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The Name Letter Effect: Correlation between Name, GPA, and Choice of Exam Times

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The name letter effect refers to unconscious priming based on one's name that may influence behavior. Previous research found correlations between the initial of one's last name and preferences and behavior. Study 1 investigated the correlation between students' last name initials and when they took an exam in a two-day period. Study 2 sought to replicate the finding that students whose names start with A or B earn higher grades than students whose names start with C or D (Nelson & Simmons, 2007). Study 1 showed no correlation between students' last name initial and choice of exam time. Study 2 replicated the finding that the initial of the last name is related to GPA. However, these findings should be interpreted cautiously due to methodological concerns and inconsistent results. Together, these findings suggest that the name initial is at best a very limited unconscious prime, if any.

Pages: 1-4

Many parents believe that the name they give their child is important. In China, many parents choose meaningful names for their children in the hope that the child will acquire the desirable characteristics associated with that name. For example, it is not uncommon for a child's name to be the word for "beautiful" or "brave." While it is not yet supported by research that the children with these names will develop those attributes, it has been shown that the way people perceive one another is affected unconsciously by their names (Huang, & Murnighan, 2010; Widner, 2011). In addition, some studies show that the letters in one's name can have an impact on his or her preference on alphabet letters, to a small but significant degree (Nuttin, 1985; Koole, Dijksterhuis, & van Knippenberg, 2001; Lipsitz & Gifford, 2003). This paper reviews several previous studies about how one's preferences and behavior are unconsciously affected by his or her name, and then we will discuss the findings from our study on the correlation between the initial of one's last name and the preference for taking an exam early.

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Studies show that people have stronger preferences for items related to the initials in their name. For example, Hoorens and Nuttin (1993) found that consumers prefer brands that have the same initials as their own last names, possibly because people's preference for themselves is extended to their possessions. According to Pelham, Mirenberg, and Jones (2002), even major life decisions can be affected unconsciously by one's last name. People prefer to live in places or work in occupations which have names similar to their own. Thus, the percentage of people with the last name of Louis is greater in St. Louis than in most other cities. Likewise, more Lawrences become lawyers and more Dennis's become dentists. These interesting findings of consequential behavior that may be primed unconsciously by the letters in one's name stimulated further investigation to identify other ways in which names may motivate behavior.

Recently, Carlson, and Conard (2011) found that task performance related to motivation can be affected by one's name. A significant correlation was found between the alphabetic ordering of individuals' last names and how quickly they responded to opportunities to acquire objects, such as a lottery ticket or a free reward. They suggested, for example, that if there were the opportunity of getting a free reward, Mr. Alision will get it faster than Mr. Davison. Interestingly, this motivation can even be found in academic performance. Nelson and Simmons (2007) found a significant correlation between the alphabetic order of students' last names and their relative grades. That is, Mr. Anderson who has A as his last name

initial was found to be more likely to earn an A in a class than Ms. Davis who has D as her last name initial.

Bargh and Chartrand (1999) believed that unconscious judgment was evolutionarily adaptive because conscious judgment and self-regulation capacity are limited resources. Thus, the rapid, efficient and automatic nature of unconscious judgment may have intrinsic adaptive value. People's preference for objects related to their own name is hypothesized to be an example of this unconscious judgment. Pelham and colleagues (2002) stated that people unconsciously make many decisions that are affected by their names due to implicit egotism, a preference for things that are related to oneself. Nevertheless, not everyone accepts these findings readily. Gallucci (2003) inspected more closely the study by Pelham, Mirenberg, and Jones (2002), and pointed out that the method used in the original study was flawed. New analysis on the same data conducted by Gallucci showed that the data seems to not support the idea of a name letter effect.

An unusual opportunity to extend this line of study arose in an Introductory Psychology class in which students are asked to sign up to take exams in one-hour time slots over a two-day period. Study 1 will investigate the impact that the initial of one's last name has on the choice of time slot to take the exam. We hypothesize that there is a positive correlation between the ranking of students' last name initials and the order by which they enter the test system; that is, people whose last name initials are at the start of the alphabet will be more likely to take exams earlier than the people whose names are at the end of the alphabet. In Study 2, we seek to replicate the finding of Nelson and Simmons' study that students whose last names start with an A or B have a higher GPA than students whose names start with C or D. The results will be helpful in testing the validity of their conclusion that the initial of one's last name affects his or her GPA. Consistent with their hypothesis, we hypothesize that there is a negative correlation between the alphabetical ranking of the initial of one's last name initial and his or her GPA.

STUDY 1

Method

Participants

All participants were enrolled in an introductory psychology course at the University of Minnesota. Exams in this course took place over the course of 10 hours on two separate days. We analyzed data from two midterm exams. There were 907 students who took the first midterm and 895 students who took the second midterm. One student was excluded from the analysis of the first exam because the exam was taken at a later date. Twelve students did not take the second exam due to withdrawing from the class or for other reasons.

Procedure

Students were allowed to sign up for any of the exam sessions over the two-day period. We recorded the time they started the exams. Only the initial of the students' last name was disclosed to the researcher to protect confidentiality; students whose last name began with the initial A were coded as 1, B as 2, C as 3, and so on.

Results and Discussion

The code for the last name initial (1-26) is regarded as a continuous variable in this study. A Spearman rank order correlation between the initial of a student's last name (1-26) and the rank order of when the student started the exam (1-906) was conducted. For exam 1, $r(906) = 0.051$, $p = 0.126$, two tail. For exam 2, $r(895) = 0.039$, $p = 0.242$, two tail.

For both exam 1 and exam 2, the correlation between the last name initials and exam time were close to zero. So, our findings suggest that there is no correlation between the time at which students entered the exam system and the initial of their last names. The non-significant correlation should be interpreted cautiously considering other constraints on students' ability to sign up for exams (such as other classes, work schedules and other life obligations). Therefore, we conclude that there is not a correlation between the initial of one's last name and the preference to take the exams early or late.

STUDY 2

Method

Participants

The participants were 1,952 students who took an introductory psychology class at the University of Minnesota. Among the 1,952 participants, 907 were the also the participants in Study 1. There were 782 male, 1,112 female, and 58 unidentified. Racially, there were 1,448 white-identified participants, 321 Asian identified, 63 black, 55 Hispanic 26 American Indian, 4 Hawaiian, and 35 unidentified.

Procedure

We obtained data on GPA and last name initials for the participants. Their names were coded in the same way as was done for Study 1 to protect student confidentiality. We conducted three analyses. In the first analysis we controlled for gender and ethnicity to replicate the method used by Nelson and Simmons. A chi-square was done to determine whether gender and ethnicity were related to the initial of one's last name and no differences were found among groups. Then a second analysis was done which did not control for gender and ethnicity. Finally, a finer-grained analysis of names was done to confirm the impact of last name initial on GPA.

Results and Discussion

The one-way analysis of covariance (ANCOVA) procedure was used here because this test was used by the study of Nelson and Simmons. The first analysis was a one-way analysis of covariance (ANCOVA) on GPA as a function of three groups (where last names beginning with A and B=1, C and D=2 and E to Z=3), controlling for gender and ethnicity (1 = American Indian, 2 = Asian, 3 = Black,

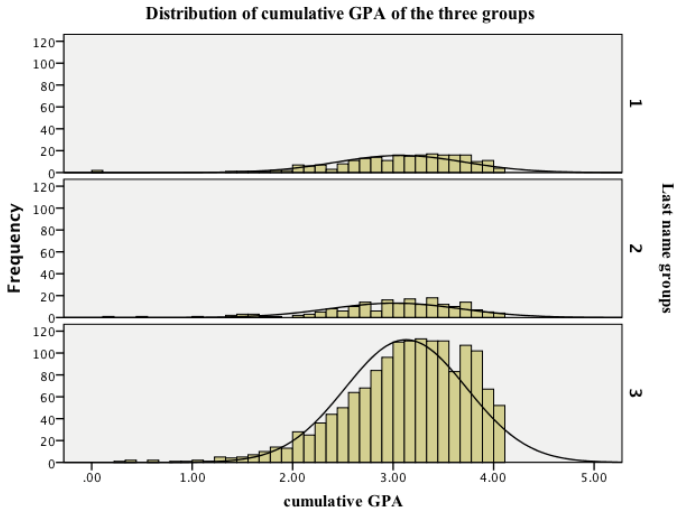

FIGURE 1. Group 1 consists of students whose last name initials are A and B; group 2 consists of students whose last name initials are C and D; group 3 consists of students whose last name initials are from E to Z.

4=Hawaiian, 5=Hispanic, 6=White). In the second analysis, we did a one-way analysis of covariance (ANCOVA) on GPA as a function of the three groups (where A and B=1, C and D=2 and E to Z=3) without controlling for any factors. In the final analysis, we did a one-way analysis of covariance (ANCOVA) on GPA as a function of five groups (where A=1, B=2, C=3, D=4, and E to Z=3).

Then, we did the same analysis after excluding the names with conflicting first and last initial, as Nelson and Simmons (2007) did. This process excludes the students who have first name initials as A, B, C, and D but not the same as that of the last name initial for name group 1 and group 2. This was done so that we can study only the priming effect of last name initial, which is not affected by the first name initial. For example, we would exclude David Andrews and Cassandra Benson because David could be primed by both the letter "D" and "A", and Cassandra "C" and "B". This criterion excluded 77 students, resulting in a sample size of 1,875. The result of the first analysis was $F(8,1952) = 1.940$, $p = 0.05$. The findings replicated the findings of Nelson and Simmons' study; a significant relationship was found between the initial of one's last name and GPA when controlling for gender and ethnicity.

The chi-square between gender and last name initial group was insignificant: $\chi^2(2,N=1894) = 1.704$, $p = 0.427$. A chi-square between ethnicity and last name initial group was also insignificant: $\chi^2(10,N=1917) = 12.954$, $p = 0.226$. Gender and ethnicity are not associated with the initial of one's last name. The second analysis which did not control for gender and ethnicity showed a significant result: $F(2,1952) = 3.334$, $p = 0.036$, which seems to support the results from Nelson and Simmons' study.

The analysis on the sample that excluded students who may experience "name collision" when controlling for gender and ethnicity showed non-significant results: $F(2,1875) = 2.850$, $p = 0.058$. The second analysis on this sample, which did not control for gender and ethnicity, found no significant result: $F(6,1875) = 1.456$, $p = 0.190$.

The underlying assumption of adjusting the sample for "name collision" is that the first name initial may interfere with the last name initial, disrupting last name initial priming. Therefore, taking away these "name collision" students should improve the significance. However, our findings were inconsistent with this hypothesis.

Our findings do not replicate the findings of the previous literature that hypothesized that students with a last name starting with the initial of A or B will be more likely to get grades of A and B than students whose names start with the initial C or D. In addition, we also found that the distribution of students' GPAs were skewed, with a clear cut on the right tail because 4.0 is the upper bound of the range of the grade which many students have (Figure 1). Moreover, the overall mean GPA for the 1,952 students was 3.110 ($SD = 0.616$), and the average GPA of group 1 is 3.073, group 2 is 3.015, and group 3 is 3.127. The sample used in Nelson and Simmons' (2007) study were all M.B.A. students, and the average GPA of the three groups were between 3.32 and 3.38. Due to the competitive nature of an M.B.A. program and the fact that the average GPA of all three groups were significantly higher than the average GPA of all three groups in our sample, we believe that the distribution was more severely skewed in the Nelson and Simmons' sample. Therefore, this raises a concern of how legitimate it is to conduct an ANCOVA test *per se*, jeopardizing the validity of the findings.

