correlations were calculated between social distance scores and electromyography difference scores. For African-American participants, there was no relationship between *zygomatic* difference scores and the social distance ratings, $r(45) = .17$, $p = .26$ (two tailed). Similarly, there was no relationship between *corrugator* difference scores and the social distance ratings, $r(44) = .07$, $p = .67$ (two tailed). For White participants, again there was no relationship between *zygomatic* difference scores and social distance ratings, $r(62) = .06$, $p = .66$ (two tailed) or between *corrugator* difference scores and social distance ratings, $r(62) = -.127$, $p = .33$ (two tailed).

Discussion

Priming bias scores were generally (although nonsignificantly) associated with application rating scores such that stronger stereotypes of Blacks resulted in lower ratings of the ingroup candidate – regardless of the race of the participant. Priming bias was also significantly associated with the Social Distance Scale ratings for Whites, but failed to predict Social Distance ratings for African-American participants. With regard to the implicit measures of prejudice, the relationship between priming bias scores and *corrugator* activity showed a trend towards being moderated by the race of the participant: for White participants, stronger stereotypic associations of Blacks relative to Whites were associated with increased *corrugator* activity to Black faces; for African-American participants,

stronger stereotypic associations of Blacks relative to Whites were associated with increased *corrugator* activity to White faces.

Unfortunately, none of the implicit measures of prejudice were significantly related to the application ratings or the Social Distance ratings. Although many trends were found between the various measures of the three variables, the lack of significant relationships between priming bias scores and discrimination measures prevented the use of mediation techniques to examine the relationship between the three constructs. This discussion will therefore focus on the trends in the relationships between the three constructs and possible explanations for a lack of significant findings.

Priming bias scores did predict discrimination for White participants, as measured by the Social Distance Scale, such that more positive priming bias scores (indicating stronger stereotypes of African-Americans than Whites) were associated with less willingness to associate with members of the outgroup. This finding is consistent with the hypothesis that stronger stereotypes of the outgroup should result in less willingness to interact with the outgroup. This finding replicates the relationship between priming and explicit measures of prejudice found by Wittenbrink et al. (1997), this time using the Social Distance Scale.

Zygomaticus bias also predicted Social Distance ratings, but only on the distance subset (e.g., “I would be willing to have a White (Black) person as a roommate”) of the scale. This relationship was such that more activity to White

stimuli than Black stimuli was associated with a decrease in willingness to interact with members of a different race. This relationship is what was predicted for White participants. But again there was no interaction with the race of the participant – African-Americans who showed more cheek activity towards Whites were less willing to interact with Whites, which is the inverse of what would be predicted.

Finally, priming bias scores significantly interacted with the race of the participant when predicting *corrugator* bias. For White participants, the nature of the relationship was consistent with predictions: stronger stereotypes of African-Americans resulted in more brow activity to Black stimuli. However, African-American participants showed the opposite result: stronger stereotypes of Whites than Blacks resulted in more brow activity to Black stimuli.

The relationships between priming and discrimination, priming and prejudice, and prejudice and discrimination were all nonsignificant, with the exception of the relationship between *zygomatic* activity and the distance subscale of the Social Distance scale and priming bias scores predicting social distance ratings for White participants. This general lack of relationship may have been due to several issues. For the remainder of the discussion, I will offer several *post hoc* explanations for potential reasons for nonsignificance.

The first issue is statistical power. The relationship between priming bias and discrimination (as measured by the social distance scale) has the same effect

size as is reported by Dovidio (1996) with r = .16. However, according to Cohen (1988), with 115 participants there is approximately a 67% chance of detecting an effect. In order to detect a significant effect, approximately 40 more participants would need to be run.

