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Altering Frequency Estimates of Hindsight Bias in Others Via Stereotyping: Asians as a Model Minority

The role racial stereotypes play in influencing attributions of hindsight bias in others was investigated. White college students made frequency estimates of hindsight bias for 1 of 3 different ethnic groups—Asians, Blacks, and Whites—with regard to a sporting event. The bias was estimated to be less for Asians than for both Whites and Blacks, with no significant difference between the latter two groups. Consistent with earlier research, this outcome supported the notion of positive stereotyping being linked to Asians; the negative stereotyping ascribed to Blacks was unsubstantiated. Future research should be aimed at the social psychology of hindsight bias, because overestimating its presence in others may lead us to minimize its prominence in our everyday thinking.

From the social cognitive perspective, stereotypes are beliefs we have about individuals as members of a group (Macrae, Stangor, & Hewstone, 1992). They are cognitive structures that have a major impact on perception, attention, and memory and facilitate the information processing involved in person perception, which results in positive or negative attributes (Dovidio, Evans, & Tyler, 1986).

To accommodate all the information about the many people we encounter every day, we categorize the information, which simplifies our processing task. Stereotyping is one way we do that. This social categorization can be derived from people's desire to evaluate themselves positively; therefore, they are motivated to see their own group as different from and perhaps better than other social groups (Hamilton & Sherman, 1994).

Stereotyping is a cognitive process that seems to happen automatically (Dovidio et al., 1986). Prior exposure to stimuli, such as people, ideas, or even mere words, influences the perceivers' interpretation of new information. Dovidio et al. (1986) used a priming technique to examine the role of stereotypes in social cognition. They found that when White participants were presented a single word, either a "Black" or "White" prime, they altered their responding to stereotypic traits pertaining to social judgments of Black and White individuals.

Several researchers (Chan, 1991; Oyserman & Sakamoto, 1997; Sue & Kitano, 1973) have reported that Asian Americans are generally seen as being smart, intelligent, competitive, and diligent. Other positive...
attributes include studious, hard working, modest, and quiet. They are portrayed positively as the “model minority.”

Black stereotypes are more negative than stereotypes linked to Asians and Whites. On the other hand, Blacks are described more negatively than Asians (Sears, Citrin, & Laar, 1995). Blacks are often considered violent, lazy, loud, and welfare-dependent (Sigelman & Tuch, 1997). Many believe that Blacks are more aggressive and outgoing than Whites and Asians (Rushton, 1999). These positive or negative stereotypes may bias judgments about other social groups on the basis of race.

Another identified form of bias is the hindsight bias consequence, the “knew-it-all-along” effect. This bias is characterized by individuals who exaggerate what could have been predicted in foresight. For example, after the most recent presidential election, individuals were heard proclaiming that “they knew” that George W. Bush would make it to the White House. This tendency to believe that an individual would have predicted Bush’s victory is an example of hindsight bias. Synodinos (1986) used a 1982 gubernatorial election to show that the postelection judgment of individuals for the winner was higher than those made prior to the election. Once individuals know an outcome of an event, they tend to try to explain and make sense of the situation. “Making sense” out of being told the outcome is so natural that individuals may be unaware that the outcome knowledge has biased their judgment (Fischhoff, 1977). Hindsight bias, much like stereotypes, seems to happen automatically.

Researchers have examined how stereotyping strengthens or mitigates hindsight bias. Carli (1999) found that for either a positive outcome (marriage) or negative outcome (rape), hindsight bias was increased by the addition of stereotypically antecedent details relevant to each outcome but not actually in the story. Bodenhausen (1990) utilized a criminal assault or sexual harassment/molestation scenario and found that individuals exhibited hindsight bias for judgments about a nonstereotypic but not a stereotypic offender. Evidently, in the latter instance, the outcome information contradicted the stereotype associated with the offender. These studies draw attention to the role of stereotyping in the production of hindsight bias and to other aspects of a social nature important for the biases of stereotyping and hindsight.

Our decision-making and social strategies may be influenced greatly by how well we judge others’ attitudes and beliefs. For example, it seems likely that many of us avoid others who engage in extensive hindsight bias when they speak about a variety of daily outcomes ranging from sports scores to stock market prices as if they “knew-it-all-along” (Moodie-Dyer, Hom, & Wright 1999).

Related to our judgments of others is the notion of self-serving bias. Feldman (1995) found that people rated themselves higher on positive qualities, such as being responsible, interesting, and bright, but significantly lower on negative aspects, such as being cruel and snobbish. When making judgments about others, the negative qualities were much higher. We overestimate the accuracy of our judgments and underestimate the degree to which others share our skills and positive attributes. Negative behaviors seem to be more prevalent in others than in us. Thus individuals should be more likely to claim that they exhibit hindsight bias less often than others.

Self-serving bias may lead us to believe that others exhibit both hindsight bias and stereotyping more frequently than we do. In support of this view, Hass, Katz, Rizzo, Bailey, and Moore (1992) found that some individuals shield their self-image by claiming they are not as biased as others.

Moodie-Dyer et al. (1999) investigated the role of positive/negative racial stereotypes for judgments about hindsight bias frequency in others on the basis of race. White college participants were read a definition of hindsight bias and given an example of baseball player Mark McGwire displaying the bias. This study was conducted immediately after McGwire’s historic home-run feat. Students made judgments about how often they thought that Asian, Black, or White groups show hindsight bias while watching a sporting event.

Participants were cued about race on the basis of a single-word label, which should be subtler than the use of stronger cues such as making judgments about the characteristics of the specific race. This approach allowed for the detection of stereotyping in White individuals who view themselves as being essentially non-prejudiced (Hass et al., 1992). The participants also made judgments about how much these targeted racial groups would consider Mark McGwire as likeable or conceited on the basis of his hindsight bias exclamations that he knew he would hit the winning home run.

Moodie-Dyer et al. (1999) anticipated that hindsight bias frequency judgments would be lower for Asians and higher for Blacks when compared to Whites. This expectation was based on the positive stereotypes linked to Asians and the negative stereotypes associated with Blacks.

The results showed that hindsight bias frequency was thought to be greater for Whites than for Asian and Blacks, with no significant difference between the latter groups. This finding, however, occurred with women but not with men. For the likeability and con-
ALTERING FREQUENCY ESTIMATES OF HINDSIGHT BIAS • Wright and Horn

c dit measures there was no interaction with gender. These findings were consistent with the notion that the positive stereotype of Asians being a model minority resulted in Asians being seen as less likely to engage in hindsight bias. Contrary to the predictions, the estimates for Black populations were the same as for Asians and less than for Whites.

Nearly every participant responded to an open-ended question for Blacks but not for the other racial groupings. These responses were mainly of a racial nature such as "every race has the same opinions" and "color doesn't matter in relation to personality and talent." It is possible that the participants, particularly the women, were exhibiting compensatory bias in their hindsight frequency ratings. They may have attempted to deal with the emotional aspects of the stereotypes by hiding their views or compensating for them, which could have accounted for the difference between Whites and Blacks.

The current study further examined the role of stereotyping in making hindsight bias frequency judgments about other ethnic groups by altering procedures from the earlier work by Moodie-Dyer et al. (1999) in three ways. First, the athlete was changed from a specific individual (Mark McGwire) to a more generic one: a baseball player. Because the earlier findings noted for gender may be due to the fame and popularity of Mark McGwire, use of a more generic baseball player would thus extend the generality of the earlier study. Second, college students were told that their responses should be based on the views of their peers rather than on their own beliefs. This method was designed to minimize the possible role of compensatory bias. And third, an assessment of the participants' understanding of hindsight bias was included. If participants failed to grasp the notion of hindsight bias, then they could not be expected to make reliable judgments about its frequency in other racial groups.

Like the earlier study by Moodie-Dyer et al. (1999), a brief survey instrument using only a single-item measure of the key dependent variable, hindsight bias frequency, was used because of time constraints. Because this approach is not as convincing as a multiple-item approach, it is important to be able to assess the reliability of the earlier findings with the single-item measure.

The investigation was designed primarily to replicate the earlier supportive findings of a positive stereotype being associated with Asians when compared to both White and Black individuals. In line with our initial belief that Blacks would be viewed negatively, we hoped to minimize the role of compensatory bias and demonstrate differences in participants' judgments when comparing Blacks and Whites. Such an outcome would support the notion that the positive/negative stereotypes attributed to the targeted ethnic group influence judgments of hindsight bias frequency.

Method

Participants

Forty-seven White students (M = 21.65, SD = 4.47) from introductory physical health and education classes participated in this study. A 2 X 3 between-subjects factorial design was used; the first factor was gender of the participant and the second factor was the participants' judgments about one of three different racial groups: Asian, Black, and White. Individuals were assigned to the various conditions in a counterbalanced order by gender and the targeted racial group, which resulted in nearly equal proportion of each gender for the targeted racial groups: Asians (8 men, 9 women), Blacks (6 men, 9 women), and Whites (8 men, 7 women). On the basis of self-reported race, non-White participants, fewer than 3% of total participants, were excluded from the data analysis. All participants were unpaid volunteers and received no extra course credit for participation. Each participant signed a consent form to participate.

Materials

The participants completed the questionnaire anonymously but were asked to provide information about gender, age, and ethnicity. The written instructions for completing the questionnaire included the underlined statements, "This study is not concerned with your personal views," and "It regards the views of your peers at this University." A newspaper article was cited that described a baseball player's display of hindsight bias after hitting a winning home run. The keywords included in the story were, "After the game, the baseball player sat with his bat beside him and said, 'I knew tonight would be the night I would save the game.'"

Hindsight bias was then explained in the following way:

It is probably unlikely that the baseball player was as certain that he would hit the home run before the game as he was after the game. After hitting the home run, he tended to exaggerate the extent to which he would have predicted it. This tendency of the baseball player to overestimate the extent to which he would hit the home run has been labeled hindsight bias or the "knew-it-all-along" effect.

After reading the information about hindsight bias, the participants answered five questions. First, participants rated their understanding of the hindsight bias concept on a scale from 1 (low) to 9 (high). Using the same Likert scale with different anchors, 1 (never) to 9 (always), hindsight bias frequency was
assessed by asking how often their peers expect Asians/Blacks/Whites to show hindsight bias when watching sporting events. Two other questions measured participants’ perceptions of the baseball player’s likeability (1 = likeable, 9 = unlikable) and conceit (1 = not conceited, 9 = conceited) from the perspective of Asians/Blacks/Whites. The last question was open-ended and allowed participants to list any characteristics or attributes about the targeted racial group.

Procedure
The researcher presented this study to three physical education classes during class time. The researcher first handed out consent forms for the participants to complete if they wished to participate. Then, the three versions of the questionnaire instructing the participants to make judgments about one of the three targeted racial groups (Asians/Blacks/Whites) were distributed in a counterbalanced order to approximate an equal number of men and women judging each race.

**Results**
Initially the dependent variables of understanding the concept of hindsight bias, hindsight bias frequency, and likeability and conceit were subjected to a 2 X 3 analysis of variance (ANOVA) with the factors being, respectively, gender of the participant and ethnicity of the target group. None of these analyses (p values > .05) revealed significant effects for gender, so the factor was excluded from any further consideration.

Participants were first asked to rate their understanding of the hindsight bias concept. A one-way ANOVA on participants’ understanding of the concept showed that there were no significant differences (F < 1) for the targeted group of Asians (M = 7.29, SD = 0.68), Blacks (M = 7.00, SD = 0.40), and Whites (M = 7.15, SD = 0.39). The level of these means, ranging from 7.00 to 7.29, revealed their understanding to be moderately high.

In support of our expectations for the measure of hindsight bias frequency assertions, a significant difference was found for the targeted racial groups, F(2, 47) = 13.47, p < .01. Post hoc comparisons utilizing the Tukey honestly significant difference test showed that participants attributed significantly lowered hindsight bias frequency to Asians (M = 4.06, SD = 1.52) than to Whites (M = 5.93, SD = 1.22) and Blacks (M = 6.07, SD = 0.96), p values < .001. No significant difference was found when comparing Blacks and Whites, p > .05.

No significant differences were found for the measures of likeability and conceit, F values < 1. For likeability, the means for Asians, Blacks, and Whites, respectively, were 4.82 (SD = 1.51), 5.00 (SD = 1.81), and 4.80 (SD = 1.61). For conceit, the means were as follows: Asians, 5.29 (SD = 1.26); Blacks, 5.67 (SD = 1.80); and Whites, 6.00 (SD = 1.60). Because participants’ judgments of hindsight bias frequency occurred before these judgments, they might have altered their likeability and conceit assertions. Although both of these measures were significantly related to one another, r = .56, p < .01, neither was linked to hindsight bias frequency, p values > .05.

Few respondents chose to answer the open-ended question about their specific targeted racial group. Thus this outcome did not allow us the opportunity to examine the nature of their answers for the role of compensatory bias.

**Discussion**
In line with the earlier findings by Moodie-Dyer et al. (1999), White college students perceived hindsight bias frequency to be significantly lower for Asians when compared to Whites. Moodie-Dyer et al. (1999) found that the estimates for Asians and Blacks were similar; in the present study, however, frequency of hindsight bias was judged to be lower for Asians than Blacks. Contrary to our expectations, no significant difference was found for the White-to-Black comparison. There was no evidence that these outcomes were related to the gender of the participants. Also, we failed to find any significant differences for the measures of likeability, conceit, and understanding of the hindsight bias concept. Perhaps a better method to assess participants’ understanding of hindsight bias would be for them to describe the bias in their own words or to apply the concept to a new situation.

Earlier, Moodie-Dyer et al. (1999) found that their difference in hindsight bias frequency judgment for the different racial groups was linked primarily to the women. That was not the case in the current study, as there was no evidence that participant’s gender was a factor. However, this outcome might have been due to procedural differences between the two studies, including attributing hindsight bias for a generic baseball player rather than for a famous one, adopting the perspective of peers, or the time of testing. Moodie-Dyer et al. (1999) conducted their study right after Mark McGwire broke the home run record. Informally, many students, including women, commented that they watched Cardinal games during the latter stages of McGwire’s pursuit of the record.

The belief that Asians would show less hindsight bias than the other target groups supports the stereotypic view that Asians are a model minority and provides an important replication using a simple word label to cue race and the single-item methodology. Whereas the earlier outcome of Moodie-Dyer et al.
(1999) focused on self-judgments about others, the current work extends the generality of this outcome to making judgments about peers. This outcome was accomplished through the use of a between-subjects design, which minimizes the role of social comparisons in contrast to the use of a repeated measures design, whereby individuals would be asked to make judgments about all three racial groupings.

Further investigations should be directed at expanding the network of factors related to hindsight bias frequency, determining whether individual differences in views toward racial groups is a factor, and perhaps using a more focused rather than the global or vague event such as watching sporting events. Conceivably, providing participants with a scenario with more specific details may result in even greater differences in their assertions.

The current findings for hindsight bias frequency are qualified by a number of issues. First, we did not directly assess positive/negative stereotypes linked to the different ethnic groups. Future research should assess the specific contents of the stereotypes prior to the participants’ judgments about hindsight bias frequency. A second issue is whether compensatory bias plays a significant role in making judgments about Blacks. We attempted to minimize compensatory bias by having college students make judgments about their peers rather than themselves. We thought the use of a single-word descriptor for race would be subtle enough to trigger racial stereotyping, but it is possible the cue was a potent one when the target group involved Blacks. Hence the demand characteristics may have produced compensatory bias. But, unlike the earlier study by Moodie-Dyer et al. (1999), participants rarely responded to the open-ended question regarding the target group. If they did, their statements did not suggest that compensatory bias was a factor. Further research to examine the role of compensatory bias via an experimental manipulation would be beneficial.