GENERAL DISCUSSION

The results of Study 1 did not provide evidence that one's last name initial primes his or her behaviors. Students with last names at the start of the alphabet seem no more likely to take exams at the start of an exam period than students with names at the end of the alphabet. The ambiguous results from Study 2 indicate that although there may be a marginally significant correlation between the initial that a student's last name begins with and his or her GPA, the conclusion should be interpreted cautiously because the statistical tool used requires that GPA is normally distributed, which it is not. Even though the sample is not randomly assigned and the participants were only drawn from one class, we believe the skewed distribution of GPA is not limited by this constraint. This class is an introductory level class, and is taken by students of very diverse backgrounds. Also, studies show that undergraduate students in other institutes have a very similar range of GPA to ours, supporting the representativeness of our sample (Aspelmeier *et al.*, 2012; Campbell *et al.*, 2013). Therefore, the inappropriate usage of the statistical method is a greater concern than the failure to replicate the study. It is likely that the conclusion from previous literature based on the measurement of GPA is controversial, if the distribution of GPA is not normal.

Thus, while the name letter effect may be beguiling, our data suggest that the effect is at best elusive or non-

existent. The last name does not appear to affect the time that students sign up to take the exam, and it is not yet well supported that one's own name can affect the grades he or she earns. Nevertheless, it has been well documented elsewhere that names can affect unconsciously one's behaviors and beliefs. Future research may focus on other domains where name might affect behavior and belief. In particular, people who have East Asian names can directly benefit from the research because these names usually consist of characteristics that carry meaning. Also, future research can examine the relationship between names that carry certain meanings and the impression that the name leaves on others, to examine whether giving a child a "meaningful" name can really exert any influence on the bearer of the name or others.

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The Effects of Animal Interaction on Happiness

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Animal-assisted therapy has become a hot topic in psychology over the past decade because of its broad implications in daily life. It is easily accessible for many populations and it is one of the few therapeutic interventions that may continue at home. The purpose of this study was to see if interaction with an animal would increase positive feelings. Participants were placed either in a room with a dog and allowed to freely interact for fifteen minutes or in a room without a dog. The participants then completed a short word find and a mood questionnaire. Analyses showed that the group that interacted with the animal had significantly higher scores for positive feelings than the group that did not interact with the animal. Additionally, the experimental group showed lower scores for negative feelings than the control group. These findings indicate that even short-term interactions with animals improve mood, which lends credibility to the use of animal-assisted therapies in psychology to improve overall well-being.

Pages: 5-8

Animal-assisted therapy is a new and exciting field of medicine and psychology. It utilizes an interaction with an animal in order to improve medical conditions as well as to decrease loneliness in people. An additional benefit of the use of animals in daily life and animal-assisted therapy is increased happiness, which can lead to a rise in overall quality of life. Society can greatly benefit from animal-assisted therapy because animal interaction is an easily accessible method of treatment for those in need of therapy as well as for those looking for a companion.

One of the major uses of animal-assisted therapy is to enable people with physical disabilities to practice skills to improve posture, balance, and strength. For example, in a study conducted by Borges, Werneck, de Silva, Gandolfi, and Pratesi (2011) researchers evaluated the efficacy of a horseback riding simulator for improving posture in children with cerebral palsy. Children were separated into two groups, one of which used the simulator and one of which used traditional physical therapy. At the post-intervention stage of evaluation the children who used the simulator had higher motor function and greater control of posture. This study illuminates the efficacy of horseback riding as a method of animal-assisted therapy, which improves the overall quality of life for disabled individuals.

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Horseback riding has also been shown to be an effective therapy for individuals with mental disabilities like autism disorder. In a study by Bass, Duchowny, and LLabre (2009) researchers studied the effects of horseback riding on social functioning in children with autism spectrum disorders. They compared the children receiving animal-assisted therapy with those on the waitlist and found that the children in the therapy program exhibited several traits associated with higher social functioning like social motivation, greater sensory seeking, less inattention, and less sedentary behaviors. Similar to the previous study, this study indicates an improvement of the quality of life for people with disabilities as a result of animal-assisted therapy.

Though much research on animal-assisted therapy has been dedicated to studying the effects on people with disabilities, there is also a plethora of research devoted to studying mood and loneliness. Banks, Willoughby, and Banks (2008) examined whether geriatric patients living in long-term care facilities would be less lonely after using either a living dog or a robotic dog for animal-assisted therapy compared with a control group receiving no animal-assisted therapy. The patients with the robot and the living dog showed decreases in loneliness, while the control group showed no change. These results indicate that animals, even artificial ones, play an important role in decreasing loneliness. It is possible that a decrease in loneliness may later promote an increase in happiness and in overall quality of life.

Loneliness was also examined in a group of rural adolescents by Black (2012). Black surveyed adolescents from

two ethnically diverse high schools using self-report measures regarding pet ownership, loneliness, attachment to an animal, and social support. The researcher found that the adolescents who owned pets had significantly lower scores in loneliness than non-pet owners. Research suggests that attachment to a companion animal was positively correlated to the number of companions considered to be in the adolescents' social support network. Similar to the elderly population, a decrease in loneliness in pet owners may lead to an increase in happiness and the overall quality of life.

McConnell, Brown, Soda, Stayton, and Martin (2011) examined three different areas in which owning a pet had a positive impact on well-being and quality of life. In the first study, pet owners scored higher on several measures of well-being, including self-esteem and exercise, as well as on measures of individual differences like conscientiousness and positive attachment than non-pet owners. A second study found that pet owners had a higher standard of well-being when they felt their pets fulfilled their social needs than did non-pet owners. The final study, conducted in a laboratory setting, demonstrated that pets assisted people in dealing with social rejection, like being ignored. These studies demonstrate that pets improve the quality of life by providing a social support system in many different settings.

Previous research regarding animal-assisted therapy has indicated that animal interactions and ownership of an animal increases skills in people with disabilities, decreases loneliness, and improves the overall quality of life for several populations. However, little research has examined the impact of animal interactions on a short-term basis. We conducted a study evaluating happiness following a fifteen minute interaction with a dog. We compared two groups' happiness: one group interacted with a dog for fifteen minutes, the other group sat and socialized for fifteen minutes. We predicted that the subjects that interacted with the dog would rate higher on the positive feelings on a scale of positive and negative experience than the group that did not interact with the dog.

METHOD

Participants

Twenty-two participants, 17 of which were females and 5 of which were males, were involved in the study. The participants were undergraduate students obtained through convenience sampling from two classes of an undergraduate psychology course. The participants ranged in age from 19-48 (M = 24.36, SD = 7.36). Sixteen of the participants identified themselves as Caucasian, one as American-Indian, two as Asian/Pacific Islander, one as Chicano/Latino, and one participant did not provide their race. The participants were not compensated for their participation.

Materials

A short word-find puzzle was created by the instructors to conceal the true purpose of the experiment following the interaction (see Appendix A). The participants interacted with a Sheltie dog that was trained to be an assisted therapy animal. In order to measure the emotional state (specifically positive feelings and negative feelings) of the participants following the interaction, a modified paper version of Diener and Biswas-Diener's (2009) Scale of Positive and Negative Experience (SPANE; see Appendix B) was given. The scale was modified to include a description of the experiment and all neutral feelings were removed. Participants rated their feelings on a numbered Likert scale. Participants then completed a demographic survey.

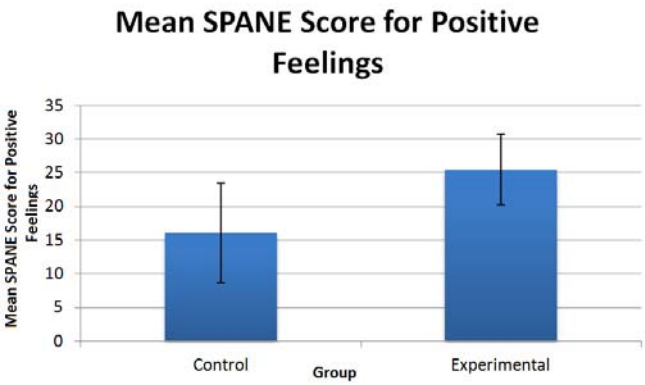


FIGURE 1. Mean scores on the SPANE for positive feelings. Error bars represent the standard deviations.

Procedure

Participants were sampled from two psychology classes. Every participant first read an informed consent statement detailing the nature of the experiment as well as the participant's right to discontinue the experiment at any time. Participants were then randomly divided into two groups, one of which was the control group (Group 1) and one of which was the experimental group (Group 2). Group 1 sat in a room and quietly socialized with one another for fifteen minutes. Group 2 was given fifteen minutes to freely interact with a trained animal (assisted therapy dog) and its handler. The dog then was removed from the room. Participants in both groups then completed a short word-find (see Appendix A). Upon completion of the word-find, participants filled out the modified SPANE questionnaire regarding their feelings in the preceding fifteen minutes (see Appendix B). Following completion of the SPANE questionnaire, participants completed a demographic survey. The participants were given the opportunity to ask the researchers questions and then released.

RESULTS

Participants were scored on both positive and negative feelings by using the scoring rubric for the SPANE (see Appendix B). One-tailed independent samples t-tests were performed to determine the significance of differences between groups of both positive and negative feelings. Analyses showed that Group 2 (M = 25.5, SD = 5.3) scored significantly higher on the measure of positive feelings than Group 1 (M = 16.0, SD = 7.4), $t(22) = -3.461$, $p = 0.001$.

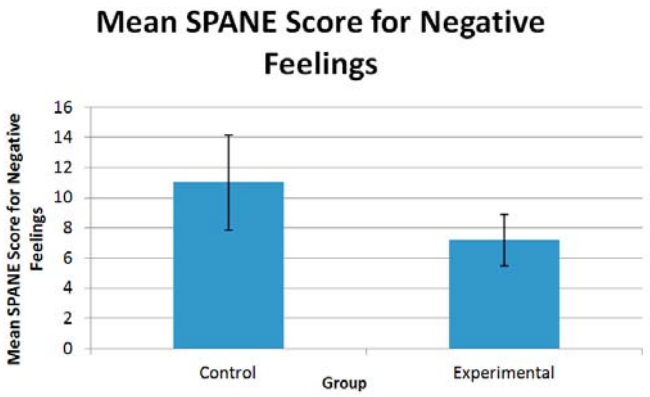


FIGURE 2. Mean scores on the SPANE for negative feelings. Error bars represent the standard deviations.

Additionally, analyses showed that Group 2 (M = 7.2, SD = 1.7) had significantly lower scores on the negative feelings scale than Group 1 (M = *11.0, SD* = 3.2), $t(22) = 3.52$, p = 0.001. These results are illustrated in Figures 1 and 2.

DISCUSSION

We hypothesized that the group that interacted with the dog would have higher positive feeling scores on the modified SPANE than the group that did not interact with the dog. Our results support this hypothesis. Though we did not construct a hypothesis regarding the negative feelings scores on the SPANE, it is reasonable to conclude that as positive feelings increase, negative feelings decrease which is supported by the current data.

The decrease in loneliness following the use of robotic dogs and real dogs in geriatric care facilities that was found by Banks, Willoughby, and Banks (2008) is consistent with our findings; our study showed that interaction with animals on a short-term basis can decrease negative feelings. Similarly, Black (2012) found that pet ownership showed a decrease in loneliness in adolescents, suggesting that these results may be consistent across age groups. Furthermore, three studies by McConnell, Brown, Soda, Stayton, and Martin (2011) found that pets assisted in improving overall well-being and acted as a support system for owners. Based upon our results as well as the results of previous research regarding animal interaction, it is likely that animal interaction increases positive feelings, which increases factors like happiness and, eventually, overall well-being.

While our results directly supported the hypothesis, it is possible that other factors contributed to the significant results. One possible alternative explanation for the results was the extreme manipulation of the independent variable. While our independent variable manipulation was simply the opportunity to interact with the dog, the control group was given no instruction. Sitting inactive for fifteen minutes may have significantly decreased control participants' positive feelings and increased their negative feelings. These changes in feelings may have likely made the contrast between the control group and experimental groups' feelings greater than if the control group had something to keep them occupied during the experiment. Also, the word find may have been unnecessary. Though its intended purpose was to lead the participants to believe the hypothesis was related to cognitive testing, it may have been too simple for the participants. A more difficult cognitive task would have been a better concealment.