A second issue may be related to the experimental context. For all participants, the experimenter was a White male. For White participants, this resulted in an ingroup interaction that may have not caused anxiety or hesitation to report beliefs about a sensitive topic such as race. However, for African-American participants, this resulted in an interaction with an outgroup member that may have resulted in some level of stereotype threat (Steele, 1997) for the participant. Stereotype threat theory posits that in situations that may be considered indicative of one's intellectual performance, if the participant is the member of a group that is stereotypically "low performing," the awareness of this stereotype can itself inhibit the performance of the participant in the experimental task. In the present experiment, participants were asked to identify whether or not strings of letters comprised words. Many of the nonwords were phonologically plausible which did cause confusion among some participants – some felt that the nonwords may have been words they just did not know. In the EMG portion of the experiment, the participants were led to believe the test was examining memory abilities – a task many people believe to be indicative of their intellect.

In fact, simply having a White individual as the experimenter can significantly decrease the performance of Black participants compared to when they have a member of their own group administer the test (Marx & Goff, 2005). For the present results, a more detailed experimental design would be required to test this hypothesis explicitly that stereotype threat was the cause of the counter-intuitive performance of African-American participants. Other studies have shown that implicit measures can be sensitive to experimental context. When White participants interact with a Black experimenter, automatic bias (as measured by the IAT) is reduced (Lowery, Hardin, & Sinclair, 2001). I am not aware of studies that have replicated this effect in Black participants (interacting with a White experimenter). Similarly, automatic racial prejudice (again measured by the IAT) is sensitive to anticipation of interacting with a member of an outgroup (Richeson & Ambady, 2002).

Recently, work by Cohen and Garcia (2005) has examined the role of "collective threat" in minority students. They found that poor performance by an ingroup member on a stereotype-relevant task resulted in lowered self-esteem of the participant. In the present study, all participants completed the stereotype-priming task before completing the supposed memory task. It is possible that the priming of negative ingroup stereotypes resulted in a more negative feeling toward the minority participants' ingroup that confounded their electomyographic

responses. Again, this hypothesis is beyond the scope of this experiment and would need to be independently investigated.

The findings of social psychology of stigma may also lend some explanations for the differences in relationships between Black and White participants. Stigma occurs when an individual is “marked” by the surrounding culture resulting in the individual being the victim of negative stereotypes and excluded from obtaining resources. To be classified as “stigma,” the individual must have less power than the surrounding social structure (Major & O’Brien, 2005). In the experimental context, being a member of a stigmatized group can have unique effects on performance. The negative stereotypes of the stigmatized group are more accessible due to their self-relevance for the stigmatized individuals (Shih et al., 2002) and situations that activate these negative stereotypes for the stigmatized group can even enhance performance for nonstigmatized individuals in the same situation (Walton & Cohen, 2003).

The effects of this stigmatization can directly impact the emotions and cognitions of the participants, even when the stimuli that may induce the activation of negative stereotypes are presented subliminally (Winkielman & Berridge, 2004). In the present study, it is therefore possible that for stigmatized participants (i.e., African-American participants who are the lower-status members in American culture), completing the subliminal priming task activated negative stereotypes. This may have resulted in lowered collective self-esteem

(Crocker & Major, 1989) that would then possibly have confounded the relationship between stereotypes, as measured by the subliminal priming, and prejudice. White participants, being the group in power, would not be as prone to these effects due to less accessibility and self-identification with the stereotypes activated in the priming task. In short, African-American participants were in effect possibly subjected to a much different experimental experience than White participants, thus resulting in the significant interactions with race of the participant.

Postmes and Branscombe (2002) have formulated a new theory examining how the environment surrounding a minority group can influence the attitudes of that group. This model, "The Rejection-Identification Model," predicts that when minority-group members (specifically African-Americans) are integrated into society where they are the minority, this integration can result in lowered self-esteem and less identification with their in-group. In the context of the present experiment, we could be picking up on this effect with African-American participants showing increased *corrugator* activity when they possessed stronger stereotypes of Whites. The university where this study was conducted may be less prone to these rejection-identification effects due to the relative integration of the Atlanta metropolitan area. However, Blacks are still the minority at the university, comprising 31% of the incoming freshman class (compared to 48% of the students who identify as White). Although data were not explicitly gathered

from participants in this experiment regarding the environment in which they were raised, data are available on the students of the university. For the 2004 freshman class (2 years prior to the students in this experiment), 80% of students are within 50 miles of "home" – covering the greater Atlanta metropolitan area (Office of Institutional Research, 2006). The metro area is segregated or integrated depending on the county with some counties being half Black and half White while others being 95% White. However, it should be noted that the relationship between priming bias and EMG activity to Black faces for African-American participants is only a trend and is nonsignificant. In order to make more definitive conclusions regarding the role rejection-identification may play with these participants, more demographic data would need to be directly collected regarding their environmental background and current living and social situations.