Despite contrary evidence presented by Brigham and Wasserman (1999), who showed the importance of race for hindsight judgments, participants’ assertions of no hindsight bias differences between Whites and Blacks may be accurate. First, Sigelman and Tuch (1997) argue that Whites’ negative stereotypes of Blacks have lessened today as compared to previous decades. Second, the participants in our study were all college students. Plos and Williams (1995) found that noncollege participants were almost twice as likely to endorse racial stereotypes. Bodenhausen (1990) noted the possibility that his earlier findings may not be naturalistic due to the university setting for the study. Third, this Midwest university is not as diverse as some areas; the entire minority population of the university is 3%, thereby providing limited contact between White college students and minorities.

In conclusion, focusing on hindsight bias frequency judgments draws attention to the social psychology of hindsight bias. In general, the social psychologist is concerned with how we think about ourselves and influence one another. If we understate the frequency of hindsight bias in ourselves and overestimate it in others, what are the possible pernicious social and personal consequences? Others’ pronouncements about seemingly obvious outcomes may be viewed positively or negatively when considering the expected baseline level of hindsight bias on the basis of ethnicity. Frequency of hindsight bias judgments may inadvertently act to reinforce or to maintain the stereotypes associated with ethnicity.

References
Handshake: Its Relation to First Impressions and Measured Personality Traits

This study examined the relation of the handshake both to perceived personality characteristics in a first-impression situation and to actual measured personality traits. One hundred eight male and female college students completed the Eight State Questionnaire (8SQ), which measures 8 personality characteristics. Additionally, the students rated 2 other participants on 3 hand-shaking measures and also provided their impressions of these 2 participants on the same 8 personality traits measured by the 8SQ. For men, perceived arousal was positively correlated with a firm, warm, and dry handshake. For women, a firm, warm, and dry handshake was positively related to perceived arousal and extroversion and negatively related to perceived anxiety, depression, fatigue, guilt, and regression. Results are discussed in terms of the particular importance of the handshake to women. It is concluded that when a woman extends her hand to be shaken, it is important that it be firm, warm, and dry if she wants to make a positive first impression on others.

Interpersonal communication is a basic component of human interaction. It is difficult to overemphasize the importance of the communication process. The quality of our life experience, whether we are happy or frustrated, is to a large extent dependent on our ability to communicate effectively with others. Because of the importance of communication, we have developed an extremely intricate verbal language. Despite the intricacy of our verbal language, some experts have estimated that at least 65% of the messages we send one another occur at the nonverbal level (Burgoon, Buller, & Woodall, 1989). Weiten and Lloyd (2000) defined nonverbal communication as “the transmission of meaning from one person to another through means or symbols other than words” (p. 189). Major means of nonverbal communication include facial expression, head nodding, body posture, touch, and eye contact, each of which may convey thoughts, emotions, and personality.

The handshake has traditionally been a common means of greeting others. This form of greeting behavior was developed from a handclasp dating back to ancient Rome (Knapp, 1980). The handshake is considered by many to be a form of nonverbal communication that conveys a great deal about a person. Amy Vanderbilt (1957), in her book Amy Vanderbilt’s Complete Book of Etiquette, states that “A handshake is as much a part of personality as the way we walk, and although we may modify and improve a poor handshake if someone calls our attention to it, it will still usually be just like us, assured or timid, warm or cool” (p. 185).

Although concern with nonverbal communication is prevalent in psychological research, little of it has been devoted to the handshake. Astrom and colleagues have conducted a few studies investigating the relation between greeting behavior, including the handshake, and personality traits (Astrom, 1994; Astrom & Thorell, 1996; Astrom, Thorell, Holmlund, & d’Elia, 1993).

Astrom et al. (1993) looked at the relation between handshake variables and personality traits in psychiatric patients. The experimenters trained two psychologists to perform a standardized handshake with each participant. The psychologists rated the participants on four handshake dimensions, each measured on a 5-point scale: (a) consistency of handshake (limp and loose to rigid and muscular), (b) temperature of hand (cold to warm), (c) dryness of hand (wet to dry), and (d) strength of grip (no pressure to very strong pressure). Colder handshakes were correlated with social
introversion in both men and women. Hand dryness was correlated with psychological masculinity in women. Moist hands were correlated with depression in men.

Astrom (1994) conducted research that examined possible relations between aspects of introductory greeting behaviors, including the handshake, and personality traits in a nonclinical population. Using the Cecarec-Marke Personality Schedule (as cited in Astrom, 1994), Astrom measured 12 psychogenic needs derived from the personality theory of Henry Murray. Trained raters assessed the handshake dimensions (consistency, dryness, temperature, and strength). In addition, each rater assessed the handshake dimensions with regard to how a "most pleasant handshake" and a "most unpleasant handshake" are perceived. Limp, cold, wet, and weak handshakes were viewed as the most unpleasant. Women, in comparison to men, had significantly less consistency and strength in their handshakes.

Astrom (1994) analyzed the relation between handshaking and personality traits separately for men and women. For men, perceived dryness of handshake correlated positively with sociability, and perceived strength related positively to aggressive nonconformance and negatively to sociability. In women, high temperature and strength of handshake related positively to rational dominance. For both men and women, the strength of handshake related positively to the personality traits of aggression, dominance, and exhibition (collectively known as extroversion).

Astrom and Thorell (1996) studied three professional groups who use the handshake (therapists, clergymen, and car salesmen) to determine whether they were able to detect any connection between greeting behaviors and personality characteristics. They interviewed participants about 22 types of greeting behavior especially related to shaking hands and asked them to associate the occurrence of each behavior with 1 or 2 of the 12 traits measured by the Cecarec-Marke Personality Schedule. Participants agreed about the relation of greeting behaviors to personality characteristics, particularly the traits of extroversion and introversion. A weak handshake related to the trait of introversion and a strong handshake to extroversion. More than three fourths of the greeting behaviors related to at least one of the personality traits.

Chaplin, Phillips, Brown, Clanton, and Stein (2000) investigated the idea that handshakes are reflected in personality and influence first impressions of others. Participants were college undergraduates. Trained raters assessed the participants’ handshakes on eight characteristics: (a) completeness of grip, (b) temperature, (c) dryness, (d) strength, (e) duration, (f) vigor, (g) texture, and (h) eye contact. The handshake raters also provided their impression of the students by rating each participant on 5-point scales representing each of eight personality characteristics: (a) openness to experience, (b) conscientiousness, (c) extroversion, (d) agreeableness, (e) neuroticism, (f) shyness, (g) emotional expressiveness, and (h) general affect. A firm handshake related positively to measured extroversion and emotional expressiveness and related negatively to neuroticism and shyness. In women, a firm handshake related positively to measured openness to experience. First impressions were more positive with a firm handshake. Because of the pattern of relations between openness, sex, handshake, and first impressions, Chaplin et al. suggested that a firm handshake might be an especially effective means of impression management for women.

Although these studies may provide some insight into the relation of the handshake and impression formation, much remains to be discovered. The aim of the present study was to investigate the relation of handshake to both perceived personality characteristics in a first-impression situation and actual measured personality traits. Consistent with previous research, we expected that a firm, warm, and dry handshake would be related to a positive first impression and to higher scores on traits such as anxiety, depression, and guilt, whereas a limp, cold, and wet handshake would be related to a negative first impression and to lower scores on the same traits.

Method

Participants

One hundred eight undergraduate introductory psychology students participated in the study in partial fulfillment of a course requirement. Five participants’ questionnaires were incomplete, and we omitted them from the analysis of the data. Of the remaining questionnaires, 64 were completed by women and 39 by men aged 18 to 22 years. The majority of participants were Caucasian.

Measures

Personality ratings. Each participant completed the Eight State Questionnaire (8SQ; Institute for Personality and Ability Testing, 1975). The 8SQ consists of 96 questions about moods and feelings that most people experience. Each question is followed by four possible answers: (a) very true, (b) fairly true, (c) fairly false, and (d) very false. The respondent chooses the one response that best reflects the way he or she feels at the moment. The 8SQ assesses eight personality traits: (a) anxiety, (b) depression, (c) stress, (d) extroversion, (e) fatigue, (f) regression, (g) arousal, and (h) guilt. Scores on each trait can range from a low of 0 to a high of 36.
Handshake ratings. Each participant rated two other participants on three handshake characteristics, each on a 5-point scale: (a) strength (from 1 = weak to 5 = firm), (b) temperature (from 1 = cold to 5 = warm), and (c) moisture (from 1 = wet to 5 = dry). We calculated a handshake index by summing the scores on the three handshake factors of strength, temperature, and dryness. Scores could range from 3 to 15, with low scores indicating the handshake characteristics of being weak, cold, and wet and high scores indicating being firm, warm, and dry. Each participant also provided his or her impression of the other participants on the same eight personality traits measured by the 8SQ. They rated each trait on a 9-point scale from 1 = not at all to 9 = very.

Procedure
Participants met in a large classroom in five groups, with the number of students in each group ranging from 19 to 24. Upon arrival, they completed the 8SQ and received a numerical ID tag to wear on their chest. The experimenter placed the participants into groups of three, each composed of students who reported that they did not previously know each other. One at a time, the experimenter took each group to another room where she explained that when people meet for the first time they typically shake hands. She asked the participants to introduce themselves and to shake hands. She told them to pay close attention to the handshakes of the other participants as well as to their ID numbers because they would be filling out a questionnaire indicating their impressions of each other. She then separated them and gave each a questionnaire containing the handshake ratings and personality ratings. Following completion of the questionnaire, the experimenter took approximately 10 participants aside and asked whether they had altered their handshake because they knew others were paying close attention to it. Only one indicated doing so. The experimenter asked approximately 10 other participants whether they had difficulty completing the ratings of the eight personality characteristics. Nobody reported difficulty.

Results
Measured Personality Characteristics
We computed a multivariate analysis of covariance (MANCOVA) with sex of the rater (male or female) and sex of the target (male or female) serving as the independent variables. The handshake index was the covariate and the dependent variables were the target’s scores on the eight scales of the 8SQ. MANCOVA yielded no significant effects either for the independent variables or the covariate.

Perceived Personality Characteristics
We computed a MANCOVA with sex of rater (male or femal) and sex of target (male or female) serving as the independent variables. The handshake index was the covariate and the dependent variables were the raters’ responses to the eight scales on the 8SQ. The covariate was significantly related to perceived personality characteristics, \( F(8, 194) = 3.38, p = .001 \). No significant main effects were observed. Table 1 shows mean scores for measured and perceived personality characteristics.

Because of the significant covariate effect, we computed correlations to assess the relation of the handshake index to scores on the eight scales of the 8SQ in male and female targets. We computed additional correlations to assess the relation when men rated men, women rated men, men rated women, and women rated women.

For male targets, only arousal was significantly, and positively, related to the handshake index. For female targets, the handshake index was significantly, and positively, related to arousal and extroversion; it was significantly, and negatively, related to anxiety, depression, fatigue, guilt, and regression (see Table 2).

Table 3 shows that when men rated men, the handshake index was positively related to perceived arousal. When women rated men, no significant correlations were observed. When men rated women, the handshake index was negatively related to perceived anxiety and depression. When women rated women, the

**TABLE 1**

Mean Scores on the 8SQ for Measured and Perceived Personality Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Measured</th>
<th>Perceived</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>14.85</td>
<td>3.67</td>
</tr>
<tr>
<td>Stress</td>
<td>16.97</td>
<td>3.52</td>
</tr>
<tr>
<td>Depression</td>
<td>12.85</td>
<td>2.86</td>
</tr>
<tr>
<td>Regression</td>
<td>14.80</td>
<td>3.06</td>
</tr>
<tr>
<td>Fatigue</td>
<td>18.56</td>
<td>3.69</td>
</tr>
<tr>
<td>Guilt</td>
<td>16.04</td>
<td>2.89</td>
</tr>
<tr>
<td>Extroversion</td>
<td>21.16</td>
<td>5.21</td>
</tr>
<tr>
<td>Arousal</td>
<td>17.00</td>
<td>5.61</td>
</tr>
</tbody>
</table>

**TABLE 2**

Correlations Between Handshake Index and 8SQ Scales

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>0.12</td>
</tr>
<tr>
<td>Stress</td>
<td>0.18</td>
</tr>
<tr>
<td>Depression</td>
<td>0.23</td>
</tr>
<tr>
<td>Regression</td>
<td>-0.17</td>
</tr>
<tr>
<td>Fatigue</td>
<td>0.21</td>
</tr>
<tr>
<td>Guilt</td>
<td>-0.22</td>
</tr>
<tr>
<td>Extroversion</td>
<td>0.28</td>
</tr>
<tr>
<td>Arousal</td>
<td>0.41</td>
</tr>
</tbody>
</table>

**TABLE 3**

Correlations Between Handshake Index and Perceived Personality Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>0.35</td>
</tr>
<tr>
<td>Stress</td>
<td>0.40</td>
</tr>
<tr>
<td>Depression</td>
<td>-0.38</td>
</tr>
<tr>
<td>Regression</td>
<td>0.29</td>
</tr>
<tr>
<td>Fatigue</td>
<td>0.45</td>
</tr>
<tr>
<td>Guilt</td>
<td>-0.27</td>
</tr>
<tr>
<td>Extroversion</td>
<td>0.38</td>
</tr>
<tr>
<td>Arousal</td>
<td>0.52</td>
</tr>
</tbody>
</table>
TABLE 2

<table>
<thead>
<tr>
<th>Correlations Between Handshake Index and Eight Perceived Personality Characteristics for Men and Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality characteristics</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Arousal</td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Extroversion</td>
</tr>
<tr>
<td>Fatigue</td>
</tr>
<tr>
<td>Guilt</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Stress</td>
</tr>
</tbody>
</table>

*p < .05. **p < .01.

handshake index was positively related to perceived arousal and extroversion, and negatively related to perceived depression, fatigue, and guilt.

Discussion

Inconsistent with the research of Astrom and colleagues (Astrom, 1994; Astrom & Thorell, 1996; Astrom et al., 1993), handshake was not related to measured personality characteristics. Consistent with previous research (e.g., Chaplin et al., 2000), handshake was related to perceived personality characteristics (i.e., first impression). As in Chaplin et al., a firm, warm, dry handshake was related to formation of a positive impression. Chaplin et al. recommended that women use a firm handshake as a positive form of self-promotion.

According to Amy Vanderbilt (1957), women are not supposed to extend their hand to be shaken, unless they are meeting someone for the first time, unlike men, who shake hands as a common greeting. One possible reason for the stronger relation between shaking hands and impression formation in women may be that historically it has been unusual for women to engage in shaking hands, people may pay more attention to it in women. The results of the present study also indicate that the relation occurs more frequently when women are judging other women. Mazanec and McCall (1976) found that women pay more attention to nonverbal information than do men. Hall (1978, 1990) reported that women are better at translating nonverbal cues and expressing their emotions through nonverbal communication than are men and suggested that this effect may occur because the female role provides women with greater exposure to nonverbal cues and greater practice in decoding them. The present study suggests that women are more influenced by a handshake than are men when shaking hands with a woman.