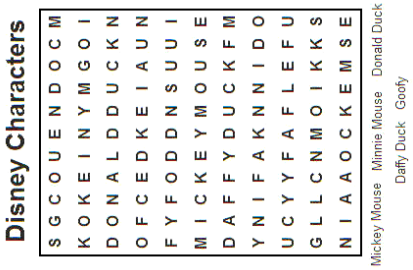
Generalizability is also an issue. Convenience sampling presents a problem because the results may not represent a broad demographic. Since students were sampled from college courses, the participants were most likely well adjusted and exerted a high level of mental function. It is unclear based on this research whether participants with anxiety or depression would also benefit from a short session. This problem could possibly be eliminated if SPANE scores were compared to average SPANE scores from other studies to confirm the results.

Our study design could have been improved by conducting a pre-test (using a different word find but the same questionnaire) so that it was clearer what the mental states of the participants were prior to the intervention. Since we did not evaluate state of mind prior to the experiment, the events that had occurred in the participants' lives prior to the experiment could have been the sole reason for the feelings they described on the SPANE.

If future research were conducted on this subject, it would be useful to allow the control group to do something during the experiment to avoid boredom-induced negative feelings. Perhaps conducting an experiment in a population requiring therapy with a traditional therapy serving as the control intervention and animal-assisted therapy as the experimental intervention would be useful in determining how much the animals actually increase positive feelings as well as give insight as to the efficacy of animal-assisted therapy.

Our results as well as the results of several other studies indicate that animal interactions, whether it be short-term in a therapy setting or with pets, increase positive feelings which in turn increases overall well-being and improves quality of life. The implications of our findings and other research on this topic are great for the newly expanding field of animal-assisted therapy. It is a viable therapeutic option for many populations, and it is possible that it may be more efficacious than traditional therapies for some. These results can also be applied to the general population: owning a pet may increase positive feelings, happiness, quality of life, and overall well-being, all of which are important for maintaining a healthy life.

APPENDIX A



APPENDIX B

Scale of Positive and Negative Experience (SPANE)©

Please think about the experience you have had participating in this study. Then report how much you experienced each of the following feelings, using the scale below. For each item, select a number from 1 to 5, and write it next to each feeling. For example, if the feeling was "happy" and you felt very happy during the experiment, you would write a number 5 next to the word "happy."

1) Not at all 2) A little 3) A moderate amount
4) A lot 5) Very much

Positive _____	Negative _____	Good _____
Bad _____	Pleasant _____	Unpleasant _____
Happy _____	Sad _____	Afraid _____
Joyful _____	Angry _____	Contented _____

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You Are What You Eat: The Effects of Boredom on Food Consumption

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This experiment examined the effects of boredom on the amount and type of food that a person consumes. The first hypothesis was that bored participants would consume more food than interested participants. The second hypothesis was that bored participants would preferentially choose sweet flavored foods, rather than bland foods. A between subjects experimental design was used to conduct this experiment. Although the results suggested no significant difference in the amount of food consumption between bored and interested groups, there was a significant difference between the bored participants' choice in sweet versus bland foods. This study underlines the importance of monitoring the impact of emotional states on nutritional choices.

Pages: 9-11

In the United States the rate of obesity is increasing (Reynolds & Himes, 2007), with obesity being defined as having a body mass index of over 30. Between the early 1980s and 2002 obesity rates in adults have more than doubled. With the increase in obesity there may also be an increase of the chronic diseases that are associated with obesity, such as high blood pressure, cardiovascular disease, diabetes and arthritis (Reynolds & Himes, 2007), which makes it important for people to identify factors that may increase food consumption, one of which is emotional states.

Many studies have examined how mood influences food consumption. Davis, Freeman, and Solyon (1985) measured self-reported eating habits and moods of bulimic and non-bulimic participants. Participants in both groups usually rated themselves to be in a better mood after eating. Nonetheless, consumption differed between the groups. This result indicates that emotions can affect consumption, and that consumption can affect emotions. However, the researchers did not examine specific emotions in this study, rather they examined overall mood. Thus, it is not clear which specific emotions influence consumption of food.

In an attempt to determine which specific emotions have an impact on a person's eating behavior, Macht (1999) asked participants to describe the food habits that may be present when a person experiences specific mood states. The mood states were sadness, joy, anger and fear. Participants reported that they would be more likely to eat during episodes of anger and joy than when feeling fear and sadness. Further research could show if these patterns actually occur in these mood states.

The previous research was not experimental, and therefore causal effects of specific emotions on eating cannot be drawn. To address this issue, Appelhans, Whited, Schneider, Oleski, and Pagoto (2011) examined the effects of anger on consumption. Participants in the experimental condition were told to recall and re-experience a memory that caused them anger whereas participants in the control condition were told to recall a daily activity. All participants then recorded their mood and hunger ratings. The participants were left in a room with some of their favorite food items, which they had identified previously. The results showed that anger did not have an effect on the amount of food consumed by participants.

Though anger did not cause increased consumption, researchers have identified other emotions that do increase consumption. Abramson and Stinson (1977) conducted a study about consumption and boredom, in which obese and non-obese participants were assigned to either an interest condition or a boredom condition. The boredom condition consisted of writing the letters "cd" continuously, for the duration of the study, while the participants in the interest condition wrote stories based on pictures. Before being put into a condition, the participants were preloaded, which means that they consumed as much food as they could until they were full. Each

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participant was then placed in a room with a bowl of crackers. Bored participants in both groups ate more crackers on average than interested participants (Abramson & Stinson, 1977).

Previous studies focused on identifying emotions that may cause a person to consume more food. Nonetheless previous studies have not addressed which types of food people prefer to consume while experiencing boredom. Research suggests that rats have a preference for sweet, sugary tastes. For instance, in a study done on taste preferences, Bolles, Hayward, and Crandall (1981) provided rats with two flavors: Vanilla, a flavor associated with high caloric value, and anise, the flavor associated with low caloric value. The rats preferred the high caloric flavoring even if the meal itself was not actually high in caloric value. Thus, this finding suggests that the attraction of particular foods may be related to flavor rather than its caloric value. Given the phenomenon of increasing obesity, this research is valuable because typically sugary snacks are high in calories, which can increase weight gain.

The present study will expand upon the previous literature on mood and food consumption by examining the effect of boredom on consumption of particular types of foods. Although the previous research provides good insight into the association between the variables, it does not indicate which types of food participants will be more inclined to consume when in a bored state. Also, I attempt to replicate Abramson and Stinson's (1977) finding that boredom increases consumption, and to expand on this work by identifying the type of food that will be favored when bored. The results of this study could subsequently establish a connection between boredom and a preference for sugary sweets that are high in calories, which may contribute to weight gain within the population.

In this study, participants were assigned to either a boring or interesting condition. The hypothesis was that participants in the boredom condition would eat more in general. In addition, when bored participants do consume snack foods, it was predicted that they would, like the rats, choose a sugary snack over bland crackers, which are less flavorful.

METHOD

Participants

Eighteen participants were recruited for the study, nine male and nine female. Participants were selected using convenience sampling, and the participants were all involved in a psychology research methods class. Participants' ages ranged from 19-55 years old (M = 24.55, SD = 10.05). The demographics of the participants were 75% white, 5% African American, 5% Hispanic, and 15% Asian. Participants with diabetes or food allergies were excluded from the sample. Participants did not receive compensation.

Materials

Two separate videos, one showing grass and one showing a construction cone, were put together to form a five-minute boring clip for this experiment. The interesting video clip was a five-minute clip from the movie Finding Nemo found on YouTube.com. A researcher chose these clips based on lack of activity for the boredom condition, and the large amount of activity for the interesting condition. M&Ms (the sweet snack) and Saltines (the bland snack) were measured in a measuring cup and put in bowls. The bowls were measured previously on a small digital scale. The amount of each cup was converted to grams to compare pre-experiment amounts to post-experiment amounts. A post-experiment questionnaire was also given to participants asking them questions about how interested they were in the video and if they had food allergies, and to gather demographic information.

Procedure

The participants who gave their consent to participate in a study on perception were randomly assigned to either the boring condition or the interesting condition. The rooms in both conditions were furnished similarly, with three computers, one turned on, three chairs and two bowls, one with M&Ms and one with Saltines. Each participant was assigned to his or her own room, and there were six rooms being used at a time. The bowls were weighed prior to beginning the experiment so a comparison could be made pre- and post-experiment. The M&Ms bowl contained one cup of candy, and the Saltines bowl had 10 crackers in it. The participants were told to take a seat in front of the computer that was turned on, and the researcher instructed the participant to read the consent form. Upon obtaining consent, the researchers read a script that told participants that this was a study of perception, and that they would be watching a short video clip. Since the study was on perception, the participants were told to watch the video closely. The researchers informed the participants that the food was there because their teaching assistant had extra food remaining from a different experiment, and gave it to the experimenters to use when conducting the experiment.

The researcher began playing the video clip and left the room. After five minutes the researcher came back in the room to give the participant a post-test and to debrief them. Once they were debriefed on the study they were thanked and told they could go. Every time a participant left the room, the remaining crackers were counted, and the remaining M&Ms were measured using a measuring cup. The measurements were then converted to grams.

RESULTS

The mean amounts of food consumed by each group are shown in Table 1. A mixed-model two-way ANOVA was performed to determine if there was a significant difference in consumption between the bored and interested groups or for M&Ms versus saltines. The post survey was used to determine that participants were in fact bored in the bored group, and interested in the interested group. The result showed that the bored and interested variable was manipulated properly. There was no main effect of the type of video (interesting or boring) on amount of food consumed [$F(1,18) = 0.28$, $p = 0.604$].

TABLE 1. Mean amounts of food consumed (in grams) in the two conditions.

	M&Ms	Saltines	Total
Bored	M=32.0, SD=29.4	M=4.2, SD=5.9	M=36.2, SD=8.9
Interested	--	--	M=45.5, SD=15.2

There was no significant interaction between type of video and type of food [$F(1,18) = 0.77$, $p = 0.39$], indicating that the type of video had no effect on the type of food that subjects chose to eat. There was a significant main effect of food type [$F(1,18) = 15.66$, $p = 0.001$], though this is not particularly meaningful because it probably is inappropriate to compare the two types of food in terms of weight.

DISCUSSION

The hypothesis that participants in the boredom condition would eat more than the participants in the interested condition was not supported by the results of the experiment. This result contradicts the previous study on boredom and consumption, which found that bored participants eat more than those who are not bored (Abramson & Stinson, 1977). The results of the experiment did not support the second hypothesis that bored participants would eat more sugary foods than bland snacks. The participants ate approximately the same amount of food overall, and they ate the same proportions of M&Ms and saltines.

Numerous methodological differences are found between this experiment and the past research, which may have contributed to the non-significant effect of boredom on consumption. In the present study, the deception may not have been effective and therefore the participants may have been aware that boredom and consumption were the topics of the study. With the limited budget of the project, it may have been suspicious that food simply was being given away. The researchers tried to conceal the true reason by telling participants that it was food left over from their teaching assistant's lab. However, the deception may not have been effective because on the top of the consent form and post-test there was a running head that read: BOREDOM AND CONSUMPTION. Not all participants recognized this; however, it is likely that some did. If participants were privy to the subject topic they may have altered their eating habits. Since limitations exist in this experiment, it is important to look to future research to help make any further claims. Perhaps it would be possible to equate two types of food in terms of volume or caloric content. Additional research is important because it may be necessary to use different food options and different manipulations of boredom and interest to determine if the effect on food preferences is generalizable.

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Listening is Seeing: Effects of Auditory Load on Inattentional Blindness

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Inattentional blindness (IB) is the failure to notice an unexpected, yet obvious, visual stimulus due to focused attention on another task. This study sought to examine the effects of auditory load on IB and if IB increases in concordance with cognitive load between medium and high auditory load conditions. Participants were asked to view an IB video showing cards being dealt that had been paired with either music or music with embedded tones. They were asked to count the number of cards and report if they saw anything unusual in the video. The results indicate that as auditory load increases, IB increases. These results seem to indicate that there is a limit to attentional abilities, at which point unexpected events go unnoticed and that a trend of increasing IB can be seen in conformity with increasing cognitive load.