The experimental context may have also influenced the participants' responses on the questionnaires. The ceiling effect and lack of variance in responses prevented the use of regression in analyzing the relationship between priming bias, EMG bias and social distance scores. The cause of this extreme-responding effect is unclear, but previous studies have found a tendency for using the high (or low) responses on Likert-type scales by African-Americans (Bachman & O'Malley, 1984).

The shortcomings of the experiment could be addressed in a future study. First, creating a longer break between the priming task and the EMG task could reduce the effects of priming negative stereotypes and affecting the affect of African-American participants. Although this was attempted in a first run of the experiment by having participants complete the two tasks in separate sessions, that procedure was not practical due to significant participant withdrawal from the experiment (less than 10% of participants expressed interest in participating in another experiment for credit, mainly due to the lack of credits needed to complete course requirements). An unrelated task could be interposed between the priming and EMG task to decrease the level of stereotype activation and decrease carryover effects.

Second, the use of an African-American experimenter for Black participants could reduce any confounds of having an outgroup member administering the experiment. Similarly, participants should complete all surveys and demographic information either in a separate session, possibly at the beginning of the semester, or after having completed the priming and EMG tasks. This would eliminate any possible confounds involving stereotype threat.

Finally, simply running more participants would garner sufficient power to detect any effects (small as they may be) in the data. Due to the lack of power, the lack of significant results is not surprising, but the ability to continue collecting data in coming semesters will remedy this issue. However, this

experiment has been important in two respects: First, this is the first experiment to use subliminally presented faces as primes for stereotype target words. Although the effects were nonsignificant, further research should be pursued using these ecologically-relevant stimuli (faces) and examining their promise as markers of stereotype activation. Second, this experiment is one of a few that have examined the relationship between stereotypes and prejudice in African-American participants. In future experiments, it will be essential to begin collecting demographic information regarding the social context to begin to understand the variation in participants' experiences with their cultural context.

Although this experiment has not been definitive on the role of emotion as a mediator between cognitions and behavior, the trends for White participants are in the hypothesized direction. The interaction with participant race not only suggests some shortcomings in experimental design, but hints at potential follow-up experiments that can further elucidate the relationship between priming, negative stereotypes, stereotype threat and affect. For example, collective self-esteem of African-American participants could be playing a role in EMG activity when viewing faces of their own race versus faces of another race.

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Appendix A

Tables

Table 1

List of Stereotype Words. Asterisks indicate words taken from Wittenbrink, Judd and Park (1997) that were not reported by GSU students.

Stereotypes of Whites	Stereotypes of Blacks
Dull	Loud
Frail	Tough
Stuffy	Bitter
Boring	Poor*
Spoiled	Hostile
Boastful*	Agitated
Stubborn*	Criminal
Sheltered*	Dangerous*
Uptight*	Ignorant*
Selfish*	Reckless*
Uncoordinated	Illiterate
Conservative	Unintelligent

Table 2

Means and standard deviations of each priming category, split by race of the participant (msec).