Several limitations are apparent in the present study. The participants were predominantly women (64 women to 39 men); to more accurately compare the two sexes, it would be better to have a closer ratio. Owing to space limitations, the participants completed the initial survey in a large classroom with the other participants and were separated into smaller groups and taken to another room one at a time. Students who remained in the classroom for a longer period of time had greater opportunity to form impressions based on visual cues. It would have been preferable to separate the participants at the beginning, but space limitations prevented this. Future research should place people in a more realistic situation to study first impressions based on shaking hands, perhaps in a job interview setting. This setting seems particularly relevant because, historically, women have not had the same employment opportunities as men. Some have argued that to overcome this difference in job access, women need to eliminate the impression that they are less qualified (Glick, Zion, & Nelson, 1988). The handshake is a common ritual in a job interview, and the results of this study and that of Chaplin et al. suggest that this ritual may allow women who exhibit a firm,
warm, dry handshake to create a more positive impression of themselves, especially when being interviewed by a woman.

References


Perceived Commute Strain, Negative Physical Symptoms, and Exhaustion in Employees Who Commute

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More than 100 million Americans commute between destinations in their automobiles (U.S. Department of Transportation, 1994). We examined perceived strain, number of negative physical symptoms, and exhaustion of employees who commute to and from work using automobiles. We gathered data through an Internet survey completed by 323 employees from across the United States who commuted to and from work daily in their automobiles. As predicted, commuters with high commute strain reported more negative physical symptoms and exhaustion than commuters with average or low levels of commute strain. Sex differences were found: women reported significantly higher levels of commute strain than did men. This study has important implications for commuters who may already be aware of their commute strain but are not aware of the negative health consequences related to elevated levels of strain.

According to the U.S. Department of Transportation (1994), the number of automobile commuters increased from 43 million to 101 million between 1960 and 1990. This 135.5% increase was partly due to the increased numbers of women who entered the workforce. With such a large number of Americans commuting to and from work by automobile, the impact of commuting and its effects needs to be understood. To date, however, little research has investigated the effects of commuting (Hennessy & Wiesenthal, 1997). Past research suggested that commuting is a source of stress and that it can interfere with family, leisure, and work activities. Gulian, Matthews, Glendon, Davies, and Debney (1990) noted studies of commute stress and strain are important because these factors consistently correlate with problems of sleep quality, work, and health. Novaco, Stokols, and Milanesi (1990) used 99 commuters from two industrial firms to investigate commute physical and subjective impedances. Physical impedance refers to the concrete experience of the commute environment (e.g., miles commuted, minutes commuted, or number of traffic lights). Subjective impedance addresses the commuter's perception of the constraints of the commute (e.g., reduction of travel speed due to stop signs). The physical variables Novaco et al. (1990) included in their study were chest pain, colds/flu, and headaches. They found that self-reported occasional chest pain was significantly correlated with subjective impedance and that physical impedance was related to work absences due to illness and the reported number of colds/flu. The number of freeways and road exchanges traveled by a commuter each day was also significantly correlated with the reported number of colds/flu.

Evans and Carrère (1991) used male bus drivers to study the effect of traffic congestion on psychophysiological stress. They found that among these bus drivers, increased exposure to peak traffic was associated with elevated levels of urinary catecholamines. Previous studies found urinary catecholamines to be a reliable and valid indicator of occupational stress during a workday (Frankenhaeuser & Johansson, 1975).

Author note. This article is based on the undergraduate research of Kira L. Barden, while at the Department of Psychology, Agnes Scott College.

This paper was presented at the 23rd Annual Psi Chi Convention for the Behavioral Sciences on April 1, 2000, in Athens, Georgia.

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Traffic congestion reduced a bus driver’s ability to adjust speed, change lanes, and maneuver into curbside areas to pick up and discharge passengers.

Schaeffer, Street, Singer, and Baum (1988) used commuters from a governmental research agency to study traffic congestion and physical symptoms. They found that greater traffic congestion during the morning rush hour was related to increased blood pressure and deficits in commuters’ physical task performance on proofreading tasks and color discrimination tasks.

Exhaustion is another debilitating condition that can impact work and home activities. Koslowsky, Kluger, and Reich (1995) noted that commuters are logical candidates for exhaustion; commuters often report being tired or exhausted when they arrive at work or home. Wright and Cropanzano (1998) argued that managing emotional exhaustion is important for improving quality of life and functioning at work. They noted associations found between emotional exhaustion and poor work attitudes, decreased job performance, turnover intentions, and somatic difficulties such as colds, gastrointestinal problems, headaches, and sleep disturbances.

Koslowsky, Aizer, and Krausz (1996) used commuters to study commute impedance and strain. Strain was measured by using subjective stress, perceived control, and exhaustion scales. Commute impedance predicted the commuters’ subjective stress and perceived control, but did not predict exhaustion. The authors did not look at the relation between commuters’ strain and exhaustion.

Sex is a variable that has often been hypothesized to influence commuting behavior, but recent research has not found sex effects. For example, Aronsson and Rissler (1998) studied the psychophysiological stress reactions of male and female bus drivers. Both the male and female bus drivers had significantly higher levels of adrenaline, noradrenaline, and cortisol levels during work than during the control sessions. The men and women also did not differ in their self-reported stress, irritation, tenseness, strain, satisfaction, alertness, confidence, good mood, powerlessness, uneasiness, and dissatisfaction while driving.

Similarly, Hennessy and Wiesenthal (1997) investigated sex effects with their examination of state driver stress in commuters who drive in highly congested traffic conditions. They conducted interviews using cellular headset telephones while the participants were driving under low or highly congested conditions and found the level of state driver stress was dependent on the trait susceptibility to commute stress. Hennessy and Wiesenthal did not find sex to be a significant predictor of state driver stress or trait driver stress.

On the basis of the research presented above, we devised the following hypotheses:

1. Higher perceived commute strain will be related to reporting more negative physical symptoms.
2. Greater levels of commute strain will be related to greater levels of exhaustion.
3. Male and female commuters will report similar levels of commute strain.

**Method**

**Participants**

Three hundred twenty-three participants from 30 states in the United States responded to the Internet questionnaire. Sixty-five percent of the participants were from Georgia, Alabama, Kansas, Florida, Louisiana, and California.

Of the 323 surveys received, 9 surveys were not used in the analyses because the respondents did not commute by automobile, an additional 16 surveys lacked significant amounts of data, and another 14 respondents reported working less than 30 hours per week. Part-time employees are not included in this study because they commute less frequently than full-time workers. The resulting number of surveys used in the statistical analyses was 284.

The sample used in the analyses included 100 male participants and 184 female, ranging in age from 21 to 62 years, with an average age of 37 years. Eighty-seven percent reported their ethnicity as White, 7% African American, 2% Asian, 2% Hispanic, and 1% other. The majority of the sample had a bachelor’s degree or higher (71%). The average number of hours worked per week was 45, and the respondents had been working at their current job for an average of 6 years. The average commute time was 30 minutes each way, with an average number of daily total miles commuted being 39.4. The respondents had driven their present commute for an average of 4.5 years.

**Measures**

**Commute strain.** We used the 17 items of Kluger’s (1998) Cognitive and Affective Commute Strain Scale to assess commute strain. The scale has three factors including resentment, fears, and worries. Items include “I resent the length of my commute,” “I often feel that my personal safety during my commute is not being taken care of,” and “My commute causes me to worry about constantly being under time pressure,” respectively. A 7-point Likert scale is used for responses (1 = strongly disagree, 7 = strongly agree); thus higher scores indicate higher commute strain. The Cronbach alpha reliability coefficient was .91 for this scale, and for our sample it was .93.
Negative physical symptoms. The Somatic and Affective Complaints Scale (Klinger, 1998) consists of a checklist of 15 physical symptoms including a stiff neck, tiredness, back pain, difficulty in focusing attention, tension, anger, and "flying off the handle." Klinger suggested the number of symptoms checked should be summed to obtain an overall measure of somatic and affective complaints. Klinger reported a Cronbach alpha reliability coefficient of .84 for the 15 items, and for our sample it was .77.

Exhaustion. Fifteen items from the Burnout Scale developed by Pines, Aronson, and Kafry (1981) were included in this study. An example item from their scale includes "being unhappy." A 7-point Likert scale is used for responding (1 = never, 7 = always), and higher scores indicate greater exhaustion. Pines et al. assessed the internal consistency of their 12-item scale with 38 samples of participants and reported that the coefficient alpha values ranged from .91 to .93, and for our sample it was .94.

Procedure
The questionnaire used to collect data for this study was posted on an Internet Web site controlled by WebSamppling. A copy of the html file containing the questionnaire is available from the second author. The questionnaire remained available on the Internet for 10 weeks during the spring of 1999. Participants were recruited by the researchers, by the researchers' peers and colleagues, and by participants who had previously filled out the survey. This project was part of a larger project completed by a college research class investigating commuting.

Results
Intercorrelations were calculated for the variables in this study. The correlation between commute strain and negative physical symptoms was .73, between commute strain and exhaustion was .47, and between negative physical symptoms and exhaustion was .53. These correlations were significant at the .01 level.

For this study, the participants were put into one of three groups (high, average, or low) on the basis of their commute strain total score. Percentiles placed the participants into one of these groups. The commuters between the 25th and 75th percentile (total score of 29 to 60) are considered to have average strain. The commuters above the 75th percentile (total score of 61 to 104) are considered to have high commute strain, and the commuters lower than the 25th percentile (total score of 17 to 28) are considered to have low commute strain.

Hypothesis 1, higher perceived commute strain will be related to reporting more negative physical symptoms, was supported. Using a one-way analysis of variance, we found that the commuters with high, average, and low commute strain reported significantly different levels of negative physical symptoms, $F(2, 291) = 101.64$, $p < .0001$. We used Scheffe comparisons to examine the differences between the three groups. The commuters with high commute strain reported significantly more negative physical symptoms ($M = 5.08, SD = 2.40$) than the commuters with average commute strain ($M = 2.45, SD = 2.03$) and the commuters with low commute strain ($M = .64, SD = .99$).

Hypothesis 2, greater levels of commute strain will be related to greater levels of exhaustion, was also supported. The commuters with high, average, and low commute strain reported significantly different amounts of exhaustion, $F(2, 291) = 32.56$, $p < .0001$. We used Scheffe comparisons to examine the differences between the groups. The commuters with high commute strain reported significantly more exhaustion ($M = 55.94, SD = 19.28$) than the commuters with average strain ($M = 44.99, SD = 16.51$) and the commuters with low strain ($M = 34.10, SD = 13.66$).

Hypothesis 3, male and female commuters will report similar levels of commute strain, was not supported. The men ($M = 42.00, SD = 19.62$) and women ($M = 47.36, SD = 21.86$) differed significantly on their reported levels of commute strain, $F(1, 290) = 4.27$, $p < .05$. Female commuters reported significantly greater levels of commute strain than did male commuters.

Discussion
Commuters with high strain reported more negative physical symptoms and greater exhaustion, supporting Hypotheses 1 and 2. Hypothesis 3 was not supported as women reported higher levels of commute strain than did men. The reason for this difference between men and women needs to be investigated further. However, popular press articles have asserted that women bear additional stress in their commutes if they are the individuals responsible for children in the family. It is often necessary that children be picked up at day-care facilities or after-school activities at specific times, and getting stuck in traffic may increase stress levels in individuals who are aware of those deadlines and have no control in changing their present traffic situations.

Important implications can be drawn from the findings of this research. Commuters often admit that they have commute strain, but they may not be aware that negative physical symptoms and exhaustion could be related to having high commute strain. Commuters experiencing high commute strain, negative physical symptoms, or exhaustion from their commute should look into the possibility of changing their work hours.
to avoid the rush hour, carpooling so they do not have to drive every day of the week, moving closer to their workplaces, or finding new jobs closer to where they live.

Hennessy and Wiesenthal (1997) noted that long-term commute stress effects that cause commute strain can accumulate and carry over into other life situations. Negative physical symptoms and exhaustion from commuting could affect the commuter's work by contributing to absences and lower productivity (Kluger, 1998). Companies and workers should recognize that there are potential negative side effects of commuting. Companies could help by providing changes such as flexible work hours, compressed work weeks, telecommuting, or company transportation to help their workers who are experiencing commuting strain, negative physical symptoms, or exhaustion. City officials also have a responsibility to help commuters by constantly working on improving road conditions and developing mass transit options.

This study has several strengths. First, it expands the limited literature available concerning commuting, and second, it examines the relationships among commute strain, negative physical symptoms, and exhaustion. Another strength is the large sample size: much of the commuting research in the past suffered from small sample sizes. Finally, the Internet questionnaire was based on previously used commuting scales with established reliability.

Several limitations of the present research can be noted. This study was available only on the Internet, which allowed only persons with access to a computer to participate. However, using an Internet questionnaire allowed the researchers to easily obtain participants from across the United States. Another limitation of the current study involves the notion of perceived commute strain; because data were collected through self-report surveys, the actual strain of the commuters was not measured. Some individuals may be more willing to acknowledge and report greater levels of commute strain than other individuals. Future research may want to compare actual and perceived commute strain levels. Also, there is a possibility that the negative physical symptoms and commute strain reported by participants could have been the result of other factors, such as illness.

Future research should assess commute strain, negative physical symptoms, and exhaustion over a period of time to determine whether specific days and times for commuting are worse than others. Varying traffic conditions can be monitored to determine how they affect commute strain. Investigations might also examine commute strain and its relation to specific medical problems, such as gastric disorders, cardiovascular problems, or high blood pressure. This type of research could help the medical community to better assess and treat the long-term physical effects of strain from commuting.

References


The Self-Serving Bias in Children

ELIZABETH POSEY
RANDOLPH A. SMITH*
Ouachita Baptist University

In this study of self-serving bias, 20 male and 16 female second graders completed an academic task with a same-sex partner. Half of the groups consisted of friends and the other half were nonfriends. The children had 3 min to complete a math worksheet and were told their group’s performance would be graded as a whole. Each group received success or failure feedback. Results showed a significant interaction between the type of relationship between the partners and the type of feedback they received. Nonfriends in the failure group were more likely to exhibit the self-serving bias.

Research has shown that people tend to view themselves in a self-serving way. Some people claim to be more intelligent, trustworthy, and physically attractive than others (Sedikides, Campbell, Reeder, & Elliot, 1998). When people attribute their successes to internal causes and their failures to external causes, they are exhibiting the self-serving bias (Friedrich, 1996). For instance, a student may blame the teacher for a bad test grade but will gladly take the credit for a good grade (McAllister, 1996). Evidence shows that people have a need to achieve and maintain a positive view of themselves (Taylor, Neter, & Wayment, 1995). In general, people see themselves as well above average (Story & Dunning, 1998).

The two main explanations for the self-serving bias are cognitive and motivational. “The cognitive explanation emphasizes differential access to information as the leading cause of the self-serving bias” (Sedikides et al., 1998, p. 378). In other words, people manifest the self-serving bias because they limit themselves to the available information, not because they are trying to protect or boost the self (Sedikides et al., 1998, p. 378). Other researchers claim that the main cause of the self-serving bias is motivational because people want to perceive themselves in a favorable manner (Story & Dunning, 1998; Taylor et al., 1995). Story and Dunning also reported that when it comes to task performance, people are more sensitive to the information available to them about their successes.

One focus of research on the self-serving bias is whether people exhibit the self-serving bias when they are with a close friend. Two theories explain the influence of friendship on the self-serving bias: the relationship-as-enabler hypothesis and the relationship-as-bound hypothesis (Sedikides et al., 1998). The relationship-as-enabler hypothesis predicts that friendship gives each individual the freedom to be self-serving. This hypothesis claims that within a close relationship, the fear of consequences that come with being self-serving disappears (Campbell, Sedikides, Reeder, & Elliot, 2000). Characteristics like the “durability and stability of friendship might actually facilitate the expression of the self-serving bias” (Campbell et al., 2000, p. 232). In contrast, the relationship-as-bound hypothesis claims that individuals in a close relationship will refrain from the self-serving bias.