Pages: 12-16

In modern society, it seems as though people's attention is constantly divided amongst multiple tasks simultaneously, commonly referred to as multitasking. Such tasks may include checking e-mail and talking on the phone, reading an article and listening to the television, or even the highly debated issue of driving while talking on a cell phone. Although it may seem as though humans were designed to multitask, there appears to be a limited capacity for the human nervous system to process information. This capacity was theorized by Broadbent (1958) and evidenced by decrements in performance while performing multiple cognitive tasks. It could be hypothesized that practice in multitasking might increase the ability to perform certain cognitive tasks concurrently. However, researchers have actually found that those that multitasked more often were worse at it than those that did not multitask as often (Ophir, Nass, & Wagner, 2009).

It soon becomes apparent that there are limitations to how much a person is able to effectively process and respond to cognitive tasks, but the mechanisms underlying this principle seem rather mysterious. Salvucci and Taatgen (2008) recently developed the theory of threaded cognition as a mathematical model for calculating the extent to which individuals are able to multitask in terms of both concurrent multitasking and sequential multitasking. As an analogy to their theory, Salvucci and Taatgen describe the idea of a chef preparing multiple meals at once. They draw upon the idea that the chef has an oven, a stove, and mixers at his disposal. This is analogous (though very simplified) to different regions in the brain such as the somatosensory system, visual system, and auditory system. The chef also has orders (tasks) that he is to fill. These orders sometimes need the use of the same apparatus to be completed. Based on this analogy, the concept of multitasking may be considered serial events rather than simply parallel events because each task may require the same resources. This introduces the concept of cognitive bottlenecking, which is the idea that when two tasks attempt to access the same cognitive resource, only one will be able to effectively make use of the resource at one time. Cognitive bottlenecking still makes use of Broadbent's (1958) ideas on distinct resources in that other

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tasks may be affected negatively in order to complete all tasks presented. By utilizing these theories, it may be deduced that the addition of unexpected stimuli may produce hindrances to the performance of an individual if they allocate limited attentional resources to the unexpected stimuli.

One consequence of an organism having limited attentional resources is the phenomenon known as inattentional blindness (IB). IB is the failure to notice an unexpected, yet obvious, stimulus because attention is focused on another task (Mack, 2003). There are differing degrees to which this may present danger. It could be as harmless as overlooking a large puddle on the ground or as hazardous as not noticing a vehicle while changing lanes. Understanding the mechanics behind this phenomenon may help reduce number of tragic accidents and save the lives of many. On a more fundamental level, it can provide insight into the limits of human cognition.

Relating multitasking and inattentional blindness is a matter of observing the concept of cognitive bottlenecking. This was demonstrated in a study conducted by Macdonald and Lavie (2008) in which the researchers observed the effects of low perceptual load versus high perceptual load on inattentional blindness. First, they had the participants use a computer and correctly identify the letter *X* or *N* that flashed briefly on a grey screen. The researchers then created high perceptual load by introducing additional letters that are similar in form to the target letter (i.e., *H*, *K*, *M*, *W*, and *Z*). Low perceptual load was produced by the use of *O* instead of similar letters. The participants were then asked to press the appropriate button to indicate seeing *X*, *N*, or the "critical" stimulus (CS), which was a small, gray meaningless figure. Macdonald and Lavie (2008) found that the ability to detect the CS at baseline was not significantly different from detecting the CS during low perceptual load. However, during high perceptual load, there was a significant reduction in the detection of the CS relative to baseline. It may be concluded that higher cognitive loads increase inattentional blindness. This supports the idea that greater amounts of resources used in one cognitive area will lead to an increase in inattentional blindness as it follows the cognitive bottlenecking paradigm.

However, a recent study conducted by Beanland, Allen, and Pammer (2011) sheds new light on how cognitive load influences inattentional blindness. The researchers wanted to investigate the effects of attending to music on inattentional blindness. In their study, they had participants observe black and white *L*'s and *T*'s on a computer screen. They were then instructed to count the number of times the white letters "bounced" off the sides of the screen. They did this while listening to ABBA's "Mamma Mia". In one condition, the participants were instructed to simply listen to the music. In another condition, the participants were to listen for an embedded tone and make the appropriate response when they heard a tone. Near the end of each trial, a gray letter *A* would travel horizontally across the middle of the screen. The results of this experiment were somewhat counterintuitive. Attending to music with embedded tones actually *decreased* inattentional blindness. Thus, although inducing an overload of stimuli to one cognitive area within the brain (e.g., visual or auditory) appears to cause a decrement in certain abilities, it would appear that lesser amounts of stimulation to multiple modalities are not detrimental to a person's ability to multitask.

Previous studies restricted stimulus overload to one modality without observing the effects over multiple modalities. The conflicting results of these studies present a new opportunity for research. Beanland *et al.*'s (2011) study indicated that attending to music decreases inattentional blindness. They concluded that this may have been due to the predicted U-shaped curve of load on IB. That is to say that low load and high load see higher rates of IB than moderate load because participants get distracted easily or the task is so difficult that it requires cognitive resources that are not available, thus inducing IB. In the case of moderate load with the accompaniment of a simple auditory task, IB occurs at a lower frequency because it maintains the individual's attention at the point where distractibility is less of an issue, but does not take up enough cognitive resources to induce IB. However, the auditory task must be simple enough to avoid increasing cognitive load. In contrast, the increase in cognitive load based on MacDonald and Lavie's (2008) research might suggest that the increased cognitive load should increase inattentional blindness monotonically. This study aims to further extend the research of Beanland *et al*. (2011) and investigate if there could be some 'optimal point' at which cognitive load is relatively high, and yet, inattentional blindness is low. More specifically, this study seeks to observe whether inattentional blindness might increase with increased auditory load as consistent with the theory of limited resources in cognition, when the complexity of the cognitive (auditory) task is increased. Additionally, the goal of this study is to replicate Beanland *et al*.'s findings that IB decreases while attending to music.

In this experiment, different levels of inattentional blindness across three groups represented by three levels of auditory load were observed. Low load consisted of just listening to a song. Medium load consisted of listening to the same song, but with embedded tones (similar to Beanland *et al*. study). High load required the participant to listen for the key word "one" within the song lyrics. Thus, the high load condition resembled the higher cognitive function of speech comprehension. The visual part of the task included watching a video of cards being turned over. The participant was to count the number of black cards (i.e., spades and clubs) turned over, amidst a total of 42 cards. In a survey, at the end of the task, the participants were asked if they saw anything unusual in the video. If so, they were asked to identify what it was that was unusual. The correct identification of the unexpected stimulus (a blue-backed card in a red-backed deck) was counted as noticing (e.g., "I saw a blue card in a red deck"). Any "no" responses or incorrect attempts at identifying the unexpected stimulus was counted as not noticing. Based on the past theories incorporating limited cognitive resources and threaded cognition, it is hypothesized that there will be an increase of inattentional blindness in the group required to perform the high load (increased complexity) auditory task compared to the

medium load. It is also expected that results from this study will be similar to the Beanland *et al*'s finding of decreased IB while attending to music (i.e., medium load will see a decrease in IB relative to low load).

METHOD

Participants

Forty-five subjects were selected via convenience sampling from three different sections of a psychological research methods class and from the acquaintances of the researchers at the University of Minnesota. The age range was 18 to 32 with a mean age of 21.78 (SD = 3.11). The sample included 19 females and 26 males. Individuals indicated race as follows: 73.33% Caucasian, 24.44% Asian/Pacific Islander, and 2.22% African American. All individuals had normal or corrected-to-normal visual acuity and no hearing deficits were reported. All individuals participated either as a course requirement or freely without compensation. Finally, subjects were distributed across each level of auditory load, low (n = 16), medium (n = 15), and high (n = 14).

Materials

An inattentional blindness video was created using an HTC Hero phone's video application/camera and two different colored decks of Bicycle playing cards. There were 42 total cards used: 19 black (club or spade) cards with red backs, 22 red cards (diamond or heart) with red backs, and 1 black card with a blue back. The cards were filmed being turned over from face down to face up. The face down side was visible until the card was turned over and stacked in a pile. This video was presented using the website YouTube.com (respectively, videos for the low, medium, and high auditory loads are as follows: watch?v=FYoSNT0rRzg, watch?v=N8KPSbdjxng, and watch?v=Sd8A14DT0kw). They were played on a laptop computer (Gateway MX6927).

The song used for the auditory task was called *Be the One* performed by *The Fray*, off of the CD *The Fray [Bonus Disc]*. The segment of the song used was from 1:47-2:37. In low auditory load and high auditory load conditions, only the song was paired with the video. In the medium auditory load condition, the music was paired the same way, but the addition of a tone was introduced at varied intervals of the track (i.e., 11, 15, 20, 30, and 41 second marks in the video). The music was paired with the video using Picasa, a program affiliated with Google, Inc. The five tones were generated using the website soundjay.com/censor-beep-sound-effect.html. They are 500 ms in duration and 900 Hz in frequency. They were embedded in the video using Goldwave software (Goldwave, Inc.). The target word in the high load condition, "one", appeared five times in the audio clip. A pair of Bose earphones was used to present auditory stimuli.

In all three conditions, the participant was asked to count the number of black cards (i.e., club or spade). Participants were presented with a paper survey at the end of the task to record the measure of inattentional blindness through the use of two questions. The first question asked, "Did you notice anything unusual in the video," and required the participant to circle yes or no. The second question pertained only to those that answered "yes" and requested a description of the unusual event that they noticed (e.g., I saw a blue card within the red deck). The latter portion of the survey gathered demographic information.

Procedure

The researchers first obtained informed consent. Then the participants were randomly assigned to one of three groups that represented different levels of the independent variable: low auditory load, medium auditory load, and high auditory load. Before beginning the task, the participant adjusted the volume of the audio clip while listening to another segment of the song to achieve a comfortable listening level that also permitted the participant to perceive the lyrics. Each participant was told that they were to watch a video of cards being flipped and they were instructed to count the number of black cards (club or spade). Also, all participants were informed that there would be music playing in the background.

Additionally, each group was given information in regards to their assigned auditory task. The low auditory load group was told to simply listen to the song, but was given no specific task regarding audition. The medium auditory load group was told to verbally respond "Yes" each time that they heard a single tone. Finally, the high auditory load group was instructed to respond, "Yes" each time that they heard the word "one" in the song. The researcher recorded the number of "Yes" responses for each participant. There were a total of 5 occurrences of either the tone or the word "one".

At the end of the video, the participant was asked to fill out the survey described above. At the end of the experiment, each participant was debriefed on the true intentions of the experiment.

RESULTS

The dependent variable was measured using two questions asked on the survey following the task. Based on the answers given (e.g., I saw a blue card in a deck of red cards), the participants were categorized as either seeing the unexpected stimulus or not seeing it. A chi-square test of independence was performed to compare rates of noticing the stimulus between the three groups of low auditory load, medium auditory load, and high auditory load.