Prime	White	Black	Control	Black	White	Control
Stereotype	White	White	White	Black	Black	Black
Race of Participant						
White	692.89	696.59	682.04	679.82	687.08	685.73
(Standard Deviation)	(94.48)	(102.98)	(77.46)	(87.81)	(89.52)	(104.17)
African-American	695.97	706.54	693.89	676.13	680.83	687.71
(Standard Deviation)	(110.69)	(129.01)	(115.79)	(101.98)	(105.79)	(107.40)

Table 3

Means of all variables, split by race of participant

Race of Participant	Priming Bias	Zygomatic Bias	Corrugator Bias	Application Bias	Social Distance
Black	13.67	-.2544	.0171	.7667	81.52
(Standard Deviation)	(119.41)	(.66)	(.31)	(4.83)	(13.40)
White	16.76	-.0568	.0001	-.2759	84.68
(Standard Deviation)	(92.52)	(.53)	(.26)	(5.43)	(13.34)

Table 4

Correlation matrix of all dependent variables for all participants

	Priming Bias	Corrugator Bias	Zygomatic Bias	Social Distance
Priming Bias				
Corrugator Bias	-.014			
Zygomatic Bias	.002	-.027		
Social Distance	-.156	-.053	.124	
Application Difference	-.176	-.025	-.119	.0

Appendix B

Figures

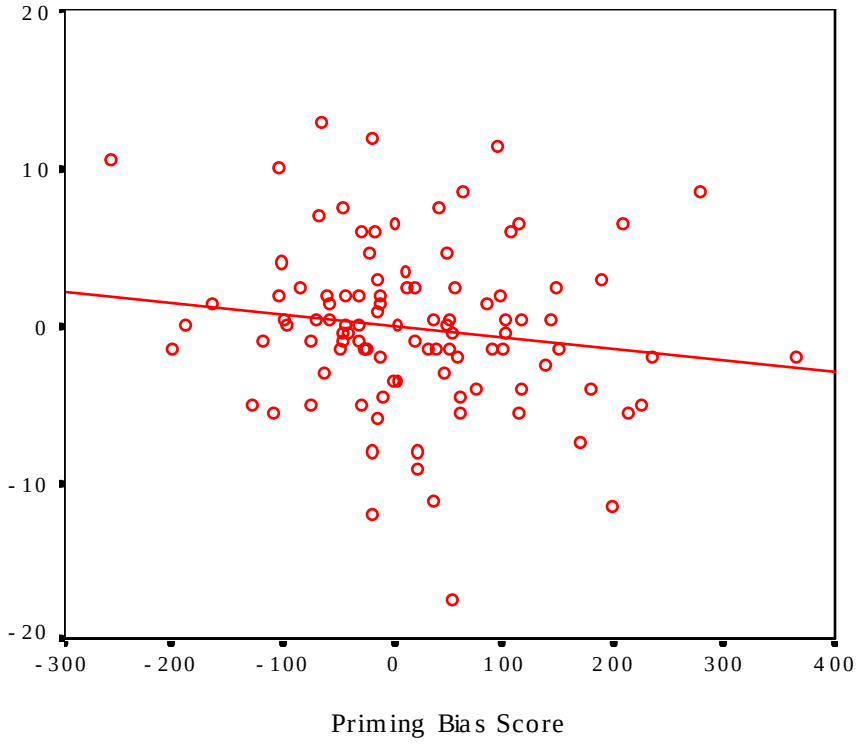

Figure 1 – The relationship between priming bias scores and application differences. There is a nonsignificant trend (p = .14) such that stronger stereotypes of African-Americans tend to be associated with lower ratings of the ingroup job applicant, regardless of the race of the subject.