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because people include their close friends in their own self-concept (Campbell et al., 2000). Close friends are expected to share the responsibility for success as well as failure (Sedikides et al., 1998). In this case, neither person will show evidence of the self-serving bias.

Campbell et al. (2000) found evidence supporting the relationship-as-bound hypothesis. Half of the participants signed up to report for the experiment with a same-sex friend, and the other half signed up with a list of strangers. The participants completed four single-item 9-point scales to make sure those who reported with a friend were closer than those who reported with a stranger. The researchers presented the participants with the task of brainstorming in dyads. They gave each pair a combined score and randomly assigned them to a success or failure feedback group. Campbell et al. (2000) found a significant interaction, which indicates a relationship-type influence on the self-serving bias. Compared to strangers, friends did not show evidence of the self-serving bias. Despite the fact that Sedikides et al. (1998) relied on induced close relationships and Campbell et al. (2000) used participants who had a close relationship before the experiment, both concluded that friendship plays a crucial role in taming the self-serving bias.

One major limitation of the study of the self-serving bias is that the overwhelming majority of research has involved college students (McAllister, 1996). I wanted to know whether the self-serving bias pertained to children and whether children would show evidence of the relationship-as-enabler or the relationship-as-bound hypothesis. Whitley and Frieze (1985) found in a meta-analysis that children in grades 1–7 did exhibit the self-serving bias (effect size = .56 for success attributions; effect size = .45 for failure attributions). Few studies, however, have used academic tasks as a means of studying the self-serving bias; the majority of studies have focused on experimental rather than naturally occurring academic situations (Whitley & Frieze, 1985). I sought to determine whether an academic task made a difference in whether children exhibited the self-serving bias. Because of similar findings with adults, I predicted that children would show evidence of the relationship-as-bound hypothesis.

**Method**

**Participants**

The study included 36 second graders, 20 boys and 16 girls, from four elementary schools in the North Little Rock, AR, school district. Eight students were from each of two schools and 10 students came from each of the other two schools. I used four schools to obtain a variety of second graders. All the participants were volunteers.

**Materials**

I gave each participant a worksheet of 150 math problems to complete. After consulting an elementary school teacher, I constructed the problems to consist of second-grade-level addition and subtraction. Each participant was asked two questions orally to measure the self-serving bias. Participants responded on a 1–5 scale.

**Design and Procedure**

The design was a 2 (relationship type: friends or strangers) X 2 (feedback type: success or failure) X 2 (gender: boy or girl) factorial design (Campbell et al., 2000). I used a factorial analysis of variance (ANOVA) for my statistical analysis.

The experiment had three independent variables. The first independent variable was the type of relationship between the two participants in each individual group. I manipulated the type of pairs by putting half of the participants with a randomly selected partner and half with a friend classified as such on the basis of the teacher's report. The second independent variable was the performance feedback. I randomly placed each group into either a success or failure category with an equal number of friends and nonfriends in each group. The third independent variable was gender. I used only same-sex pairs and divided them equally between the success and failure categories. The dependent variable was the self-serving bias.

To prevent any of the participants from learning about the experiment before it was complete, all the students from each school stayed together until the debriefing. I also instructed the children not to say anything about our conversation or the questions to the other children. My assistant monitored the children while I was out of the room.

I used 10 pairs of boys and 8 pairs of girls. I sent out permission slips to be signed by a parent 2 weeks before the experiment. All the children who participated brought back a signed permission slip. The teachers helped pair the students. Half of the groups consisted of friends who voluntarily played together on a consistent basis and half were nonfriends who did not associate with each other unless forced by the teacher.

Partners sat across from each other at a table. I gave each participant a worksheet and explained that they had 3 min to correctly complete as many problems as they could. I gave each pair a group number and told them to write only their group number at the top of the worksheet. I explained that although the partners solved the problems separately, the group evaluation was based on the total number of problems solved between the two. I explained that each group would be evaluated as a whole and that no one person's grade weighed more than the other. After 3 min,
students were instructed to hand their test to my assistant. I took the tests from my assistant and left the room so the students would believe I was grading their work. My assistant entertained the children while I was out of the room.

Before the testing began, I had randomly assigned the groups into two equal groups of failure or success (Sedikides et al., 1998).Assigning these groups created an opportunity for self-serving children to blame others for failure and take the credit for success. If they were in the success group, I told them their group performed better on the worksheet than all the other groups. I told the failure groups that their scores were worse than all the other groups. I told the failure groups that their scores were worse than all the other groups.

I measured the self-serving bias by separating each student from his or her partner and asking two questions: "Who caused your group to perform this way?" and "Who did the better job on the test?" The children used a scale of 1 (my partner) to 5 (me) to respond to the questions (Campbell et al., 2000). I reversed the scores for Question 1, the responsibility question, for the failure groups, because a low number on this question represented the self-serving bias. After the scores for that question were reversed for the failure group, high scores represented a self-serving response. When all the students completed the questions, I debriefed the children by revealing the deception for their performance feedback.

Results

I collapsed across gender because there was no significant difference between boys and girls for either question. For Question 1, "Who caused your group to perform this way?" results from the factorial ANOVA showed no effect for the feedback, \(F(1, 36) = .38, p = .54\). The type of relationship was significant, \(F(1, 36) = 4.97, p = .03\). This main effect, however, was qualified by a significant feedback by relationship interaction, \(F(1, 36) = 5.87, p = .02\). The interaction appears in Figure 1. Nonfriends in the failure groups were most likely to give a self-serving response.

For Question 2, "Who did the better job on the test?" results from the factorial ANOVA showed no effect for the feedback, \(F(1, 36) = .01, p = .92\). The type of relationship was significant, \(F(1, 36) = 4.79, p = .04\). This main effect was qualified by a marginally significant feedback by relationship interaction, \(F(1, 36) = 3.33, p = .08\). The interaction appears in Figure 2. Nonfriends in the failure group were more likely to give a self-serving response. Friends in the failure group were more likely to give a non-self-serving response.

Discussion

In this study I sought to determine whether second graders exhibited the self-serving bias during an academic task. Previous research has shown that children do exhibit the self-serving bias; the present data produced similar results (Whitley & Frieze, 1985). Children paired with a nonfriend and placed in the failure group were more likely to exhibit the self-serving bias than children who were also in the failure group but worked with a friend. When asked who did the better job, nonfriends in the failure group were more likely
Children's attributions as a function of group type and feedback for Question 2 (higher scores represent self-serving attributions).

My data are also consistent with previous research supporting the relationship-as-bound hypothesis (Campbell et al., 2000). Friends did not exhibit the self-serving bias. In fact, when it came to crediting someone for the better job, friends gave the praise to their friend. These data coincide with the hypothesis that friends become a part of our self-concept (Campbell et al., 2000). Our friends and how others view them is a reflection of our self.

These results have potential for application in classroom settings. Teachers should be aware of the self-serving bias and watch for it when a group experiences failure. They may need to appease tension after a group fails by providing ways for its members to mend relationships.

My research and previous research have shown that children in grades 1–7 do exhibit the self-serving bias. The question of the development of the bias is left unanswered. Although Whitley and Frieze (1985) found no significant difference between grade levels, their study did not extend to prekindergarten and kindergarten children. An extension of this research would be to test children younger than the first grade to determine whether they exhibit the self-serving bias. Further research would help determine when children are first able to make causal attributions.

References


The purpose of this study was to determine the intercorrelations between religiosity, perceived family support, and self-esteem in adolescents. Using convenience sampling, we recruited the participants from three high schools and one church youth group in Southeast Louisiana. There were 93 participants (32 male and 61 female) ranging in age from 14 to 18 years. The participants filled out a demographic questionnaire, the Rosenberg Self-Esteem Scale, a Religiosity Scale, and the Perceived Social Support Family Scale. No significant correlation was found between religiosity and self-esteem. However, perceived family support and self-esteem had a significant positive correlation, as did perceived family support and religiosity. Male adolescents had lower religiosity than female adolescents. Suggestions for future research include investigating a more diverse sample and other possible variables.

Self-esteem, a person's positive or negative evaluation of him- or herself, has been recognized as a predictor of social problems in the recent research of psychological and social development (Donahue & Benson, 1995; Mecca, Smelser, & Vasconcellos, 1989; Murk, 1995). Recent studies have found direct links between low self-esteem and substance abuse, unprotected sex, criminal behaviors, particular personality disorders, depression, and suicide. Self-esteem can be used to predict possible occurrences of depression (Murk, 1995; Nunley, 1996). Researchers who study suicide assert that when the protective shield of self-esteem is low, depression is more likely to sneak in (Murk, 1995). Extreme cases of low self-esteem can be deadly because depressed adolescents are especially prone to considering the option of suicide and following through with it (Murk, 1995; Nunley, 1996). Some research estimates that up to 5% of adolescents experience the symptoms of depression, and severe depression occurs in "one in fifty school children" (Nunley, 1996). Currently suicide is the third leading cause of death in adolescents between the ages of 15 and 24 years (Donahue & Benson, 1995; Nunley, 1996). The suicide rate in this age group has increased to 4 times what it was 25 years ago (Nunley, 1996).

Although establishing a causal relationship between self-esteem and depression/suicide is not possible, correlations do exist between these variables. In view of the fact that the link between self-esteem and depression/suicide could have fatal consequences, this research study further investigates self-esteem. Because social identity and social context have been linked to self-esteem, the current study considers the relationship religiosity and family support have with self-esteem (Mecca et al., 1989; Murk, 1995).

Past research on the relationship between religiosity and self-esteem has produced a variety of results. Some research studies, such as that of Bahr and Martin, who tested high-school students, indicate that only a very slight relationship exists between religiosity and self-esteem (Hyde, 1990). Donahue and Benson (1995) reviewed recent religiosity research literature such as The Troubled Journey report, which based the conclusions of its correlational study on a nationally representative sample of 34,129 participants. The Profiles of Student Life: Attitudes and Behaviors survey was given to students in public schools in 32 states to assess such things as their family support, internal motivation, stress, self-esteem, prosocial behaviors, and risky behaviors. The religiosity of the students was evalu-
ated by a three-question survey that asked how many hours per week they spent at religious services/groups, how frequently they attended religious services/groups, and how important religion was in their lives. The researchers concluded that religiosity had significant but small negative correlations with drug abuse (−.10), premarital sex (−.10), suicidal ideation (−.08), suicide attempts (−.07), driving while intoxicated (−.13), and violence (−.09), and it had only a very small, but significant, positive correlation (.08) with self-esteem. Other research reports that a negative correlation exists between self-esteem and drug abuse, unprotected sex, depression, suicide, and criminal behaviors (Murk, 1995; Nunley, 1996), which are the same behaviors that have a negative correlation with religiosity according to Donahue and Benson. It seems logical to conclude that because both religiosity and self-esteem are related to the same behaviors, there would be a relationship between religiosity and self-esteem. Therefore, the current study examines the relationship between religiosity and self-esteem.

Other correlational studies that found a significant relationship between religiosity and self-esteem are discussed in a book by Hyde (1990). For example, Hyde described a study by Moore and Stoner (1977) in which juniors in high school were surveyed for self-esteem and religiosity. Results showed that self-esteem and religiosity were significantly connected for male but not for female adolescents. Habib (1988), as cited by Hyde (1990), found that the more religious students in Cairo universities also had higher self-esteem compared to the less religious students. In addition, Hyde (1990) described a study by Tabachnik (1986) in which a meaningful correlation existed between self-esteem and Jewish identity. This research study attempts to provide more data and clearer results to evaluate better the accuracy of past conclusions.

There exists a great deal of research that concludes that family support is also a major influence on self-esteem. One study analyzed group data of the family structure, function, and support of 913 mothers and their 1-year-old children and the Rosenberg Self-Esteem Scale scores of the children at 24 years of age. The researchers concluded that children have higher self-esteem when their parents are loving, supportive, and deeply involved in their lives (Yabiku, Axinn, & Thornton, 1999). In an article expressing the need for concern about low self-esteem and depression in adolescents, Nunley (1996) reported that children with high self-esteem typically have parents who are receptive to new ideas, encourage their children to create their own views and ideas, and provide their children with the support they need to explore their views and ideas. Self-esteem has been found to have a direct correlation with the quality and strength of parent-child relationships. Children from families with poor communication methods or dysfunctional families tend to have low self-esteem and trouble finding their own identity (Nunley, 1996). Niolon (1999), in reviewing research on the effects on children of being in a dysfunctional family, stated that because dysfunctional families have elevated amounts of stress and conflict, children in these families demonstrate low self-esteem and are at a particular risk of suffering from depression.

A study done in Australia on the correlation between children’s perspective of family cohesion and their self-esteem involved 467 fifth and sixth graders. This study found that the children who felt that their families were unsupportive had the lowest self-esteem (Cooper, Holman, & Bráithwaite, 1983). This study did not investigate this relationship in adolescents, who are especially at risk for the social problems connected to low self-esteem (Murk, 1995; Nunley, 1996). The current study seeks to research the correlation of family support and self-esteem in adolescents.

In a recent study, Mandara and Murrey (2000) measured family functioning of 116 fifteen-year-old African American high school students from Southern California. They found that family functioning could predict self-esteem 90% of the time, which was measured by the Multi-Dimensional Self-Esteem Inventory. This study supported the theory that the quality of family functioning/support is directly related to the children’s self-esteem.

Even though one’s self forms according to experiences and relationships with family, school, work, etc., it is really a person’s perception of these experiences and relationships that have a greater impact on one’s self-esteem (Mecca et al., 1989). Although most of this research clearly stated that family support is directly related to self-esteem, many of these studies were not done on perceived family support.

The purpose the present study was to determine the relationship that religiosity and perceived family support have with self-esteem in adolescents. It was hypothesized that as religiosity increased, self esteem would also increase. It was also hypothesized that as perceived family support increased, self-esteem would also increase.

**Method**

**Participants**

The participants were 93 high school students (32 male and 61 female) ranging in age from 14 to 18 years. The sample consisted of two 14-year-olds, eight 15-year-olds, thirty-two 16-year-olds, thirty-two 17-year-
oldest, and nineteen 18-year-olds. Participants were recruited from one private high school, two public high schools, and one nondenominational church youth group in Southeast Louisiana. All participants volunteered to be in the study. Some received extra credit in the class in which the study was conducted. Because participants were minors and the study was conducted in the schools and a church, written consent was obtained from parents and principals/youth group leaders prior to participation in the research study.

Materials

Materials included a demographic questionnaire that asked for the participant’s age and gender, the Rosenberg Self-Esteem Scale, an investigator-designed Religiosity Scale, and the Perceived Social Support Family Scale, which were used to measure the participants’ levels of self-esteem, religiosity, and perceived family support, respectively. The demographic questionnaire asked for the participant’s age and gender. The Rosenberg Self-Esteem Scale, which was initially created to measure self-esteem of high school students, is a 10-item survey with a four-option Likert scale. The other three items that measured occurrence of religious behavior had six-point Likert scales, of which two ranged from “never to once a day” and the other ranged from “strongly disagree to strongly agree.” The scale includes items such as “I take a positive attitude toward myself.” Scores range from 10 to 40, with 40 signifying the highest level of religiosity score. A high score on this survey indicates that the participant feels he or she is a person of value who is worthy of self-respect. A low score on this survey indicates the feelings of “self-rejection, self-dissatisfaction, and self-contempt” (Murk, 1995; Rosenberg, 1965). The Rosenberg scale has been shown to be internally consistent with a coefficient alpha of .88 (Gray-Little, Williams, & Hancock, 1997).