Analyses showed that the proportion of participants who noticed the unexpected stimulus significantly differed between the low auditory load group, medium auditory load group, and the high auditory load group, $\chi^2(2) = 7.90$, $p = 0.019$. The data illustrate that those in the low auditory load group (68.75%) noticed the unexpected stimulus more than those in the medium auditory load group (20.00%) and the high auditory load group (35.71%). The pie charts in Figure 1 display this pattern. Pair-wise comparisons between conditions were then used to test differences between each group. A pair-

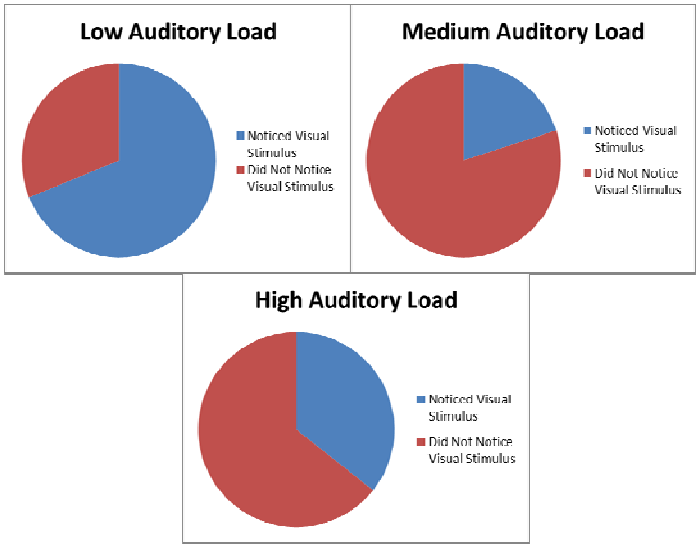

FIGURE 1. Proportions of participants who noticed or did not notice the unexpected stimulus in the low auditory load, medium auditory load, and high auditory load conditions.

wise comparison between the low auditory load group and medium auditory load groups indicated that there was a significant difference in the proportion of participants that noticed the unexpected stimulus, χ^2 (1) = 7.43, p = 0.006. However, a pair-wise comparison indicated that the proportion of participants who noticed the unexpected stimulus was not found to significantly differ between the medium auditory load group and the high auditory load group, χ^2 (1) = 0.90 p = 0.34. Lastly, a pair-wise comparison between the low auditory load group and the high auditory load group did not indicate a significant difference, χ^2 (1) = 3.27, p = 0.07.

DISCUSSION

It was originally hypothesized that there would be an increase of inattentional blindness in the high auditory load group as compared to the medium auditory load group. While there was a significant difference when comparing the low, medium, and high auditory groups, pair-wise comparisons did not support the research hypothesis. This was evident from the lack of a significant difference between the medium auditory load group and the high auditory load group. Also, the high auditory load group displayed a slightly better score in noticing the unexpected stimulus than the medium auditory load group.

Another surprising result was the fact that the results found in the research conducted Beanland *et al*. (2011), in which a decrease of inattentional blindness while attending to tones in music, were not replicated. The results from this study seem to contradict their findings in that low auditory load group scored significantly better than the medium auditory load group. However, there are some differences between their experiment and ours that may account for differences observed. Although an attempt at using similar methodologies to the Beanland *et al*. (2011) study were made, we were unable to set up a program similar to theirs and so resorted to using the video recording with the song and tones embedded. Also, the unexpected stimulus in the current experiment differed from the unexpected stimulus in the Beanland *et al*. (2011) study. Their unexpected stimulus may have been more overt in the sense that it did not conform to the same pattern as the other letter (i.e., bouncing vs. sliding across the screen) as compared to the same repetitive motion of flipping cards. This might be enough to produce a difference between the two studies and these differences may account for the low number of individuals within this study that noticed the unexpected stimulus in the medium auditory load group. Finally, a major source of difference resides in the fact that in the Beanland *et al*. (2011) study, participants pushed a button each time a letter bounced off the side of a computer screen, while the current study had them count the number of black cards and report their counts at the end. In having the participants count the cards, the researchers inadvertently included memory in addition to the auditory and visual tasks. The addition of another area of cognition hinders performance overall, consistent with MacDonald and Lavie's (2008) cognitive load theory. If there is a delicate balance between number of cognitive areas tested and cognitive load that does exist, the addition of memory to the task may be sufficient to tip the proverbial scales enough to see a decrement in attentional abilities with increasing cognitive load.

The trend across conditions showed increasing inattentional blindness with increasing cognitive load (although the difference between the low and high load conditions was not significant due to the small sample size). The researchers' findings in this study are consistent with the threaded cognition theory proposed by Salvucci and Taatgen (2008). From this theory, the researchers postulate that as cognitive load increases, inattentional blindness also increases. The significant difference between the low auditory group as compared to the medium and high auditory load groups seems to support this concept. Based on this study's significant results, we conclude that auditory load does appear to play a role in increasing inattentional blindness. As cognitive demands increase, increases of inattentional blindness are expected. The involvement of memory may have increased cognitive load and may be the reason as to why the researchers were unable to replicate the Beanland *et al*. (2011) study.

With these conclusions in mind, limitations of results need to be discussed. Two major limitations to the results of this study stem from the unintended use of memory in the task and the construct validity of the video created as there are not many videos similar to the one used. Future research should address the differences between this experiment and previous studies that may have produced inconsistent results. For example, the fact that this experiment utilized a task that depended upon memory may have placed additional demands on attentional resources. One option may be to replicate this study, but completely avoid the memory task altogether.

However, another option for research may purposefully involve memory and move toward concepts involving multi-tasking.

After conducting this research, it seems evident that people may be more prone to missing unexpected occurrences in their environment due to multiple senses registering stimuli. This can result in rather harmless mishaps or in devastating accidents. Understanding the boundaries of cognition is an important goal if we hope to reduce these possible accidents in our lives. In furthering our understanding of our boundaries in cognition, we can hopefully gain greater insight to our human limits in multitasking and potentially increase stretch the limits we have to greater extremes.

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Ethnic Identity as a Predictor of Locus of Control and Academic Self-Efficacy

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Research suggests that ethnic identity salience predicts high self-esteem. The present study examines whether ethnic identity also predicts two other psychological constructs related to self-esteem in college-aged participants: higher internal locus of control and academic self-efficacy. In the beginning of the 2011 fall semester, a total of 315 participants, most of whom were ethnic minorities, completed an online-administered survey which measured their ethnic identity salience, internal locus of control, and academic self-efficacy. Results indicated that only one of the two sub-dimensions in the ethnic identity scale, ethnic identity commitment, had positive links to the two criterion variables, while the other factor, ethnic identity exploration, had little relationship with internal locus of control and a slightly negative association with academic self-efficacy. These findings were consistent with the identity status theory, which holds that an individual's identity exploration, unlike identity commitment, is paired with an identity crisis.

Pages: 17-21

Psychologists have given significant attention to how an individual develops his or her own sense of identity. Erik Erikson (1968), one of the earliest psychologists to lay a developmental framework involving identity (Holloway, Holloway, & Witte, 2010), considered adolescence to be the critical period of one's identity formation. According to Erikson, identity, which is uniquely formed in each individual through the process of exploration and commitment, "depends on the support which the young receive from the collective sense of identity which social groups assign to [them]" (as cited in Phinney & Alpuria, 1990, p. 171). Erikson's notions of exploration and commitment were further developed by Marcia (1966) in his identity status theory. Marcia defined identity status as that determined by *(a)* whether one has explored or is exploring for a clear sense of identity and *(b)* whether one is committed to his or her identity. Hence, the degrees of one's identity exploration and identity commitment make up four possible identity statuses: Identity Achievement (high exploration and high commitment), Moratorium (high exploration and low commitment), Foreclosure (low exploration and high commitment), and Identity Diffusion (low exploration and low commitment). In this model, an individual obtains a solid identity by exploring for his true identity and committing himself to his identity.

As the number of ethnic minorities has been growing in the United States and other Western countries over the past decades, the need for psychological research on populations has also been increasing (Schwartz, Unger, Zamboanga, & Szapocznik, 2010). The Eriksonian framework, however, does not directly examine the influence of ethnicity or culture on identity formation. Tajfel and Turner (1986) sought to mend this gap with their social identity theory, which explains how specific social groups, such as religious, occupational, or political groups, influence an individual's identity formation. According to the theory, one's self-concept depends largely on a sense of belonging to a group, because people attribute value to the group from which they derive a considerable amount of self-esteem (Phinney, 2003). Hence, on the basis of social identity theory, researchers have considered ethnic identity an important type of group identity that is vital to the self-concept of ethnic minority individuals. Ethnic identity has thus been defined as "a dynamic, multidimensional construct that refers to one's identity or sense of self as a member of an ethnic group" (Phinney, 2003, p. 63).

In support of the social identity theory, numerous studies have identified a positive association between self-esteem and ethnic identity. For ethnic minority students, the salience of ethnic identity showed a positive correlation with

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self-esteem, in both high school and college settings (Phinney, 1992; Phinney & Alipuria, 1990). Phinney and Chavira (1992) have found that adolescents' self-esteem increased while their ethnic identity became salient over time. A similar relationship was found in adolescents of a younger age group (i.e., middle school students; Smith, Walker, Fields, Brookins, & Seay, 1999; Roberts, Phinney, Masse, Chen, Roberts, & Romero, 1999). Despite the amount of research that exists on the relationship between ethnic identity and self-esteem, however, little research has been done on the relationship between ethnic identity and other concepts related to self-esteem. In the present study, I focused on the concepts of locus of control and academic self-efficacy.

Locus of Control

Locus of control refers to the amount of control an individual believes he or she has in life (Rotter, 1968). People with an internal locus of control believe that they can control the events in their lives, whereas people with an external locus of control believe that events in their lives are controlled by external forces. Studies have largely supported the positive relationship between self-esteem and internal locus of control. Judge, Erez, Bono, and Thoresen (2002) found that self-esteem, internal locus of control, non-neuroticism, and generalized self-efficacy were strongly and positively correlated with one another, and suggested that these four concepts may belong to one larger concept. On a similar note, a neurological relationship between self-esteem and internal locus of control, in terms of hippocampal volume and cortisol activity, has been identified (Pruessner *et al*., 2005). Sterbin and Rakow (1996) have also found that both self-esteem and locus of control are predictors of standardized test scores among high school students, suggesting that the two constructs are closely related.

The relationship between ethnic identity and locus of control, however, has not been widely studied. In one study, Cosby (1999) found a positive correlation between internal locus of control and racial identity development among African American students between 14 and 18 years of age. Studies of racial identity, such as Cosby's, have typically focused on African Americans and their unique historical experiences (Burlew, 2000). For that reason, the concept of racial identity was differentiated from the concept of ethnic identity in the present study, in order to study identity formations in people of all ethnic groups.[a] Also, since Cosby examined students who were not yet in college, it remains unclear whether a similar relationship involving locus of control can also be found among college students of ethnic minorities. On the basis of these previous studies, I hypothesized in the present study that college students who have salient ethnic identity would report higher internal locus of control.

Academic Self-efficacy

According to Bandura (1997), self-efficacy refers to a person's belief about his or her competence in a particular context or domain. Self-efficacy is situational and context-dependent, whereas self-esteem is a general belief about one's aptitude. Academic self-efficacy, therefore, can be defined as people's conviction that they can accomplish a certain level within an academic task or reach a specific academic goal (McGrew, 2008). Although little research has compared self-esteem and academic self-efficacy together, there seems to be a significant link between the two concepts. Research suggests that high academic self-efficacy is related to high academic achievement, which, in turn, is positively linked to self-esteem. For example, high academic self-efficacy predicts high GPA among college students (Elias & Loomis, 2002), and self-esteem can predict standardized test scores, as noted above (Sterbin & Rakow, 1996).

In regard to ethnic identity, Zarate, Bhimji, and Reese (2005) identified that ethnic identity salience among Latino adolescents in America, when coupled with an adequate understanding of their bicultural status, was predictive of their academic performance. However, their study did not examine whether the participants' academic self-efficacy influenced the outcome, and whether similar results could be found in people of other ethnicities and other age groups. Cosby (1999) found a positive correlation between African Americans' racial identity development and career self-efficacy, yet her study was limited to the experiences of African Americans and their career self-efficacy, not academic self-efficacy. Smith *et al*. (1999) looked at both academic self-efficacy and ethnic identity, but their study examined these constructs as mediated by generalized self-efficacy and their subjects were middle school students, not college students. In contrast, the present study directly looked at the potential relationship between ethnic identity and academic self-efficacy in college-aged participants. Following the results of previous studies, it was hypothesized that salience of ethnic identity among college students is positively related to academic self-efficacy.

In the present study, I examined whether having a strong ethnic identity would be predictive of having an internal locus of control and academic self-efficacy by analyzing responses to a survey administered to college students, most of whom were ethnic minorities. In the first hypothesis, ethnic identity salience was expected to predict higher internal locus of control among the students. With the second hypothesis I expected that ethnic identity salience would be positively related to higher academic self-efficacy among the participants.