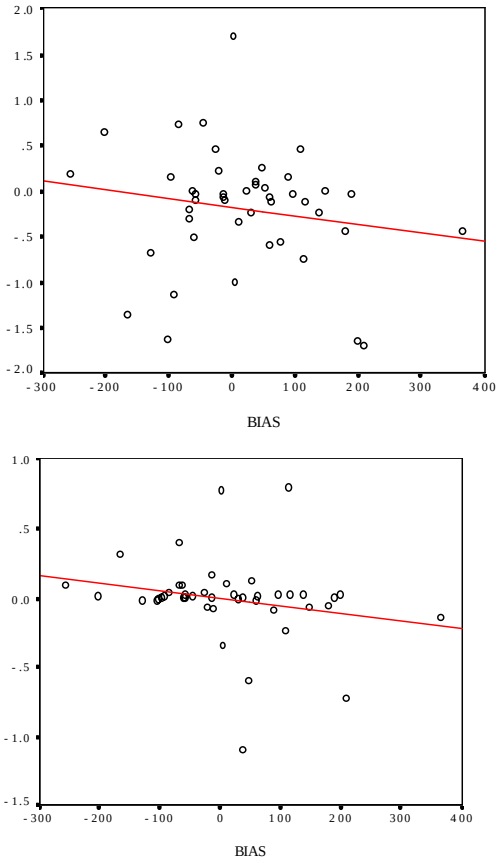

Figure 2 – Priming bias scores fail to predict *zygomatic* (p = .26) and *corrugator* (p = .21) differences for African-American Participants.

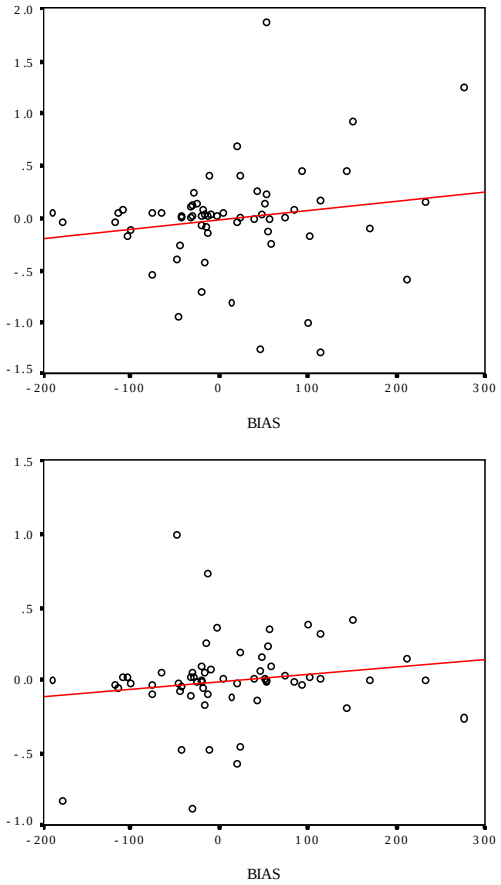

Figure 3 – Priming bias scores fail to predict *zygomatic* (p = .19) and *corrugator* (p = .16) differences for White participants.

Appendix C

Candidate Rating Questionnaire

Please circle one response for each question that most closely relates your feelings.

This candidate is competent to fulfill academic responsibilities.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This person would work well with others.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This candidate is qualified to be a good student.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This candidate's academic experience is sufficient for this job.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This candidate would do a good job.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This individual has good leadership characteristics.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This applicant has the potential for academic success.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This candidate has the ability to solve problems when they arise.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This person seems responsible.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This applicant would generate progressive ideas and make the classroom a better place.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

This person could not be an effective student.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

I would prefer to hire a more highly qualified applicant.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

I would hire this individual.

1	2	3	4	5	6
strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree

Appendix D

Motivations to Control Prejudiced Reactions Scale

Directions: For each statement below, write a number in the blank that indicates the extent to which you agree or disagree with the statement. Please answer honestly, remembering that your answers will be kept confidential. Please use the following scale:

-3……-2……-1……0……+1……+2…….+3

strongly strongly

disagree agree

_____ 1. In today's society it is important that one not be perceived as prejudiced in any manner.

_____ 2. I always express my thoughts and feelings, regardless of how controversial they might be.

_____ 3. I get angry with myself when I have a thought or feeling that might be considered prejudiced.

_____ 4. If I were participating in a class discussion and a student of another race expressed an opinion with which I disagreed, I would be hesitant to express my own viewpoint.