The primary investigators of this study developed a Religiosity Scale, which consisted of five items. Two self-perception items had a six-option Likert scale that ranged from “strongly disagree to strongly agree.” The other three items that measured occurrence of religious behavior had six-point Likert scales, of which two ranged from “never to once a day” and the other ranged from “never to always.” Scores range from 5 to 30, with 30 signifying the highest level of religiosity. The survey included items concerning the level of the participant’s religious beliefs, religious activity, and religious service attendance. An example of a question on the scale is “I would consider myself religious.” The primary investigators’ Religiosity Scale was modeled after the one used in a 1977 study by Gladding, who later went on to develop the Gladding, Lewis, Adkins Scale of Religiosity (Gladding, 1977; Gladding, Lewis, & Adkins, 1981). The survey Gladding used in his study had only two items: (1) I attend church at least once a month; (2) I am a religious person. Gladding (1977) cited a validity study done by Spilka, Read, Allen, and Dailey in 1968 that showed that these questions measured the religiosity just as well as a more complex survey. However, a coefficient alpha was not reported, so this present study added items to ensure reliability. An analysis of internal consistency was performed on a pilot sample, which resulted in a coefficient alpha of .8379 for the current study’s five-item Religiosity Scale.

Procidano and Heller (1983) developed the Perceived Social Support Family Scale. It is a 20-item survey with the response options of “Yes,” “No,” and “Don’t Know.” The survey contains items such as “I rely on my family for emotional support.” The answers that signify perceived social support were scored as 1 point each so that the highest possible score was 20. A preliminary version of this scale had high internal consistency (coefficient α = .90).

Design and Procedure

This study was a nonexperimental correlational study that looked at the relationship between self-esteem, religiosity, and perceived family support. Self-esteem in this study was defined according to Rosenberg as “a positive or negative attitude toward a particular object, namely, the self” (Murk, 1995). Self-esteem was operationalized as the score from 10 to 40 on Rosenberg’s Self-Esteem Scale, with 40 signifying the highest self-esteem score. Religiosity was defined as an individual’s level of religious beliefs, religious activity, and religious service attendance. Religiosity was operationalized as the score from 5 to 30 on the Religiosity Scale, with 30 signifying the highest level of religiosity. Perceived family support was defined as “the extent to which an individual believes that his/her needs for support, information, and feedback are fulfilled” by his/her family. Perceived family support was operationalized as the score from 0 to 20 on the Perceived Social Support Family Scale, with 20 signifying the highest level of perceived family support (Procidano & Heller, 1983).

Participants were tested in their high school classrooms or their youth group classroom. The study took place at times convenient for the teachers or youth group leaders on weekdays and weekends between 7:00 a.m. and 9:00 p.m. during spring 2001. Before the study was conducted, the principals and youth group leader signed approval letters allowing this study to be done with their students and youth group members. Their teacher or youth group leader informed participants of the nature and purpose of this study a week before testing took place. Participation was voluntary. Students were given a letter and a con-
sent form for their parents. If both parents and students signed the consent form, then students were allowed to participate. On the day of the actual study, the consent forms were collected. Then the researcher handed out a packet of surveys to each participant. Once all the participants were finished completing the surveys, the investigator debriefed them. The investigator reminded the participants that if for any reason they felt a need to talk about any feelings that may have surfaced during their participation in this study, they could talk to their school counselor or youth pastor whose contact information was written on a paper that was handed out to them. The investigator also answered any questions they had and thanked them for participating in the study.

Results

The means and standard deviations of the variables age, religiosity, self-esteem, and perceived family support are presented in Table 1. The Pearson correlations between each pair of variables are also displayed in Table 1. The first hypothesis, which predicted that religiosity and self-esteem would be positively related, was not supported by the correlation analysis. However, the correlation analysis did support the second hypothesis that perceived family support and self-esteem would have a positive correlation. This correlation, \( r(91) = .384, p < .001 \), was statistically significant. We also found that perceived family support and religiosity had a statistically significant correlation, \( r(91) = .265, p = .010 \), indicating that these two variables have a positive relationship.

An independent samples \( t \) test compared the means of male adolescents and the means of female adolescents for religiosity, self-esteem, and family support. The difference between male adolescents’ religiosity (\( M = 21.31 \)) and female adolescents’ religiosity (\( M = 24.69 \)) was statistically significant, \( t(45.591) = 2.469, p = .017 \), according to an \( t \) test on which equal variance was not assumed. This signified that, in general, female adolescents have higher levels of religiosity than do male adolescents. The difference between male adolescents’ self-esteem mean (33.22) and female adolescents’ self-esteem mean (31.48) was not significant, \( t(91) = 1.718, p = .089 \). The difference between male adolescents’ perceived family support mean (13.66) and female adolescents’ perceived family support mean (13.89) was nonsignificant, \( t(91) = 0.188, p = .851 \).

We conducted a regression analysis to find out how much variability of self-esteem could be accounted for by perceived family support and to determine whether the amount of explained variability would significantly increase when religiosity was included as one of the predictors. The regression analysis for perceived family support predicting self-esteem provided an \( R^2 = .148 \), indicating that 14.8% of self-esteem variability was explained by this variable. The regression analysis that included religiosity as one of the predictors did not change the \( R^2 \) value (\( p = .810 \)), indicating that religiosity does not explain a significant amount of variability not already accounted for by perceived family support. Sex was not included in the regression analysis because the correlation analysis already showed it not to be significant in predicting self-esteem.

Discussion

We found no significant correlation between religiosity and self-esteem. Thus the first hypothesis was not supported. These results were unlike those of The Troubled Journey report in which the correlation between
religiousness and self-esteem was significant yet very small. One reason for the difference in correlation significance in these two studies was that The Troubled Journey study's sample size was much larger than the one in the present study. Both this present study \((r = .124)\) and The Troubled Journey study \((r = .080)\) indicated a weak positive correlation, but this current study, with much fewer participants, lacked the power to achieve significance (Donahue & Benson, 1995). Therefore, there is reason to believe that there actually may be a statistically significant correlation between religiosity and self-esteem, but it may be too small to have much practical importance.

A possible explanation for this lack of correlation between religiosity and self-esteem might be that adolescents do not perceive their religion or spiritual beliefs to be an important part of their self-identity. Consequently, their views on religiosity and self-esteem do not influence each other. Another possibility is that adolescents with equal levels of religiosity may have different religious backgrounds, resulting in different spiritual beliefs, which in turn might affect their self-esteem differently. Therefore, an adolescent's level of religiosity alone is not enough to predict that adolescent's self-esteem.

The second hypothesis was supported by the significant positive correlation between perceived family support and self-esteem. These results are consistent with those of previous studies such as the one by Cooper et al. (1983), which concluded that fifth- and sixth-grade children's self-esteem is positively related to perceived family cohesion/support. The current study provides support for extending these conclusions about elementary school children to adolescents. The current research is also consistent with Mandara's and Murrey's (2000) study on the relationship between family functioning and self-esteem of 15-year-old African American adolescents. The current study's results suggest that the conclusions about the 15-year-old African American students should be extended to all ages of adolescents.

There are several possible explanations for this relationship between perceived family support and self-esteem in adolescents. Because most adolescents must spend time daily in their family environment, it is one of the most fundamental and central environments in their lives. One explanation might be that a high level of family support provides adolescents with a sense of stability and security, which is very important during a time that can be turbulent for some individuals. This sense of stability and security allows them to have a positive self-perception. Another possible explanation is that because of adolescents' egocentric nature and tendency to internalize everything around them, those adolescents who do not perceive much support from their families interpret this to mean that they do not deserve this support because of their faults. There is also the possibility that optimistic adolescents perceive both their family support and their self-esteem positively and likewise pessimistic adolescents perceive both their family support and their self-esteem negatively.

No hypothesis was postulated about a relationship between religiosity and perceived family support. Nevertheless, we found a significant relationship between religiosity and perceived family support. This relationship is not a causal relationship; therefore, it is possible that other characteristics associated with certain families affect both family support and religiosity and thus bring about this correlation. Mason and Windle (2001) found that family support was positively correlated with religiosity \((b = .27, p < .001)\) of adolescents. In their study, adolescents were more likely to be dedicated and involved in their religion if they reported having families that were loving and emotionally supportive than were those from less supportive families. Mason and Windle suggest that the family may present an influential social framework for adolescents to develop their religiosity.

A relationship was also found between gender and religiosity, even though no hypothesis was proposed for these variables. Francis' (1997) review of empirical studies on gender differences in religiosity evaluated several prominent theories that past research had provided. Francis reported that gender orientation (femininity vs. masculinity) seemed to explain most of the variance in religiosity according to gender, with more feminine individuals having higher religiosity. However, gender still explained additional variance aside from gender orientation for adolescents' religiosity. The explanation that seems to be most plausible for adolescents combines the gender orientation theory with the gender role socialization theory, which states that female adolescents are socialized with value placed on conflict resolution, compliance, tenderness, nurturance, and other expressive ideals that correspond with religious importance.

Despite interesting findings, there were sampling limitations because we used a small convenience sample. Therefore, results may not be generalizable to a wide population. As mentioned earlier, the small sample size may have also impacted the power to detect a significant relationship between religiosity and self-esteem.

This research study adds to the body of knowledge on the predictors of adolescent self-esteem. An individual adolescent's level of self-esteem can be predicted if that adolescent's sex and level of perceived...
family support is known. This was a correlational study and was not done as an experiment. Therefore, cause and effect relationships between the variables could not be established. However, if the explanation for the significant correlation between perceived family support and self-esteem happened to be that perceived family support influences self-esteem in some way, then increasing the amount of family support an adolescent receives and perceives should increase the adolescent's self-esteem. If this is true, then parents should be encouraged to provide their children with a large amount of support in order to raise their children's self-esteem and lessen the likelihood that their children will fall prey to the antisocial behaviors associated with low self-esteem. Being able to predict which adolescents are at risk of having low self-esteem can also help school counselors, teachers, and others to be better able to anticipate and take preventive action against the possible problems that adolescents with low self-esteem are likely to have.

For future research, it is suggested that the sample be larger and include randomly selected adolescents from various locations across the country so as to be more nationally representative. Perceived peer support, academic achievement, perceived physical security, socioeconomic status, and maturity are other possible variables to correlate with adolescent self-esteem in future research. We also suggest that future research investigate the reasons behind the correlations of these variables and self-esteem, perhaps by using an experimental approach in which one set of families is given counseling on how to increase parental support for their adolescents and after some length of time compare the self-esteem of these adolescents to that of other adolescents in a control group whose families did not receive counseling.

References


Influence of a Sleeping Versus Waking Retention Interval on Spatial, Visual, and Auditory Memory Performance

We investigated the influence of a retention interval spent sleeping or waking on participants' performance in spatial, auditory, and visual tasks. Using Jenkins and Dallenbach's research (1924) as a paradigm, we replicated and extended the original study using a 2 x 3 mixed design with repeated measures. The 2 independent variables were the activity during the retention interval (i.e., sleeping or waking) and the 3 types of memory tasks (i.e., spatial, auditory, and visual). Fifty-seven undergraduate students participated in 2 sessions. Results indicate that a retention interval spent sleeping had a beneficial effect on auditory memory performance. We did not find a significant effect for visual and spatial memory performance, but attribute this to ceiling effects within the experimental design.

Memory retention has been the subject of much psychological experimentation and investigation. Researchers have investigated both how memories are formed from a given stimulus and how those memories are then retained. However, it was only in the early 20th century that memory was paired with sleeping for investigation and study. Researchers began to focus on how sleep, both its length and quality, affects memory formation and retention. Evidence has emerged that suggests an intricate link between memory consolidation and sleep length and quality.

Memory research proposes that activities immediately after learning have a large impact on the retention of the learned material. Sleep is believed to facilitate memory consolidation because it prevents interference from novel stimuli (Benson & Feinberg, 1977). However, sleep investigators propose that interference alone cannot explain the beneficial effects of sleep on memory consolidation: the intrinsic characteristics of sleep appear to help to consolidate and retain memories (Stickgold, Whidbee, Schirmer, Patel, & Hobson, 2000).

Using Ebbinghaus' memory research as their foundation (as cited in Jenkins & Dallenbach, 1924), Jenkins and Dallenbach (1924) compared the rate of forgetting during sleep and waking. Jenkins and Dallenbach asked their two participants to learn a series of nonsense syllables to the point of mastery and then asked them to recall those syllables at intervals of waking ranging from 1, 2, 4, or 8 hours and randomly varied. Jenkins and Dallenbach's study demonstrated that recall was twice as effective after sleeping intervals when compared to recall after waking intervals. Their research also indicated that this difference between waking and sleeping intervals became increasingly pronounced as the interval length increased. The average number of reproductions for both 4-hour and 8-hour recall intervals of waking was significantly lower than responses at 2-hour waking intervals, whereas responses after intervals of sleep were maintained at 2, 4, and 8 hours.
hours. This study supports the hypothesis that sleep improves memory retention compared to waking.

Benson and Feinberg (1977) extended Jenkins and Dallenbach's research to focus on time intervals and the forgetting curve, and they challenged Jenkins and Dallenbach's proposal that sleeping merely prevents interference and thus improves retention through insulation. Using a paired associates list as their learning task, Benson and Feinberg systematically replicated Jenkins and Dallenbach's study. Their sample size was significantly larger (N = 60). Their retention intervals were set at 8, 16, and 24 hours. Because both groups were allowed to sleep after the 8-hour interval, the 16- and 24-hour intervals allowed researchers to test the enhancing effect of sleep on memory. If the Jenkins and Dallenbach conclusions were correct, all participants would show improved recall when tested at 16- and 24-hour intervals. In fact, Benson and Feinberg's results confirmed Jenkins and Dallenbach's findings: sleep onset shortly after learning verbal materials had a beneficial effect on recall in the 8- to 24-hour period following learning.

Koulack (1997) raised the question of how circadian rhythms affect memory consolidation. Koulack proposed that circadian rhythms increase a participant's vigilance and consequently play a critical role in aiding memory consolidation. Koulack showed 40 male participants a series of 40 words individually and at regular intervals. Koulack then showed his participants 80 words, 40 new and 40 that they had previously seen. Participants were instructed to indicate whether the word on the screen was "new" or "old." Koulack's results showed that afternoon learners had higher scores than morning learners. Koulack's research also showed that participants who slept had higher scores than those who remained awake. Koulack's study therefore confirmed Jenkins and Dallenbach's (1924) early research, reinforcing the idea that sleeping improves memory consolidation.

Ficca, Lombardo, Rossi, and Salzarulo (2000) addressed the role of REM sleep in memory processes. Ficca et al.'s research compared the effects of disorganized sleep cycles and sleep discontinuity on the recall of verbal material in young adults. These researchers hypothesized that regular occurrences of NREM-REM cycles are critical to the retention of verbal material learned just prior to sleep onset. The study's 12 participants were given a verbal recall task using 20 unrelated word pairs. Ficca et al. found that "sleep efficiency" (i.e., the quantitative amount of intranight wakefulness) did not significantly affect recall. However, their results suggested that the organizational quality of sleep, defined as regular cycles of NREM-REM sleep, is more important than contiguity for memory tasks. Ficca et al. were careful to highlight that their findings are applicable only to verbal material. This disruption may not be present when other learning modalities are tested.