METHOD

Participants

A total of 315 participants voluntarily participated in the study. Two participants did not complete the survey and their responses were excluded from this analysis. All participants were ethnic minority undergraduate students who were enrolled in a program sponsored by the Multicultural Center for Academic Excellence (MCAE) at the University of Minnesota. Because the participants were surveyed in the beginning of their first semester at the university, most of them were freshmen, but there were also three sophomores and eight

juniors. One hundred and twelve people identified themselves as males, 211 as females, and two did not identify their gender. The ages of the participants ranged from 16 to 28 (M = 18.22). The median and the modal age were both 18. The ethnicity of each participant was self-reported; the participants could list as many races/ethnicities with which they identified as they liked. When categorized, there were 174 (55.2%) Asians/Asian Americans, 46 (14.6%) Africans/African Americans, 24 (7.6%) Hispanic/Latino or Central Americans, six (1.9%) Middle Eastern/Arabic Americans, 38 (12.1%) Mixed/Multicultural Americans, nine (2.9%) Native Americans, 13 (4.1%) White/Caucasian/European Americans, and four (1.3%) individuals who identified themselves with unclear or unspecified ethnic labels that could not be classified into any ethnic category.

Materials

All participants filled out an online survey form. In the survey they indicated their basic demographic information and responded to various question sets, many of which were reserved for other potential studies and thus were not analyzed in the present study. Three measures in the survey were used in this study: Multigroup Ethnic Identity Measure, internal locus of control scale, and academic self-efficacy measure. All participants were given the same sets of questions.

Multigroup Ethnic Identity Measure (MEIM), formulated by Phinney (1992), allows researchers to quantify an individual's degree of ethnic identity development. MEIM itself contains two factors, ethnic identity exploration and ethnic identity commitment (Roberts *et al.*, 1999). MEIM ethnic identity exploration subscale included items such as "I think a lot about how my life will be affected by my ethnic group membership" and "In order to learn more about my ethnic background, I have often talked to other people about my ethnic group." MEIM ethnic identity commitment subscale included items such as "I have a clear sense of my ethnic background and what it means for me" and "I have a lot of pride in my ethnic group." Participants responded to each of these items on a 4-point scale that had "strongly disagree," "disagree," "agree," and "strongly agree" as possible options.

Internal locus of control scale (INT), from which five items were taken, was used to measure the participants' perceived locus of control (Côté, 1997). Examples of these items were "When I make plans, I am almost certain that I can make them work" and "What happens to me is my own doing."

Academic self-efficacy measure was based on an unpublished study proposal by Kyoung-Rae Jung ("The mediation effect," n.d.).[b] A total of nine questions in the set included items such as "I am a reliable and hardworking student" and "When studying, I make a plan and follow through with it." Both internal locus of control scale and academic self-efficacy measure were on a 5-point scale ranging from "strongly disagree" to "strongly agree."

TABLE 1. Descriptive Statistics and the Correlations among the Variables

	M	*SD*	Min	Max	1	2	3
1. MEIM Exploration	2.74	0.53	1.00	4.00	---		
2. MEIM Commitment	3.13	0.52	1.57	4.00	0.502*	---	
3. Internal Locus of Control	3.77	0.60	1.60	5.00	0.094	0.174*	---
4. Academic Self-efficacy	3.63	0.70	1.44	5.00	0.005	0.204*	0.388*

* $p < 0.01$

Procedure

Participants took the survey as part of the university's new student orientation activities called the MCAE Multicultural Kick-off, which was held in late August, 2011, right before the beginning of the fall semester. Groups of 20 to 30 participants took the survey on computers in computer labs on campus. Prior to completing the survey, every participant signed a consent form that explained the purpose of the survey and was informed of the confidentiality of their responses. The participants were given 60 minutes to complete the survey. The participants were not given any compensation for their participation.

RESULTS

Means, standard deviations, and minimum and maximum scores for all four variables in the present study as well as correlations among the variables are noted in Table 1. As predicted, the MEIM ethnic identity exploration scores and the MEIM ethnic identity commitment scores were strongly correlated (r = 0.502). The two criterion variables, internal locus of control and academic self-efficacy, were also significantly correlated (r = 0.388). However, when the predictor variables and the criterion variables were compared, only MEIM ethnic identity commitment scale, not MEIM ethnic identity exploration, was significantly correlated with both criterion variables. Subsequent regression analyses examined this relationship further. Internal consistency reliability was also calculated for each of the four scales used in the present study. Cronbach's alpha coefficients for MEIM ethnic identity exploration items and MEIM ethnic identity commitment items were 0.651 and 0.859, respectively. For the internal locus of control scale and the academic self-efficacy measure, internal consistency values were 0.631 and 0.860, respectively.

Two separate regression analyses further tested the two hypotheses. Both the MEIM ethnic identity exploration and the MEIM ethnic identity commitment were predictor variables in both regression models. The criterion variables were internal locus of control and academic self-efficacy for each analysis, respectively. In the first regression model, although MEIM ethnic identity exploration had almost no relationship with internal locus of control, MEIM ethnic identity commitment predicted internal locus of control with statistical significance. The second regression model also showed that only MEIM

TABLE 2. Regression Models

#	Criterion	Predictor	*B*	*SE B*	*beta*
1	Internal Locus of Control	MEIM Exploration	0.010	0.073	0.009
		MEIM Commitment	0.196*	0.075	0.169*
2	Academic Self-efficacy	MEIM Exploration	-0.171	0.084	-0.130
		MEIM Commitment	0.364*	0.086	0.269*

* $p < 0.05$

ethnic identity commitment had a significant positive relationship with the criterion, academic self-efficacy. However, the second analysis was notably different from the first, in that MEIM ethnic identity exploration had a negative relationship with the criterion variable. Table 2 shows the complete results of both regression analyses conducted in the present study.

DISCUSSION

The hypotheses that ethnic identity is positively correlated with internal locus of control and with academic self-efficacy were partially supported by the data in the present study. Given that previous studies showed a positive relationship between self-esteem and generalized ethnic identity, it was hypothesized that the same pattern would be observed with internal locus of control and academic self-efficacy. However, the relationship between ethnic identity and the two criterion variables did not turn out to be as simple as originally presumed in the present study. Only ethnic identity commitment showed the predicted outcome, while ethnic identity exploration had little relationship with internal locus of control and a slightly negative correlation with academic self-efficacy. The relationships among the variables found in the present study are visually represented in Figure 1.

Why the variables displayed such complicated relationships in the results may be explained in terms of Marcia's (1980) identity status model. The concepts of identity exploration and identity commitment, which constitute the two factors of MEIM, are also the key components of Marcia's identity status model. Marcia's theory shows that the concepts of identity exploration and identity commitment, albeit related, have aspects independent of each other, thus they may produce independent effects on one's self-concept. Moreover, because identity exploration is driven by identity crisis (Marcia, 1980), the notion of identity exploration without identity commitment resembles the Moratorium status in which individuals are experiencing an identity crisis. Hence, having a Moratorium identity status may entail a negative sense of self, manifested as low academic self-efficacy and external locus of control. Since an individual in the Moratorium stage is struggling with various issues and is highly anxious (Marcia, 1980), it seems probable that ethnic identity exploration without ethnic identity commitment is not positively related to internal locus of control and even negatively linked to academic self-efficacy, as the results indicate. In the same way, ethnic identity commitment without ethnic identity exploration, equivalent to the Foreclosure status, could still predict higher internal locus of control and academic self-efficacy, because the individual is not in crisis.

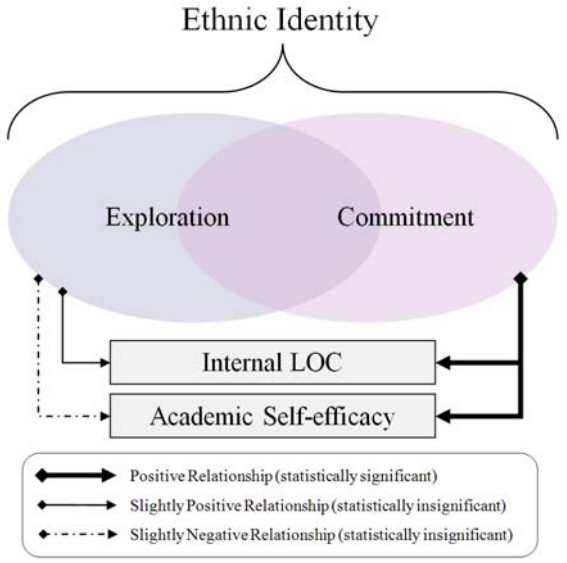

FIGURE 1. A proposed diagram of the relationships found among the variables.

Results from the present study suggest that ethnic identity salience is a moderate predictor of internal locus of control and academic self-efficacy, since people who have explored for and are committed to their ethnic identity would more likely have an internal locus of control and high academic self-efficacy than people who have not explored for and are not committed to their ethnic identity. At the same time, however, it is also inferred from the analyses that some people can be equal in terms of ethnic identity development yet may differ in their locus of control and their degree of academic self-efficacy, since people committed to their ethnic identity without exploring are more likely to have an internal locus of control and high academic self-efficacy than people exploring for their ethnic identity without committing.

What must yet be emphasized in the present study, however, is that the dimensions of ethnic identity exploration and ethnic identity commitment were strongly correlated with each other, with the implication that salience in each factor often predicts the likelihood of the other in individual ethnic identity formations. Such strong intertwinement between ethnic identity exploration and ethnic identity commitment is also consistent with Marcia's identity status model, because research suggests that changes in either identity exploration or identity commitment may induce changes in the other during the course of a person's normal identity development (Stephen, Fraser, & Marcia, 1992).

Although the original hypotheses were only partially supported, implications drawn from the results in the present study seem consistent with Marcia's identity status model. In generalizing these results, however, the present study has a few limitations that warrant further research in order to strengthen this conclusion. First, participation to the survey was completely voluntary, and this fact may indicate possible self-selection bias in sampling. Second, at the time the survey was administered, most participants were freshmen who were about to begin their first semester in college. The fact that the

majority of the sample did not have enough experience of college life may be an obstacle in generalizing these findings to the entire population of college students. Lastly, the fact that more than half of the participants were Asians or Asian Americans may be an issue. Since people of other ethnic groups may have had different patterns that were overridden by the responses of the Asian group, it remains unclear how much these findings can generalize to the general population regardless of ethnicity. In addition, it would be sensible to direct future research toward seeing whether the relationship between the construct of self-esteem and each of the two dimensions of ethnic identity, instead of ethnic identity as one generalized variable, is similar to the results in the present study. As the two criterion variables in the present study were chosen due to their theoretical closeness to self-esteem, researchers might need to re-examine the relationship between ethnic identity and self-esteem in light of the present study.

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FOOTNOTES

[a] Racial identity and ethnic identity are closely related constructs, thus often analyzed together in research (e.g., Quintana, 2007). However, the two are also different not only because the notion of racial identity primarily concerns African Americans (Burlew, 2000), but also in that the measure of racial identity (Cross's Nigrescence model; see Cross, 1991) is different from that of ethnic identity (Multigroup Ethnic Identity Measure; see Phinney, 1992). Consequently, the concept of ethnic identity was considered more suitable in the present study to account for identity formation in all ethnic groups.

[b] In Jung's proposal, academic self-efficacy is distinguished from another construct, academic self-discipline, and the two are measured differently. While academic self-efficacy denotes perceived competency in academic tasks, academic self-discipline refers to "perceived behavioral self-control regarding academic achievement" (Jung, n.d., p. 2). Jung proposes that academic self-discipline (i.e., self-regulation to achieve certain academic goals) mediates the positive relationship between academic self-efficacy (i.e., belief in one's academic competency) and college GPA. However, since academic self-efficacy and academic self-discipline are closely related concepts and each is highly predictive of the other, the present study did not differentiate the two in measurement and treated them as one construct.