_____ 5. Going through life worrying about whether you might offend someone is just more trouble than it's worth.

_____ 6. It's important to me that other people not think I'm prejudiced.

_____ 7. I feel it's important to behave according to society's standards.

_____ 8. I'm careful not to offend my friends, but I don't worry about people I don't know or don't like.

_____ 9. I think that it is important to speak one's mind rather than to worry about offending someone.

_____ 10. It's never acceptable to express one's prejudices.

_____ 11. I feel guilty when I have a negative thought or feeling about a person of a different race.

_____ 12. When speaking to a person of a different race, it's important to me that he/she not think I'm prejudiced.

_____ 13. It bothers me a great deal when I think I've offended someone, so I'm always careful to consider other people's feelings.

_____ 14. If I have a prejudiced thought or feeling, I keep it to myself.

_____ 15. I would never tell jokes that might offend others.

_____ 16. I'm not afraid to tell others what I think, even when I know they disagree with me.

_____ 17. If someone who made me uncomfortable sat next to me on a bus, I would not hesitate to move to another seat

Note: The questionnaire was presented to participants titled "Personal Attitudes Survey."

Appendix E

Social Distance Scale

The following questions ask about your perception of White Americans. You may have to put yourself in different roles for some of the items (i.e., parent, spouse). Please rate the following statement with each word listed below, using the 1-9 scale, 1=strongly disagree to 9=strongly agree.

I would be willing to have a White American person as my:

	STRONGLY DISAGREE						STRONGLY AGREE
Good Friend	1	2	3	4	5	6	7
Next Door Neighbor	1	2	3	4	5	6	7
Co-worker	1	2	3	4	5	6	7
Roommate	1	2	3	4	5	6	7
Child's Friend	1	2	3	4	5	6	7
Sibling's spouse	1	2	3	4	5	6	7
Romantic Date	1	2	3	4	5	6	7
Family physician	1	2	3	4	5	6	7
U.S. President	1	2	3	4	5	6	7
Governor	1	2	3	4	5	6	7
Wife or Husband	1	2	3	4	5	6	7
Child's teacher	1	2	3	4	5	6	7
Dance partner	1	2	3	4	5	6	7
Fellow church or Social club member	1	2	3	4	5	6	7

Appendix F

Internal and External Motivations to Control Prejudiced Reactions Scale

Instructions: The following questions concern various reasons or motivations people might have for trying to respond in nonprejudiced ways toward people of a different race. Some of the reasons reflect internal-personal motivations whereas others reflect more external-social motivations. Of course, people may be motivated for both internal and external reasons; we want to emphasize that neither type of motivation is by definition better than the other. In addition, we want to be clear that we are not evaluating you or your individual responses. All your responses will be completely confidential. We are simply trying to get an idea of the types of motivations that students in general have for responding in nonprejudiced ways. If we are to learn anything useful, it is important that you respond to each of the questions openly and honestly. Please give your response according to the scale below.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

Internal Motivation Items

I attempt to act in nonprejudiced ways toward people of a different race because it is personally important to me.

1 2 3 4 5 6 7 8 9

According to my personal values, using stereotypes about people of a different race is OK.

1 2 3 4 5 6 7 8 9

I am personally motivated by my beliefs to be nonprejudiced toward people of a different race.

1 2 3 4 5 6 7 8 9

Because of my personal values, I believe that using stereotypes about people of a different race is wrong.

1 2 3 4 5 6 7 8 9

Being nonprejudiced toward people of a different race is important to my self-concept.

1 2 3 4 5 6 7 8 9

External Motivation Items

Because of today's PC (politically correct) standards I try to appear nonprejudiced toward people of a different race.

1 2 3 4 5 6 7 8 9

I try to hide any negative thoughts about people of a different race in order to avoid negative reactions from others.

1 2 3 4 5 6 7 8 9

If I acted prejudiced toward people of a different race, I would be concerned that others would be angry with me.

1 2 3 4 5 6 7 8 9

I attempt to appear nonprejudiced toward people of a different race in order to avoid disapproval from others.

1 2 3 4 5 6 7 8 9

I try to act nonprejudiced toward people of a different race because of pressure from others.

1 2 3 4 5 6 7 8 9

Note: Participants were given the IMS and EMS items mixed together. The questionnaire was labeled “Personal Motivations Scale” for participants.