Stickgold et al. (2000) addressed how sleep benefits visual discrimination tasks. Using a variation of Karni and Sagi's (1991) visual discrimination task (as cited in Stickgold et al., 2000), Stickgold et al. showed their participants a series of screens, each with slightly different images, with a 0.40-msec interval. Participants were then asked to report what image they saw on the screen. In conjunction with the learning task, Stickgold et al. analyzed their participants' sleeping patterns. Stickgold et al. found that performance on a visual task improved if the participant had a minimum of 6 hours of sleep prior to retesting. Slow-wave sleep (SWS) and REM are critical in consolidating memory for a visual task. Stickgold et al. proposed that it is the sequence of events mediated by SWS and REM sleep that improves performance on a visual task. Although their test could not empirically determine how sequential events during SWS and REM facilitate memory consolidation, they proposed that SWS allows memories to transition from the hippocampus into the neocortex. REM sleep then facilitates the strengthening of these memories in the neocortex and the formation of new associative memories.

The present study merges these two notions to investigate how sleep and waking each affect memory retention. In a replication and extension of previously conducted research (Jenkins & Dallenbach, 1924), we hypothesized that learning, followed by a sleep interval of at least 6 hours, is more effective in fostering memory retention than when learning is followed by a waking interval of the same length.

Method

Participants
Fifty-seven students enrolled in undergraduate psychology courses at a small, private, northern California university volunteered to participate. Participants ranged in age from 18 to 22 years. Volunteers were recruited via the psychology department's research participation pool and through psychology faculty advisors. All participation was voluntary, and students received participation units in their introductory psychology class for their participation or extra credit in their psychology courses. As an incentive to increase interest in subject material, the eight highest-scoring participants were awarded $5 at the completion of our study. All participants were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct," and confidentiality was maintained (American Psychological Association Ethics Committee,
For the purpose of data analysis, only participants in the sleeping group who reported getting at least 6 hours of sleep were included. For participants in the waking group, only those who reported that they did not nap during their waking interval were included in the data analysis.

Twenty-eight participants’ scores were used in the data analysis: 14 participants in the sleeping group and 14 participants in the waking group.

**Materials**

An adapted version of the Rey complex figure was used for the spatial learning task (from Kolb & Whishaw, 1996; see Appendix). Pilot testing indicated a modified version of this figure to be of appropriate difficulty for students to learn in a period of 3 minutes. The figure was enlarged to the size of 26 × 17½ in. (66 × 44½ cm). Blank 8½ × 11 in. (22 × 28 cm) sheets of paper were used as practice materials. The response materials were sheets of standard, letter-sized paper with brief directions instructing students to replicate the figure as completely and accurately as possible from memory.

We used a previously published, paired associates list for our auditory task (see Searleman and Hermann, 1994). This list was appropriate because previously published research indicated it to be composed of semantically unrelated word pairs that were of sufficient familiarity to our pool of college-age participants. The response sheet, printed on standard, letter-sized paper, listed brief directions and had a printed line corresponding to each prompted response.

Visual stimuli consisted of 32 black-and-white photos of faces. Each photo was enlarged to 8½ × 14 in. (22 × 35.56 cm) sheets on high-quality card stock. The photographs were taken from the recruitment bulletin of a northern California professional art school. All photos showed only the individuals’ faces, not including their hair or neckline. Faces varied in age, gender, and ethnicity. Facial expressions were varied as well. The response sheets for this task listed letters A and B, which directly correlated to each pair of faces presented. Directions printed atop the sheet instructed participants to circle the letter corresponding to the photo shown in the original 16 pairs presented during the learning portion of the procedure.

Several questionnaires were used. Two previously published surveys were printed on standard, letter-sized paper. These were the Owl and Lark questionnaire (from Horne & Oxbert, 1976) and the Epworth Sleepiness Scale (from Johns, 1991). These questionnaires were chosen because previous research shows they are informal measures of circadian rhythms and sleep debt. In addition, a set of questions was designed to investigate how much participants slept between the two sessions, if they exercised, if they thought about the experiment between sessions, and if their sleep followed a regular pattern.

**Design**

The study entailed a 2 × 3 mixed design with repeated measures. The two independent variables were the activity during the retention interval (i.e., sleeping or waking) and the three types of memory tasks (i.e., spatial, auditory, and visual). Activity during the retention interval was a between-subjects factor that was manipulated by assigning one group of participants to sleep for the majority of time between the learning and testing of the three memory tasks, and one group of participants to remain awake for the majority of this interval. Participants selected which group to attend; however, they were not aware of the varied conditions between each group. Repeated measures were used to score each participant’s performance on each memory task during each session attended.

For all participants there was a 10-hour interval between the first learning session and the second recall session. Furthermore, final data analysis included only those participants who reported sleeping at least 6 hours subsequent to learning. Those in the waking condition spent the entire interval between the learning and testing awake; participants who napped between learning and recall were removed from data analysis. Participants reported their sleeping habits on questionnaires distributed at the conclusion of our final session.

For the memory tasks we administered a task involving spatial processing, one involving visual processing, and one involving auditory processing. This within-subject element of the design allowed us to compare memory performance on three types of tasks before and after the retention interval.

To counterbalance possible sequencing effects that might result from presenting each task to participants in a uniform order, we used block randomization. There were six possible testing sequences for our study. We randomly assigned these sequences in blocks of six. For example, because there were 12 groups in our first week of experimentation, each testing sequence appeared twice. We also kept the task order constant between the initial learning and final testing sessions within each particular group. Therefore, participants were tested in the same order in which they had previously learned the tasks.

The dependent variable in the present study was participants’ performance on three individual memory tasks. Researchers obtained these scores 10 hours after
participants initially learned the tasks. By allotting a designated number of points for the correct responses, we were able to quantify participants’ performance on each of the memory tasks. Therefore, a score of 100% signified that an individual obtained the full number of points possible within a particular task and thus correctly remembered all elements within it.

Many variables were held constant across both groups to ensure that any observed variations on task performance were due to the manipulation of the independent variable and not to any extraneous differences existing between groups. For example, the sex and number of experimenters administering the memory tasks at both learning and testing were kept constant. We also controlled the instructional format within groups, as experimenters of all participant groups read aloud prescribed instructional sheets that designated a time limit and clear directions for each of the memory tasks. Moreover, experimenters administered all tasks in an identical fashion, varying only the order in which each was presented. For example, experimenters showed the faces used to test visual memory in a fixed order within all groups, varying them in the same manner for both Session 1 and Session 2. All of these set conditions ensured that each participant received identical instructions, guidelines, and task arrangements. Thus every participant experienced equivalent experimental procedures.

Procedure

Experiments were conducted in groups of between 1 and 16 participants. All participants attended both sessions. During the first session participants were given three memory tasks: a spatial memory task, an auditory memory task, and a visual memory task. After the tasks were administered, experimenters tested participants’ performance on these tasks. During the second session, held 10 hours after the first session, participants were again tested on the three memory tasks in the same order. To minimize demand characteristics, participants were told that our study was investigating learning environments and memory. At no point during the testing procedure were participants aware of the sleeping manipulation.

First session. For the procedural memory task, participants were shown an adapted version of the Rey complex figure for 3 minutes (Kolb & Whishaw, 1996; see Appendix). During these 3 minutes, participants were given the opportunity to practice drawing the figure on scratch paper. After the 3 minutes, the experimenter removed the scratch paper and Rey figure. Participants then drew the figure as accurately and completely as possible from memory on the paper provided. Once participants had completed the figure, the experimenter showed the Rey figure a second time to provide participants with the opportunity to see how accurately they had reproduced the figure. To score this task, the experimenter awarded 1 point for every line a participant drew correctly. One point was deducted for every incorrectly placed line (i.e., line in the incorrect orientation, or participant added lines that were not part of the figure shown). A total of 60 points could be earned on this task.

The auditory memory task consisted of 12 pairs of faces for a second time. To score this task, the experimenter awarded participants 1 point for every correct word complement they recalled for a possible score of 12 points.

To test visual memory, we gave participants a face recognition task. During the learning phase of this task, participants viewed pictures of 16 individual faces for a period of 5 seconds each. During the testing phase of this task, the experimenter showed participants eight pairs of faces again for a period of 5 seconds each. Each experimenter positioned herself where all participants could easily see the photograph. Each pair consisted of a face that participants saw during the showing of the original 16 pictures and a new face that participants had not yet seen. Participants were instructed that the picture the experimenter held in her right hand corresponded to the letter A on their testing sheet, whereas the picture held in the experimenter’s left hand corresponded to the letter B. Participants identified the face that they had seen during the learning phase of the task by circling either A or B on their testing sheet. After the testing phase of this task, the experimenter showed the original 16 faces for a second time. To score this task, the experimenter awarded 1 point for every correct face participants identified. A total of 8 points could be earned on this task.

Second session. Ten hours after the first session, participants returned to the testing site to complete the experiment, fill out three short questionnaires, and receive debriefing. Participants performed the memory tasks in the same order they received them in the first session. The purpose of the second testing ses-
Screen was to determine participants’ recall and performance on the three memory tasks 10 hours after initial learning. To test recall for visual memory, participants completed the Rey figure they saw during the first session as accurately and completely as possible from memory. Participants were given 3 minutes to complete the task. Again, the experimenter awarded participants 1 point for every correctly drawn line and subtracted 1 point for every incorrectly drawn line. To test recall for auditory memory, the experimenter read the same 12 prime words that participants heard in the first testing session. Upon hearing the prime word, experimenters prompted participants to provide the complement to the prime, as remembered, on the space provided on the testing sheet.

The experimenter awarded participants 1 point for every correct word complement they recalled, for a possible 12 points. To test recall for visual memory, participants again viewed eight pairs of faces. Participants had seen eight of the faces during the first session (they were part of the original 16 faces shown), whereas eight of the faces were new to participants. Experimenters instructed participants to identify which face they had seen before by marking A or B on the testing sheet provided. Again, face A was held in the experimenter’s right hand and face B was held in the experimenter’s left hand. To score this task, the experimenter awarded 1 point for every correct face recognized, for a total of 8 possible points.

After participants completed the three tasks, they completed three short surveys. One survey asked participants about their lifestyle habits, including how many hours of exercise they engaged in on the day of testing, the times they went to bed and woke up, and how stable they considered their sleep habits to be. Experimenters also distributed the Owl and Lark questionnaire (from Horne & Ostbert, 1976) to determine what time of day individual participants were most alert. We calculated responses as ratios out of 38 possible points. Those participants who scored close to zero (i.e., 8/38) were determined to be more alert during the nighttime. Those approaching one (i.e., 36/38) were determined to be more alert during the morning hours.

For the lifestyle habits questionnaire, we coded all responses numerically. The “thinking of study” question produced responses from 0 to 4, with 0 representing participants who did not think of the study at all between sessions and 4 being participants who reported thinking about the study many times during the retention interval between sessions. The sleep quality question produced numeric responses on a scale of 1 to 5, with 1 representing very disrupted and inconsistent sleep and 5 signifying a restful night’s sleep. All responses pertaining to time were converted into minutes for statistical evaluation.

Results

Scoring Procedure

Measuring task performance. We collaborated to define procedural and scoring criteria for all tasks and questionnaires prior to scoring any data. We then divided the data by task and scored each task independently. Each researcher was assigned one specific task to score. To maintain continuity in scoring, only one researcher scored all tasks. Both portions of the auditory task were scored on a scale of 1 to 12, awarding 1 point for each correct response with 12 points possible. The visual task was similarly scored, with the total number of recognized faces in proportion to the total number of face pairs shown. Therefore, a participant correctly recognized seven faces in the eight pairs. His or her total score was 7/8 for that visual task. The spatial task consisted of 28 lines, allowing for a total of 28 possible points. One point was given for each correctly demarcated line. We quantified the perimeter of the figure to be composed of four lines, each side representing one line. Four points were then awarded if the figure was correctly divided into eight right triangles of equal area. Participants earned the remaining 20 points if all other line segments in the interior of the figure were correctly placed. The circle and three dots in the second quadrant of the figure each represented 1 point. One point was deducted for intrusions and for lines drawn in an incorrect orientation. We calculated final scores for all tasks as proportions with the number correct over the total number of responses possible.

Scoring questionnaires. We scored responses to the Epworth questionnaire (from Johns, 1991) out of 24 possible points. Participants who reported higher scores suffered more sleep debtedness. We used the Owl and Lark questionnaire (from Horne & Ostbert, 1976) to determine what time of day individual participants were most alert. We calculated responses as ratios out of 38 points possible. Those participants who scored close to zero (i.e., 8/38) were considered to be more alert during the nighttime. Those approaching one (i.e., 36/38) were determined to be more alert during the morning hours.

Selection Criteria

After individual scores were determined, we eliminated participants if their activities during the retention interval undermined the intended manipulation. For example, participants in the waking group were eliminated if they reported taking a nap during the
retention interval. We eliminated participants in the waking group if they scored greater than 8 on the Epworth Sleep Debtedness scale. We eliminated participants in the sleeping group if they reported sleeping less than 360 minutes during the retention interval. After eliminating these participants, 14 participants in each group were used for statistical analysis.

Data Analysis

We used a multivariate analysis of covariance (MANCOVA) to determine the influence of retention interval activity on performance on each task at Time 2 while controlling for (a) task performance at Time 1 and (b) the intercorrelations in task performance across the three tasks. The mean performance at Time 2 for an auditory task was significantly greater for those participants who slept during the retention interval \( (M = 0.71) \) than for those who remained awake \( (M = 0.43) \), \( F(1, 27) = 6.00, \text{MSE} = 0.013, p = .022 \).

For the visual task, the MANCOVA demonstrated that a sleeping interval when compared with a waking interval did not affect participants' ability to recognize a given stimulus correctly \( (M = 0.94) \), when controlling for performance at Time 1 and the intercorrelations in task performance across the three tasks, \( F(1, 27) = 0.044, \text{MSE} = 0.022 \). For the visual task, a comparison of mean scores at Time 1 and Time 2 shows that there was no significant difference in memory performance regardless of retention interval activities. Thus there was no significant effect of the retention interval activity on performance at Time 2 for the visual task. See Table 1 for a summary of mean values for all tasks.

Finally, the MANCOVA indicated that a sleeping interval when compared with a waking interval did not affect participants' ability to reconstruct the previously seen figure \( (M = 0.94) \) when controlling for spatial task performance at Time 1 and the intercorrelations in task performance across the three tasks, \( F(1, 27) = 0.279, \text{MSE} = 0.019 \). In comparing mean scores at Times 1 and 2, there was no significant difference in memory performance for the spatial task. There was no significant effect of the retention interval activity on performance at Time 2 for the visual task.

A retention interval spent sleeping resulted in superior cued recall for the paired associates task but not a visual or spatial task when compared to a retention interval spent awake. Mean performance at Time 2 of the sleeping group was significantly greater than mean performance at Time 2 of the waking group on the auditory task. No such differences were found for the spatial or visual tasks.

Statistical analysis thus demonstrated that a retention interval spent sleeping when compared to an interval spent awake was beneficial to cued memory recall for an auditory task, but did not significantly affect performance for mean recall on a spatial task or mean recognition for a visual task.

Discussion

The results partially confirm the prediction that sleeping does have a positive effect on memory retention. That is, for the auditory task, results indicate that sleeping after a period of learning yields higher task performance at Time 2 when compared to an interval spent awake. However, the results do not support the same hypothesis when applied to the visual and spatial tasks. Performance at Time 2 on the visual and spatial tasks was not significantly affected by a sleeping interval.