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The Effects of Brief Mindfulness on Cognitive Test Performance

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Previous research suggests that brief mindfulness meditation can help improve attention, problem solving, and working memory in students. The purpose of this study was to provide further evidence for the same effects of mindfulness meditation in the student population. Participants were randomly assigned to the experimental and control groups, both of which received the Stroop, London Tower, and Digit Span tasks on two separate occasions. The experimental group performed 20-minutes of guided meditation four days a week between tests, while the control group was not given a task. No significant difference was found between control and experimental group performance. These results suggest that brief mindfulness meditation may not aid enhance these cognitive functions. However, a variety of methodological issues were present that may have affected the results.

Pages: 22-25

Research on mindfulness meditation has flourished over the past decade, having been implemented in a variety of hospital programs, rehabilitation centers, and clinics around the world with a great deal of demonstrated efficacy (Davidson *et al.*, 2003). Mindfulness is defined as being attentive to and fully aware of the present moment with a non-judgmental attitude (Bowlin & Baer, 2008). Meditation is simply the method of concentration used to attain a state of mindfulness. There are several methods of meditation that can be used to achieve mindfulness. For example, sitting meditation is primarily used to bring about mindfulness of the breath, while body scan meditation is used to bring about mindfulness of specific areas of the body. There are a wide variety of meditation practices from various cultural traditions such as Zen, Buddhist, and Hindu disciplines (Holzel *et al.*, 2011).

Most mindfulness meditation research has focused primarily on its long-term rather than short-term benefits (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). The most common mindfulness meditation program is Mindfulness-Based Stress Reduction (MBSR; Zeidan *et al.*, 2010). If there are short-term benefits of brief, low-cost meditation practice on cognitive performance, it would be an excellent alternative to MBSR for those who lack time and financial resources. For the purpose of introducing the topic of mindfulness, this section will focus on the results derived from MBSR research.

MBSR programs are taught over the course of eight weeks under the supervision of a certified instructor (Jha, Krompinger, & Baime, 2007). It has been shown to be effective in treating anxiety and depressive disorders (Vollestad, Sieversten, & Nielsen, 2011), decreasing negative affect and increasing antibodies necessary for healthy immune system functioning (Davidson *et al.*, 2003), as well as significantly decreasing stress in a non-clinical population (Jensen, Vankilde, Frokjaer, & Hasselbalch, 2012). As outlined by Vollestad *et al.* (2011), MBSR training includes a weekly 2.5-hour group session under the instructor's supervision, a half-day meditation retreat during week six of the eight-week program, and a guided mindfulness CD program meant to be used daily. The mindfulness exercises include sitting meditation, yoga, and body scan that last approximately 45 minutes each (Vollestad *et al.*, 2011). MBSR is the most common form of meditation practice used in clinical settings, with over 250 medical centers offering the program in the United States alone (Jha, Krompinger, & Baime, 2007).

In addition to its clinical utility, MBSR has been shown to improve cognitive functioning. MBSR has been demonstrated to improve a number of distinct subsystems of attention, such as orientation and alerting attention (Jha *et al.*, 2007). It has also been associated with an increase in cortical gray matter within the left hippocampus, temperoparietal

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junction, posterior cingulate cortex, and cerebellum; all of which are critical brain structures in learning and memory (Holzel *et al.*, 2010). While research on mindfulness meditation demonstrates a positive relationship between the benefits one receives and the amount of daily practice one engages in (Carmody & Baer, 2008), Zeidan *et al*. (2010) found that just four sessions of mindfulness for 20 minutes a day improved executive functioning, working memory, and visuo-spatial processing.

Unfortunately, the literature on brief mindfulness is scant in comparison with its long-term counterpart. The intent of this research is to add to the literature of brief mindfulness by examining its effects on cognitive test performance. This is done by comparing results on cognitive tests both before and after a one-week guided mindfulness program to determine if there is a significant benefit. The cognitive tests include the Stroop Test, the London Tower task, and the Digit Span task. These tests are meant to measure attention (Stroop, 1935), problem solving (Phillips, 1999), and working memory (Mathy & Feldman, 2012), respectively. The experimental group engaging in mindfulness would be compared with a control group that takes the test in the same time frame without engaging in meditation. We hypothesized that using the guided mindfulness meditation each day for a week would improve performance levels on all three tests for college students. We also believed increased levels of mindfulness measured through the Mindfulness Attentional Awareness Scale (MAAS) would have a positive relationship with cognitive performance.

METHOD

Participants

A total of 12 participants signed up for the present study. Convenience sampling was employed due to the time and resource restrictions of the experiment. Participants included friends of the researchers as well as several students enrolled in an introductory research methods class at the University of Minnesota. Participants ranged from 19 to 26 years old (M = 21.9, SD = 2.2). No compensation was awarded for participation.

Materials

Participants in the study were given a short demographic questionnaire to fill out prior to participation. Mindfulness levels were measured through Brown & Ryan's (2003) Mindfulness Attention and Awareness Scale (MAAS; See Appendix). The MAAS is a 15-item self-report questionnaire that measures attention, awareness, and non-judgmental attitude of the present moment (Brown & Ryan, 2003). Each question asks its respondent to rate their answer from one to six, with one being "almost always" and six being "almost never". Participants in the experimental group were provided with a 20-minute guided sitting meditation audio file available free from the University of California-San Diego website. These audio files were used to guide participants in the experimental group into a state of mindfulness. Cognitive testing was implemented through Inquisit version 4.0.0.0 beta software on a laptop computer and included the London Tower, Digit Span, and Stroop Test program.

Procedure

Participants were initially administered an informed consent form. This explained to participants, that participation was voluntary, that no identifiable information would be gathered and that they had the right to withdraw their data at any time. Participants were randomly assigned to either the control group or the experimental group. Both groups were administered the MAAS questionnaire and then asked to take the Inquisit tests.

Each Inquisit test was taken in succession beginning with the Stroop Test, the London Tower task, and ending with the Digit Span task. The Stroop Test is administered over a series of 3 short segments. The first segment shows the participant 24 dots colored red, blue, green, or yellow. Each color corresponds to the numbers one through four on the keyboard. The participant is required to identify the proper color by pressing the designated number on the keyboard. The second segment uses randomly selected words instead of dots. This segment requires the participant to name the color of the word in the same fashion as the first test. The final segment uses the names of the colors shown in different colors. For example, the word blue would be shown in red. The participant's task is to correctly identify the color of each word, not the word itself.

The object of the London Tower task is to take three different colored loops and arrange them in a designated order within a limited number of moves. Participants are presented with a picture of the proper order during the task. The London Tower task consists of 12 puzzles.

The Digit Span task involves a series of numbers intended to be memorized briefly and then immediately repeated back with the keyboard's number pad. Digit Span length begins at four numbers and increases or decreases the number of digits based on performance. Successful attempts provide more numbers to memorize and unsuccessful attempts provide less. This continues for 12 sets.

Throughout the following week, the experimental group was instructed to listen to the guided mindfulness sitting meditation audio file provided in a URL given to the participant. Participants were asked to listen to the audio file for 20 minutes each day for at least four days. The control group was not given any task to perform. Both groups were asked to come back in seven days to take the MAAS questionnaire and Inquisit tests once again. Testing was administered in the same order as it was during the previous session.

Participants were verbally debriefed following the second session. Debriefing consisted of an explanation of the experimental protocol and hypothesis, as well as answering any questions the participant had. Participants were given the contact information of the experimenters in case they had any further questions or concerns.

TABLE 1. Control Group Pre- and Post-Test Measures

	Pre-Test		Post-Test		
Test	***M***	***SD***	***M***	***SD***	
MAAS	4.0	1.2	4.1	1.2	$t(5)=0.05$, $p=0.96$
Stroop Test	-33.5	137.4	140.5	101.0	$t(5)=0.33$, $p=0.75$
Digit Span	8.2	1.5	7.5	1.0	$t(5)=0.04$, $p=0.97$
Tower of London	32.2	1.7	34.3	1.4	$t(5)=0.52$, $p=0.63$

TABLE 2. Experimental Group Pre- and Post-Test Measures

	Pre-Test		Post-Test		
Test	***M***	***SD***	***M***	***SD***	-
MAAS	3.8	0.9	4.1	0.9	$t(5)=0.08$, $p=0.93$
Stroop Test	166.7	110.4	81.2	51.5	$t(5)=0.74$, $p=0.49$
Digit Span	8.2	1.2	8.3	1.6	$t(5)=0.05$, $p=0.96$
Tower of London	30.5	3.9	34.3	1.4	$t(5)=0.26$, $p=0.81$

RESULTS

The Stroop Tests were scored to measure semantic interference as originally outlined by Stroop (1935). This scoring system takes the difference in time needed to correctly identify the color of incongruent words from the time needed to correctly identify congruent words. Incongruence occurs when letters are in a different color than the word they spell out, such as red being spelled in blue letters. Congruent words spell out the color that the letters are in. The increase in time needed to identify incongruent words is measured as interference because reading the word interferes with the identification of the correct color (Stroop, 1935).

The Digit Span score consists of the average number of correctly identified digits recalled by the participant during the task. The London Tower score consists of the total number of correct orientations constructed within the allotted number of moves subtracted by the overall number of errors it took to reach the correct orientations.

The first analysis compared pre-test and post-test performance within the control group. (See Table 1.) A paired-sample two-tailed *t*-test was used to measure differences between tests. No significant differences were obtained in any of the cognitive tests or the mindfulness measure.

The second analysis examined pre-test and post-test performance within the experimental group. (See Table 2.) A paired-sample two-tailed *t*-test was used to measure differences between the tests. No significant differences were obtained in any of the measurements of the experimental group.

The final analysis compared differences in post-test scores between the control and experimental groups on all four measures. An independent-samples *t*-test was used to measure differences in performance between the two groups. No significant differences were found between any of the measures: MAAS, $t(10) = 0.91$, $p = 0.38$; Stroop Test, $t(10) = 0.32$, $p = 0.76$; Digit Span, $t(10) = 1.0$, $p = 0.34$; Tower of London, $t(10) = 0.23$, $p = 0.82$.

DISCUSSION

The results of this experiment did not support the hypothesis that brief mindfulness meditation would improve performance on certain cognitive tests. Furthermore, brief mindfulness meditation did not contribute to significant increases in mindfulness as measured by the MAAS. The MAAS was developed to measure attention, awareness, and non-judgmental attitude of the present moment (Brown & Ryan, 2003). These results are inconsistent with those of Zeidan *et al*. (2010) which showed that four 20-minute sessions of guided mindfulness improved executive function, working memory, and visuo-spatial processing.

However, there are a few key methodological differences worth mentioning. The small sample size of the study is perhaps its most significant limitation. Zeidan *et al*. (2010) had a sample size of 63 undergraduate psychology students, while this study was only able to recruit 12 undergraduate students. Zeidan *et al*. (2010) also had access to a trained facilitator who not only guided the participants, but was also available to provide personal feedback to participants. The present study lacked the resources to personally assist novice meditators, though they were encouraged to contact the researchers if they had any questions. Participants in the present study were only given an audio file to use and had no supervision. This suggests a significantly decreased quality of mindfulness meditation available to participants in this study.

Previous experience with mindfulness meditation may also have affected the results. Many of the present study's participants had reported some form of previous experience with mindfulness meditation. Zeidan *et al*. (2010) only recruited participants who had no prior experience with any form of mindfulness meditation. The implementation of convenience sampling made it impossible to control for this subject characteristic. This is likely to have contributed to the lack of differences between the control and experimental groups. This was perhaps the most fundamental flaw of the present study. It is necessary that future research control for prior meditation experience .

As previously noted, the research literature on brief mindfulness meditation is in its infancy. There is very little evidence for the effects of brief mindfulness outside of Zeidan *et al*. (2010). Future research will need to pay close attention to the quality of meditation practice, which may have been a key factor in the lack of significant results of the present study. Future research would also benefit from examining other traditions of mindfulness meditation to assess practices that are more relevant to short-term effects. For example, examining the differences between groups that practice brief body scan meditation and groups that practice brief sitting meditation may lead to a deeper understanding of the differences and similarities between these two traditions. Close monitoring of both experimental and control groups are also essential, as is an assessment of background information and previous experience with meditation.