Results of the current study support Jenkins and Dallenbach's (1924) early findings: auditory task performance at Time 2 was greater after a period spent asleep than after a period spent awake. However, whereas the Jenkins and Dallenbach paradigm utilized nonsense syllables, our auditory task involved the use of paired associates. Our results are, however, inconsistent with Koullack's (1997) findings. Using word recognition as his learning task, Koullack found sleep to facilitate memory performance when compared to waking. Whereas Koullack's design involved a recognition task similar to our visual task, the present findings do not directly coincide with his results. Perhaps the current visual and spatial tasks may have produced a ceiling effect in performance. That is, the tasks may not have been sufficiently challenging; participants did not show a marked difference in task performance at Time 1 and Time 2. In future studies, pilot testing to measure the difficulty of tasks would be helpful in preventing the ceiling effect we believe was observed.

Similar to Koullack (1997), Stickgold et al. (2000) investigated how a sleeping interval affects visual memory performance. Stickgold et al. found that performance on a visual task improves if the participant
has a minimum of 6 hours of sleep prior to retesting. We attribute this discontinuity between the results produced by the present study and those of the Stickgold et al. study to potential ceiling effects for the visual task. Although researchers ensured that participants in the sleeping group slept a minimum of 6 hours during the retention interval, tasks may not have been sufficiently challenging to allow sleep to show a significant effect.

For future research, pilot studies should be used to ensure sufficient task difficulty and thus eliminate the possibility of a ceiling effect. For example, future researchers may want to use the original Rey complex figure (Kolb & Whishaw, 1996) rather than our simplified version. Also, the visual task could be made more difficult by showing participants more faces and reducing the individual differences between faces. For example, if all faces were Caucasian women between the ages of 20 and 30 years, participants would likely have a more difficult time distinguishing between faces they had seen before and new faces.

The experimental design could be further strengthened with a larger sample size. Because the majority of our participants were derived from a university participation pool, it was difficult to obtain a large and diverse population sample. A larger participation pool may have increased the noticeable effect of our manipulation and would have allowed our findings to be generalizable to a larger population. Also, because participants partook in the experiment on a voluntary basis and did not have adequate incentive to make scheduling sacrifices to accommodate our experimental time-table, random assignment could not be utilized in our study. Because there were many potential individual differences that could have impacted our results, random assignment should be used in future research to strengthen the experimental design. Financial compensation for participation could have offered participants a greater incentive to attend sessions, despite their inconvenient times.

Results support our initial hypothesis that sleeping, when compared to waking, has a positive effect on memory performance for an auditory task. Because we did not find significant results for the spatial or visual tasks, it may be concluded that the nature of the task is an important element to consider when studying retention level activity.

Theoretical implications of the results of our study lend support to the notion that sleep plays a critical role in memory processing. For example, these findings lend support to the hypothesis that a significant time spent asleep aids in memory consolidation. Furthermore, for this specific participant population, namely college students, these findings seem to imply that 6 hours of sleep is critical to processing newly learned auditory information, perhaps newly presented lecture materials. A night spent cramming before an exam without sufficient sleep may do little to instill the necessary information. Rather, it seems that adequate sleep on a regular basis might be more beneficial to memory retention and recall.

References
College Students’ Behavior and Attitudes Following September 11 Attacks

The attack of September 11, 2001, was one of the most devastating terrorist attacks in American history. Previous research has noted trauma-related symptoms within populations living geographically distant from the attack that had been exposed through the media (Pferrerbaum et al., 2000). The purposes of the present study were (a) to assess the level of traumatic impact of the September 11th attack reported by students within a college population geographically distant from the attack and (b) to find the benefits that were experienced within this population. Participants were 420 students aged 17 to 57 years (M = 21) who attended 3 colleges in a city not directly attacked on September 11th. The most commonly reported symptoms included difficulty concentrating, feeling edgy, and replaying painful memories. The most commonly reported benefits included being more aware of how much people care for one another and how good people can be. Results indicated that a majority of the sample reported posttraumatic stress disorder—like symptoms and that a heightened sense of compassion was experienced as a result of traumatic exposure, suggesting that college students may need additional support after widely publicized disasters.

The September 11, 2001, attacks on the World Trade Center and Pentagon represent the single most devastating terrorist attack in American history. A nation stood in horror and disbelief while it watched one of its most powerful national symbols crash into the streets of New York, with estimates of as many as 3,000 dead. The psychological impact that an attack of this magnitude will have on a population who had taken its security for granted is not known. Previous research concerning the impact of terrorism has been largely based on the 1995 Oklahoma City bombing. Pferrerbaum et al. (2000) noted trauma-related symptoms not only for those with direct exposure (i.e., knew someone injured or killed), but also for people geographically distant from the attack who had been exposed only through the media. Lewis (2000) proposed that the factors that influence the impact of terrorism on the public are (a) perceived personal risk, (b) the impact on an individual’s routine behavior, and (c) political salience. The attack of September 11th overshadowed the Oklahoma City bombing in all three of these categories and should, therefore, have a significant impact on populations living great distances from the attacks, as well as those who have experienced only media exposure. The present study was designed to assess the impact of September 11th on a college population geographically removed from the attack sites, but immersed in media coverage of the event. The focus of this study was not only on the negative impact of the event, but also on positive changes in behavior and attitude that might have occurred in the aftermath of this catastrophe.

Literature exploring the impact of disruption in a person’s core belief systems may help to explain negative consequences of trauma, even from indirect exposure. Janoff-Bulman (1992) stated that people maintain three fundamental assumptions: (a) the world is benevolent, (b) the world is meaningful, and (c) the self is worthy. These fundamental schemas help us to make sense of our world and assign meaning to common experiences. Our beliefs about the benevolence and meaningfulness of the world and of our own self-worth influence our interpretation of daily events. The average person wants to believe that bad things do not happen to him/her and that the future is secure. People are able to maintain what

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Janoff-Bulman (1992) called an “illusion of invulnerability” (p. 51). To maintain this illusion, individuals interpret experiences in accordance with beliefs about the uninterrupted continuation of secure existence. Janoff-Bulman (1992) explained that, in times of trauma, these fundamental assumptions are challenged and an intense psychological crisis is induced. On September 11th, the entire American population was, in one morning, forced to see that they were not as safe as they once believed. Janoff-Bulman’s (1992) work would suggest that an event such as September 11th would expose people to “the terror of their own vulnerability” (p. 61). The fact that civilians were targeted and that a major U.S. airline provided the bomb for such a catastrophic attack has forced American citizens to face our individual vulnerability and, therefore, confront our own mortality in very new and real ways.

Pfriembaum et al.’s (2000) findings that post-traumatic stress disorder (PTSD) symptoms and functional impairment were reported within populations living geographically distant from the 1995 Oklahoma City bombing and who had not directly experienced any interpersonal loss have specific relevance to the present study. Pfriembaum et al. conducted a survey designed to assess traumatic exposure, PTSD symptoms, and functioning 2 years after the Oklahoma City bombing. The sample was composed of 69 sixth-grade youths living within 100 miles of Oklahoma City at the time of the bombing. The youths had not experienced any direct physical exposure to the bombing, and they did not personally know anyone killed or injured in the explosion. The authors found media exposure and indirect interpersonal loss to be significant predictors of functional impairment and PTSD symptoms. Comparable studies with college students have not been published, so it is unknown whether young adult populations might be similarly impacted.

In the quest for mastery over their environment after exposure to the horror of September 11th, those indirectly exposed may have been able to cope and react in productive, and even positive, ways. This, too, would be an important phenomenon to document. The possibility of perceived or actual benefits following September 11th is suggested by events that have been well documented in the popular press, as evidenced by the surge in patriotism and compassion across the nation immediately after the attacks of September 11th. CNN reported that Wal-Mart alone sold 450,000 flags in the 3 days following the attacks and, like most stores, temporarily sold out (Max, 2001).

The complexity of reactions to trauma exposure is illustrated by the literature on mortality and worldview reactions. The mortality salience hypothesis may help explain the surge in patriotism seen in America since the September 11th attacks. It states that a person’s affiliation with his or her cultural worldview is motivated by death anxiety/terror (Dubstein & Masling, 2000). The theory predicts that reminding people of their own death will provoke increased allegiance to their worldview and has been supported by research. Arndt, Greenberg, Pyszczynski, and Solomon (1997) found that participants, when asked to think about their own death, became more positive in their evaluations of people who shared their worldview (i.e., regarding nationality and religion) and more negative in their evaluations of those who challenged it. Whereas this reaction might be perceived as evidence of prejudice, these data also highlight the benefit of heightened sense of community following threats to mortality. Research has also found that after threats to their mortality, participants were significantly more reluctant to handle culturally valued artifacts, such as a crucifix for Catholic participants and an American flag for U.S. citizens, in sacrilegious ways; they also directed more aggression toward people who threatened their physical orientation (Greenberg, Pyszczynski, Solomon, 1995; McGregor et al., 1998). Evidence from these studies suggests the benefit of heightened appreciation and respect for cultural values and self results from realizing one’s vulnerability and could help explain the increased patriotism seen throughout the nation following September 11th. However, there is a need for a formal assessment of what benefits result from this realization and if populations indirectly exposed to traumatic events could experience similar benefits.

The purposes of the present study were (a) to assess and describe the level of Davidson Trauma Scale PTSD symptoms, (b) to identify the specific PTSD symptoms reported in the first 24 hours and from the 2nd day on, and (c) to identify the most common benefits of the September 11th attacks reported by students within a college population geographically distant from the attacks. The findings of the study could help the psychological community estimate the magnitude of potential psychological damage suffered by those who do not live in the New York and Washington, DC, area, but are exposed through the media. Any benefits being generated by this exposure might explain the patriotic and compassionate reaction of the nation and, more broadly, could attest to the strength of the human spirit in the face of such tragedy.

Method

Participants
A total of 420 students (56% male, 44% female) participated in the research. The sample was 76% Caucasian, 13% African American, 3% Hispanic, 3% Asian.
American, and 5% other, with ages ranging from 17 to 54 years (M=21; SD=4.107). Students were solicited from three colleges in a southeastern city not exposed to direct attack on September 11th. The sample was composed of 15% first-year students, 19% sophomores, 34% juniors, and 31% seniors.

Measures

The Davidson Trauma Scale (Multi-Health Systems, 1998) is a self-rating scale originally composed of 17 items. An abbreviated, 12-item version was used in the current study with publisher consent. This assessment was designed for diagnosis of PTSD. This scale, recommended for screening and assessment of symptom severity, was abbreviated to 12 items most appropriate for purposes of this study. Responses were endorsed on a yes/no basis and solicited for recollections for the first 24 hours after the event and from the 2nd day after the event to the present. Although the Davidson Trauma Scale has been noted to have adequate test-retest reliability, internal consistency, and concurrent validity (Davidson et al., 1997), the psychometric properties of the abbreviated version are unknown because of its adaptation from the original version.

The Perceived Benefits Scale (McMillen & Fisher, 1998) was designed as a self-report measure to assess positive life changes that occur after exposure to traumatic stress. A factor analysis yielded eight subscales for the instrument: Lifestyle Changes, Material Gain, Increases in Self Efficacy, Family Closeness, Community Closeness, Faith in People, Compassion, and Spirituality. Scale scores have been noted to correlate with level of severity and vary as a function of the type of negative event participants experience (McMillen & Fisher, 1998). Reliability coefficients for internal consistency and test-retest coefficients for this measure are adequate (McMillen & Fisher, 1998).

Procedure

Institutional review boards reviewed the proposed study and approved the use of measures and procedures. Instructors of psychology and political science courses were approached with requests to collect data in the classroom. All instructors granted permission for data collection. The participants were informed about the study when an investigator attended their undergraduate psychology or political science classrooms (with instructor consent). Participants were solicited for participation in the study 7 to 15 days after September 11th. They were read standardized instructions and asked to sign a consent form before completing the survey if they elected to participate. Participants completed the survey in class and were permitted to use this activity to earn extra credit for courses that offered this option. Participants completed the questionnaire in approximately 15 minutes.

Results

The most commonly reported trauma-related symptoms included having difficulty concentrating, painful images, memories, or thoughts of the event (see Table 1). The 10 most commonly reported symptoms experienced within the first 24 hours were also reported as being experienced from the 2nd day on (see Table 2). The percentage of participants reporting the 10 most common symptoms declined slightly between symptoms reported within the first 24 hours and from the 2nd day on (see Tables 1 and 2). In terms of benefits, participants reported an increased awareness of how much people care for one another and the meaning of family in their lives as a result of indirect exposure to the attacks. Other commonly reported benefits involved increased feelings of compassion, understanding, and faith in God and a greater sense of community (see Table 3).

Discussion

The finding that a majority of the sample reported at least one symptom of PTSD supports Pfefferbaum et al.'s (2000) findings that trauma-related symptoms can be experienced by people living geographically
distant from the attacks and with opportunities for media exposure. Results suggest that young adults in a setting remote from home may experience PTSD symptoms related to intrusiveness, reexperiencing phenomena, or avoidance that are often provoked by serious, life-threatening stressors. The results were also consistent with Lewis’s (2000) proposed influences of the impact of terrorism to the public, given the nature and repercussions of September 11th, 2001.

Although endorsement for the four most commonly reported symptoms on the abbreviated Davidson Trauma Scale decreased in endorsement from the first 24 hours to the 2nd day on, being upset by reminders of the event moved to the most commonly reported symptom. Given that reminders of the event are frequently presented in news coverage, it appears that the same medium that introduced the original impact of trauma may be contributing to the most salient symptom in the period following it. The finding of 43% endorsement for being upset by triggers following the initial 24-hour period raises the possibility that a considerable proportion of the American population may experience less negative impact if exposure to news/media coverage of events is limited or eliminated.

Although we did not assess attributional shifts that participants might have experienced after media exposure to the September 11th attacks, Janoff-Bulman (1992) has noted that trauma disrupts fundamental cognitive assumptions about safety and induces intense psychological crises. Given that the potential for America to be the target of future terrorist attacks is noted to be high according to media sources, these disruptions in safety assumptions are understandable. Karen Hughes, who was then senior presidential adviser, was quoted by *Time* magazine as saying, “the Bush Administration is bracing for another terrorist attack.... We [are] as vulnerable today as we were on 9/10 or 9/12 (Calabresi & Ratnesar, 2002, p. 3).”

It seems that horrific events force exposed populations to admit the reality that there are times in life when the world is not benevolent. Indeed, it was hard to find benevolence on the morning of September 11th when 2,819 innocent lives (“Medical examiner,” 2002) were sacrificed for reasons the American population found hard to understand. As proposed by Janoff-Bulman, findings of distress may reflect the intense state of crisis experienced as individuals were confronted with the harsh reality of their vulnerability. The findings of a heightened awareness of the goodness and compassion of others and increased compassion and understanding of/sensitivity to others’ needs endorsed by more than 50% of this study’s participants shed light on the positive impact that an extremely negative situation can have on individuals. Participants reporting that they became more com-

### TABLE 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>Upset by reminder of event</td>
<td>43</td>
</tr>
<tr>
<td>Experienced distressing images, memories, or thoughts of event</td>
<td>39</td>
</tr>
<tr>
<td>Experienced difficulty in concentration</td>
<td>34</td>
</tr>
<tr>
<td>Felt on guard/edge, easily distracted</td>
<td>27</td>
</tr>
<tr>
<td>Negative physical reactions to reminders of event</td>
<td>27</td>
</tr>
<tr>
<td>Enjoyment of activities problematic</td>
<td>24</td>
</tr>
<tr>
<td>Sense of foreshortened future</td>
<td>21</td>
</tr>
<tr>
<td>Irritable or angry</td>
<td>17</td>
</tr>
<tr>
<td>Difficulty going to/staying asleep</td>
<td>16</td>
</tr>
<tr>
<td>Experienced sense of distance/disconnectedness from others</td>
<td>15</td>
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</tbody>
</table>

### TABLE 3

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am more aware of how much people care for one another</td>
<td>64.8</td>
</tr>
<tr>
<td>I learned how good people can be</td>
<td>62.1</td>
</tr>
<tr>
<td>I am more sensitive to the needs of others</td>
<td>59.8</td>
</tr>
<tr>
<td>I am more compassionate of those in similar situations</td>
<td>55.7</td>
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<tr>
<td>I am more understanding of those in similar situations</td>
<td>50.7</td>
</tr>
<tr>
<td>I have greater faith in God</td>
<td>47.4</td>
</tr>
<tr>
<td>I feel more a part of community</td>
<td>42.4</td>
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passionate and understanding as a result of indirect exposure to September 11th events is significant. The findings have implications that positive changes (e.g., a heightened sense of closeness with others) can come from negative experiences and attest to the ability to overcome hardship and suffering. Psychologists and school counselors must be charged with the burden of helping their students cope with their trauma-related symptoms.

Specifically, 65% of participants reported becoming more aware of how much people care for one another. It can be inferred that this was a result of being exposed to an event in which several thousand innocent people were killed because of the actions of others presumably motivated by political and religious beliefs. Perhaps the discomfort caused by intense interruptions in core belief systems led victims of traumatic exposure to seek ways of alleviating their discomfort. Focusing on the benevolent aspects of life, such as how much people care for one another and one’s ability to feel compassion, appears to be an adaptive strategy to restore the balance of perceived evil versus goodness in the world. Future studies investigating the causal and motivational components of this search could be beneficial to researchers attempting to understand victims’ successes in incorporating horrific experiences into existing worldviews.

Interpretation of results of the current study are limited by the unavailability of baseline functioning of participants prior to September 11th events. Furthermore, use of an abbreviated form of measure precluded any comparison of scores to PTSD symptoms reported on this measure for other forms of trauma. Finally, the reactions noted in the study may be limited to a young adult population facing stressors and resources that may be unique to their college environment (e.g., separation from family, potential access to dense social support system). Future studies comparing reactions (e.g., PTSD symptoms; specific cognitions) for different age-cohorts and living environments may be valuable in forwarding an understanding of how terrorism affects individuals differently.

The findings of the present study suggest horrific events may force us to confront the worst aspects of our world, and yet this confrontation somehow reminds us of what Abraham Lincoln (1861) called the “better angels” of our being. The number of bad experiences may not make us forget the value of the best. The significance of the present study’s findings, that populations can experience PTSD symptoms as a function of media exposure, could become relevant to the psychological community. This may be especially significant considering the future role media may play in presenting an enduring threat of future terrorist attacks similar to or worse than the one experienced on September 11th, 2001.

References
An Examination of Personality Traits Among Student Leaders and Nonleaders

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Loyola College

Previous research has shown a relation between leadership and characteristics such as extroversion, conscientiousness, and agreeableness in many populations. This study attempted to extend these findings to a general college population. Ninety-nine undergraduates (36 leaders and 63 nonleaders) participated in this study. Previous research suggested leaders would exhibit higher levels of extroversion, agreeableness, and conscientiousness than peer nonleaders. Results did not show significant relations between leadership and either extroversion or agreeableness. However, leaders scored higher on a measure of conscientiousness than nonleaders. Conscientiousness appears to distinguish student leaders from nonleaders.

Leadership is important in shaping the progress of society. Identifying traits among youth, more specifically the college population, can yield early recognition and development of leadership skills. Recognition of such skills will make it easier to identify people to place in positions of leadership. Within psychology, there is a long tradition of understanding leadership as resulting from an ensemble of personality traits. For example, Kickul and Neuman (2000) looked at such traits as openness to experiences and extroversion in relation to emergent leadership.

Recent applications of the five-factor model have been especially robust and pragmatic in clarifying the nature of people who make effective leaders (McCrae & Costa, 1997). The five characteristics in this model are conscientiousness, extroversion/introversion, agreeableness, neuroticism, and openness to experience. Three of these five characteristics—conscientiousness, extroversion, and agreeableness—have been particularly relevant in research into personality traits of leaders (McCrae & Costa, 1997).

Among these traits, extroversion is perhaps the characteristic most commonly studied in relation to leadership among college students. Kickul and Neuman (2000) showed the importance of extroversion among leaders in undergraduate psychology students. When students were organized into teams to accomplish tasks, extroversion was noted as one predictor of emergent leaders in each of the groups (Kickul & Neuman, 2000). It is important to note, however, that only psychology majors were used, perhaps limiting generalizability.

Seibert and Kraimer (2001) explored the relation of extroversion to promotion of professionals. More specifically, their study examined extroversion in emerging leaders. Interactional influences of personality traits, such as being people-oriented, explained the vital role of extroversion in emergent leaders because such influences may moderate the relationship between extroversion and leadership (Seibert & Kraimer, 2001). Seibert and Kraimer suggested that the trait of extroversion makes certain people more likely to thrive in social interaction, thus leading to greater career success. Early recognition of such traits as extroversion in emergent leaders was the primary objective of Seibert and Kraimer’s study, which established grounds for further exploration of extroversion’s role in emergent leaders of other populations.

Jordan and Cartwright (1998) concluded that moderate levels of extroversion were a key compo-
nent in selection of managers. Their results lend support to the idea that recognition of such traits related to leadership can aid in selecting effective leaders. The results of these studies provide strong evidence that extroversion is a personality trait related to leadership and that, with early recognition, extroversion can help identify emergent leaders.

Conscientiousness has also been shown to be a characteristic related to leadership in multiple areas. According to the literature, however, conscientiousness has not been studied in college student samples. For example, McCall (1994) found that conscientious individuals were among those with the highest executive and leadership potential in a business environment. Furthermore, Kickul and Neuman (2000) found conscientiousness to be related to being effective leaders who improved their team members' performance. Again, the literature supports a relation between leadership and conscientiousness in certain environments.

Agreeableness is another trait related to leadership. Sperry (1997) showed that agreeableness is applicable to leaders in a business-oriented environment. He cited such components of the agreeable character structure as empathy and cooperativeness. Judge and Bono (2000) found agreeableness to be related in particular to transformational leadership, a style of leadership that emphasizes inspiration of followers through personality characteristics such as charisma. Judge and Bono concluded that agreeableness is a key trait of this particular type of leadership.

Until now, leadership research has focused mainly on professional environments. These include, but are not limited to, business and managerial establishments that emphasize a hierarchical power structure of leadership. Although Kickul and Neuman (2000) found extroversion as a characteristic among college student leaders, few studies have focused on other characteristics such as agreeableness and conscientiousness in college leadership roles. The purpose of the present study is to extend the base of leadership research to the college level to help employers and organization mentors identify emerging leaders at an early stage in development.

The present study addressed three hypotheses: First, student leaders are more extroverted than nonleaders. Second, student leaders are more conscientious than nonleaders. Third, student leaders have a higher level of agreeableness than nonleaders.

Method

Participants

Participants were 99 undergraduate students at a small, private university on the east coast. Participants were between the ages of 18 and 23, with a mean age of 20.21 years (SD = 1.09). Fifty were male and 49 were female. Twelve were first-year students, 36 were sophomores, 21 were juniors, and 30 were seniors. Within the sample, there were 63 nonleaders and 36 leaders as determined by participants' responses on the questionnaire.

Materials

Demographic information. The first page of the questionnaire packet was a demographic survey. It included questions on age, gender, and whether the participant currently held a position of leadership on campus.

Leadership. A leader is a person who holds authority over and delegates tasks to others. Leadership was measured with the following question: "Are you in a leadership position where you are in advance of others, hold authority, and delegate? (Some examples are Student Government Association, resident assistant, club officer, sports team captain, work supervisor.)" If participants answered yes, they then listed what positions they held. Leadership roles were determined by self-report of the participants.

Extroversion, agreeableness, and conscientiousness. Extroversion was defined as outgoingness and degree of interest in the outside world in relation to inner thoughts and feelings. Agreeableness was defined as the extent to which people get along with others as opposed to being antagonistic. Conscientiousness was defined as the degree to which people are hardworking, energetic, and ambitious. All three traits were measured with the Mini-Markers adjective check list (Saucier, 1994), which also measures emotional stability and openness to experience. Each of these characteristics is measured with an eight-item scale. Participants rated how much each adjective describes them on a 9-point Likert scale. It was found that the markers had the following alpha coefficients: .90 for extroversion, .90 for conscientiousness, and .86 for agreeableness (Dwight, Cummings, & Glenar, 1998). All of these were at acceptable levels of validity (Dwight et al., 1998). Reliability characteristics were as follows: .41 for extroversion, .43 for conscientiousness, and .43 for agreeableness (Saucier, 1994). These were not only acceptable levels, but noted to be significantly higher than the marker's predecessor (Saucier, 1994).

Procedure

Twenty members of a research methods class (including the study investigators) distributed four survey packets to a convenience sample of undergraduate students at a small, liberal arts college on the east coast. Participants were obtained over a 2-week period by the researchers asking participants if
they would take 10 minutes to fill out a brief survey. Each class member solicited 2 male and 2 female participants. The remainder of the data were collected by recruiting additional student leaders with the help of the office of student life. This sample included 10 resident assistants (5 male and 5 female) and 9 students who held other leadership positions (5 male and 4 female). All surveys were distributed on campus and in person. Participants were told that the series of questions pertain to psychological traits of students. Participants were also informed that all information was anonymous and that they could withdraw at any time. A consent form was given to all participants before they filled out the questionnaire, and only those who consented took part in the study. Anonymity was ensured by requiring no name on the questionnaire, detaching the consent form (which had a signature), and maintaining statistical information through a coded number system. After completing the survey, each participant was debriefed as to the purpose of the study.

Results

Only one of the three comparisons between leaders and nonleaders was significant. In a two-tailed independent samples t-test, conscientiousness scores for leaders were significantly higher than scores for nonleaders, t(97) = 2.41, p < .05. Leaders had a mean score of 52.63 (SD = 11.59); nonleaders had a lower mean score of 46.97 (SD = 11.07). The effect size for this relationship was $r^2 = .06$.

Two additional comparisons between leaders and nonleaders were not significant. In a two-tailed independent samples t-test, extroversion scores for leaders were not significantly larger than scores for nonleaders, t(97) = 1.04, p > .05. Leaders had a mean score of 49.33 (SD = 10.64); nonleaders had a mean score of 47.06 (SD = 10.38). In a two-tailed independent samples t-test, agreeableness scores for leaders were not significantly larger than scores for nonleaders, t(97) = .82, p > .05. Leaders had a mean score of 52.63 (SD = 9.20), and nonleaders had a mean score of 47.06 (SD = 10.38).

Discussion

Until now, leadership research has focused primarily on professional environments such as business and politics. The purpose of the present study was to identify traits of college-level leaders to aid prospective employers and organizations in recognizing and cultivating these young leaders. Results support only one of the hypotheses tested.

The hypothesis that leaders are more conscientious than nonleaders is supported by the present study. Results support the previous findings of McCall (1994) and Kickul and Neuman (2000). The results from the current study indicate that conscientiousness plays a role in characterizing leaders at the college level.

The other two hypotheses are not supported by the present study. Findings of no relation between extroversion and leadership in this study contradict previous findings, such as those of Kickul and Neuman (2000) and Seibert and Kraimer (2001). Findings of no relation between agreeableness and leadership are not in line with previous findings of Sperry (1997) and Jordan and Cartwright (1998). These outcomes could be due to a number of factors such as differences in traits between college and professional leaders, differing types of college leadership, or sampling error.

Overall, the results of this study suggest that the personality traits of college leaders may differ from those of professional leaders. Previous research that found support for agreeableness and extroversion as common leadership traits in professional positions was not extended to the college population in the present study. However, conscientiousness appears to be a common trait of leaders at various stages of development.

The inconsistency in results relative to previous research may be due to sample differences. Most previous studies examined professional (adult) leadership and not student leadership at the college level. Previous research, which focused on professional areas such as politics and business, found significant relationships between leadership and the three variables of interest. Leaders at the college level may not possess the same traits found in professional settings. Furthermore, it has been documented that personality constructs such as extroversion, agreeableness, and conscientiousness do not fully develop, or are not fully achieved, until people are well into their thirties (Finn, 1986). This fact may indicate a reason why no relations were found between leadership and either extroversion or agreeableness. Characteristics found in professional levels of leadership may not necessarily be found in college students because they have not fully developed their personalities. The findings of past research and the present study indicate that conscientiousness, although not necessarily fully developed in college leaders, may still play a role at both levels. The finding that conscientiousness is significant among college leaders may require employers or organizations to look for other traits in college students when attempting to identify emergent leaders.

One limitation of this study may be that the sample included different types of leadership positions, such as student government members, resident assistants, and club presidents. Traits of one type of leader may not be the same as those of another type of leader. For example, students who choose to run for student...
government positions could be more inclined toward higher scores in extroversion due simply to the public exposure involved in becoming elected. On the other hand, resident assistants, who are appointed, may be more likely to score higher in agreeableness because they have to work more in teams and answer to supervisors on a regular basis. Varying types of student leadership would require investigating each type to find common traits among them. Perhaps knowing what traits are related to appointed positions versus elected positions would explain the lack of significant findings in the present study and would help further identify emergent leaders.

An additional recognized limitation of this study was the use of a convenience sample. The nonrandom sampling could have been biased and could lead to the possibility that the sample was not representative of the population of student leaders. The sample could have been biased in that researchers used participants who were nearby or who traveled in groups. This could promote homogeneity of the sample because participants who live with each other may be similar in character.

Finally, it is possible that first-year students have not had the chance to assume positions of leadership, and, therefore, results may not adequately represent leadership characteristics in first-year college students. First-year students comprise one quarter of the college population, and potentially the same portion of student leaders. However, they have not had adequate time to find their niche among student leadership roles. Not including enough first-year students in the sample could have influenced the results in two ways. First, the sample was not truly representative and thus there were differing traits within the sample. Second, as seen in the findings of Finn (1986), personality constructs may not be fully developed in first-year students. Therefore, traits that are present in upper-class leaders may or may not be present in first-year leaders.

Possible directions for future research include examining leadership and these three characteristics among the different age groups. As mentioned earlier, personalities do not fully develop until people are in their thirties, and it may be helpful to observe the disparities or similarities of traits in differing generations of leaders and nonleaders. Finding common traits in college and professional leadership could help in early recognition of emergent leaders.

In addition, it may be of interest to examine developmental changes in leadership across college years. Comparing first-year to upper-class students may be helpful in exploring how students become accustomed to a new environment and new responsibilities. Examining what traits are common among leaders at all four college levels can help identify and place new students in programs or positions in college in which they would thrive.

Future research would also benefit from looking at particular characteristics that may be associated with a particular leadership position. Possible differences between student leaders in student government, resident assistant positions, and other leadership roles could be further explained by distinguishing different types of leadership in a future study. It is likely that each type of leadership position, because of the nature of its requirements and whether the position is elected or appointed, entails differing personality traits.

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