Mindfulness meditation is an area of study ripe for scientific investigation with potential benefits that may have a positive impact on the college student population in the future.

The results of this study should not deter those interested in the practice and research of mindfulness meditation. Instead, they should encourage rigorous scientific inquiry as well as the support of accessible and high-quality mindfulness meditation resources.

APPENDIX

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until sometime later.
1 2 3 4 5 6

I break or spill things because of carelessness, not paying attention, or thinking of something else.
1 2 3 4 5 6

I find it difficult to stay focused on what's happening in the present.
1 2 3 4 5 6

I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
1 2 3 4 5 6

I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
1 2 3 4 5 6

I forget a person's name almost as soon as I've been told it for the first time.
1 2 3 4 5 6

It seems I am "running on automatic," without much awareness of what I'm doing.
1 2 3 4 5 6

I rush through activities without being really attentive to them.
1 2 3 4 5 6

I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.
1 2 3 4 5 6

I do jobs or tasks automatically, without being aware of what I'm doing.
1 2 3 4 5 6

I find myself listening to someone with one ear, doing something else at the same time.
1 2 3 4 5 6

I drive places on 'automatic pilot' and then wonder why I went there.
1 2 3 4 5 6

I find myself preoccupied with the future or the past.
1 2 3 4 5 6

I find myself doing things without paying attention.
1 2 3 4 5 6

I snack without being aware that I'm eating.
1 2 3 4 5 6

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Being Scared by Being Aware: Effects of Campus Crime Alert Emails on People's Fear of Crime

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Past research has suggested that consuming crime-related media increases people's fear of crime. The purpose of this study was to examine whether campus crime alert emails would make students more fearful of crime and more likely to perceive the threat of victimization. We asked participants to read either a crime alert email or a neutral campus newsletter, and then had them rate their fear of crime and perceived likelihood of victimization using our survey. Participants that read crime alert emails and those that read the newsletters did not differ significantly in their fear of crime and perceived likelihood of victimization. These results may indicate that campus crime alert emails do not affect people's perception of danger. However, our failure to find significant results may be due to methodological problems, and further research is needed to examine the potential negative effects of campus crime alert emails.

Pages: 26-30

Crime that occurs on and around university campuses has become an issue after the mass shootings happened at Virginia Tech in 2007 (Dameron, DeTardo-Bora, & Bora, 2009). To increase people's vigilance and awareness of crime and personal safety, security departments at educational institutions send out emails to alert their faculty members and students whenever a crime has occurred. However, while vigilance may be enhanced by these emails, it is also possible that these emails provoke the fear of crime, making people more anxious and worried about their safety. In this study, we try to examine whether or not the seemingly helpful crime alert emails make people feel insecure and afraid of victimization.

The media can affect one's perception of risk. Studies have found a positive relationship between the amount of exposure to negative messages and the perception of potential danger, defined as how likely people felt that they would be victimized (O'Keefe & Reid-Nash, 1987; Dowler, 2003). O'Keefe and Reid-Nash (1987) investigated the effects of media on social reality by conducting an experiment using participants randomly selected from three different locales. The frequency with which participants watched television news and crime reports and their orientation toward crime and prevention were measured. According to their findings, the level of attention to crime reports and television news had a significant positive relationship with the level of fear felt. Similarly, Dowler (2003) determined that there is a positive relationship between exposure to media containing crime messages and fear of crime.

Addressing the issue of media influencing the perception of crime, many researchers have identified a positive relationship between exposure to information about acts of crime and level of fear (Chiricos, Eschholz, & Gertz, 1997; Heath, 1984; Romer, Jamieson, & Aday, 2003). Chiricos *et al*. (1997) found a significant increase in fear of crime among those who viewed a higher amount of crime-related news. They randomly selected adult participants and measured their fear of crime on a 10-point scale, after manipulating the amount of newspaper, magazine, TV, and radio news the participants consumed. They discovered that people tended to be more afraid of crime and victimization if they read more newspapers or watched more local news.

Heath (1984) examined the types of crime reports contained in the newspapers that affected people's fear of

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crime. The results showed that fear of crime was associated with the location and frequency of crimes reported in newspapers. Heath concluded that people are more fearful of crime after reading newspapers reporting local and random crime.

Romer *et al*. (2003) conducted a phone survey in which they asked for respondents' danger evaluation in thirteen different risk environments. Then, the researchers had respondents rate their perception of risk of eight potential threats to society. Finally, respondents were asked about their frequency of consuming information from media and news sources. The results indicated that the perception of risk of crime tended to be higher among those who view television news and/or read newspapers reporting crime more frequently.

Although there is a plethora of research regarding the potential negative impact of media, no existing study investigates the potential problems of campus crime alert emails. These emails may arouse anxiety and fear of crime in students' minds, instead of making them more aware of crimes and their safety. Therefore, to investigate this potential negative influence, we decided to measure the impact these emails have on people's risk perception and their attitudes toward crime. We conducted our experiment with a sample composed of college students. By manipulating the content of emails that our participants read, we measured the influence of these emails using a survey with items asking them to rate their level of fear of crime and perceived likelihood of victimization. We measured fear of crime by asking how afraid our participants would be of certain types of crime. We also measured the participants' perceived likelihood that they would be victimized by crime. We hypothesized that people who read emails with messages about crimes occurring around campus would be more fearful of crime and perceive a higher likelihood of victimization compared to those who did not read the crime alert emails.

METHOD

Participants

We conducted our study with a convenience sample made up of 23 participants (8 male and 15 female) selected from our fellow classmates in an introductory research methods class and our friends. Their ages ranged from 19 to 45 years (M = 23.48, SD = 5.71). Of the 23 participants, 65.22% identified themselves as White, 30.43% as Asian, and 4.35% as other racial groups. The participants did not receive compensation.

Materials

We printed out a crime alert email sent out by the security department at the University of Minnesota approximately a year before the study was conducted (see Appendix A), and an email sent out by the president of the University of Minnesota describing the President's Student Leadership and Service Awards (see Appendix B). The experimental group read the crime alert email and the control group read the Service Awards email.

We measured participants' fear of crime and perceived likelihood of victimization as our dependent variables. For each dependent variable, We presented descriptions of 12 types of crimes and asked participants to rate on a 10-point scale how afraid they were of being a victim of each crime and how likely it was that they would be a victim of each crime (where 1 = not afraid at all/not likely at all and 10 = very afraid/very likely). The Fear of Crime on Campus Safety Survey (Bedenbaugh, 2003) was used as the basis for our survey. In order to make the survey more concise and relevant to our study, we omitted items that were irrelevant to our hypothesis. For example, we deleted items asking about number of hours of classes taken and working time. In addition, to eliminate demand characteristics, we added items asking how the participants felt about the language and professional manner of the emails. Although the items we deleted may serve the same purpose, we used our own items due to time constrain and the length of the original survey, making the questionnaire more concise. The edited version of the survey was administered in a paper and pencil, untimed format (see Appendix C).

Procedure

To select our participants, we asked classmates and friends if they would like to participate in our study by reading a short email and completing a survey. We presented an informed consent form prior to having them read the emails. After the participants read and understood the consent form, they were randomly assigned either a copy of the crime alert email or the Service Award explanation email. The survey was administered to participants upon completion of reading the emails.

After the participants completed the survey, we collected both the copies of emails and the surveys. The participants then received a debriefing text with the purpose of our study, what we were measuring, and our contact information.

RESULTS

Fear of crime and perceived likelihood of victimization were the two dependent variables we measured using a 10-point scale. We averaged the rating scores of the 12 items for each dependent variable and compared the mean scores between the control group and the experimental group. A one-tailed independent group t-test was used to analyze our data.

Analyses showed that those who read crime alert email (M = 4.81, SD = 1.92) and those who read campus newsletter email (M = 5.12, SD = 2.68) did not differ significantly in their fear of crime, $t(22) = 0.328$, $p = 0.373$. In addition, those who read the crime alert email (M = 3.56, SD = 1.34)

and those who read the campus newsletter email ($M = 3.86$, $SD = 2.09$) did not differ significantly on their perceived likelihood of victimization, $t(22) = 0.424$, $p = 0.338$.

DISCUSSION

Based on the statistical test results, we failed to support our hypothesis that people who read emails with messages about crimes occurring around campus would be more fearful of crime and more worried about being victimized compared to those who do not read the crime alert emails. Our results did not agree with previous research findings that exposure to media reporting crime increases people's fear of crime. According to the findings of Chiricos *et al*. (1997), Heath (1984), and Romer *et al*. (2003), the more people read about crime reported in the media, the more fearful they are about crime. However, in our study, there were no significant differences in the level of fear of crime between people who read crime alert emails and people who read neutral content emails.

There are several possible explanations as to why we failed to find a positive relationship between consumption of crime related media and fear of crime. First, our manipulation of the independent variable could be too weak to detect the effect we wanted to examine. Only one email may not have been powerful enough to influence people's perception of danger. Moreover, our study differs from the previous research in the content of the independent variable. Chiricos *et al*. (1997), Heath (1984), and Romer *et al*. (2003) used crime reports adapted from the public media, for example, TV news, newspapers, and magazines, whereas we used campus crime alert emails as the independent variable. It is possible that crime alert emails sent by the university security department are not as influential as the crime reports in the mass media.

Secondly, the independent variable we chose may not have a strong enough effect on our dependent variable. As noted in an archival study done by Braungart, Braungart, and Hoyer (1980), fear of crime can also be affected by differences in gender, age, race, marital status, and health status. They found that level of fear of crime was higher among females, people living in smaller communities, elderly people who never married, and African-Americans. It is possible that compared to exposure to media reporting crimes, age, gender, race, and marital status had stronger effects on people's fear of crime. Furthermore, Garofalo (1979) also illustrated that experience or history of victimization also increases people's perceived danger and fear of crime. It could be possible that some of our participants assigned into the control group had experienced victimization before. Therefore, regardless of the effect of the emails, they tended to be more fearful than those who had never been victimized, resulting in the insignificant difference between the two groups.

Thirdly, our survey might be problematic in measuring our dependent variables. In order to make the survey concise, we eliminated some items that we considered irrelevant to our study. However, these items may be actually useful in influencing the participants' perception of fear of crime and likelihood of victimization. Eliminating these items may reduce the validity of our survey and thereby affect the significance of our results. For example, we did not ask in which areas were our participants living, and the location of the crime in our email may increase fear to those who live nearby.

Finally, our sampling method also limited our development of the hypothesis and the generalizability of our results. We conducted our experiment only among our fellow classmates and friends, who were not representative enough of the general population. Our convenience sampling did not provide enough participants for us to discover a significant result, nor was it a random enough sample for the result to be generalizable.

For future studies on this topic, a stronger manipulation of the independent variable should be undertaken. To accomplish this, more crime alert emails or a summarization of several emails, with statistics of types and frequency of crimes occurred, could be used. Additionally, variables such as experience of victimization and personality traits should be considered to be important in affecting the dependent variable. Items regarding these variables would be included in the survey. Moreover, more randomization should be applied to the sampling method to provide better generalizability, and more participants are needed to help increase the statistical significance and support the hypothesis.

Although we did not successfully support our hypothesis, it is still important to study the effect of crime alert emails on people's fear of crime. The purpose of those crime alert emails is to make people aware of their safety, but the negative side effect that they implant fear and anxiety in people's minds can be influential. It is vital to know whether or not these emails increase people's fear of crime and affect their daily lives; crime do occur around campus, so it is important to increase people's awareness of their safety while not making them preoccupied and overwhelmed by the risk of victimization.

APPENDIX A

On Wednesday, March 28 at approximately 7:15 p.m., a University of Minnesota student was the victim of an assault and robbery. The crime occurred on Church Street on the East Bank campus just north of Washington Avenue.

The victim was walking north on Church Street when he observed four young males standing on the east side of Vincent Hall. As the victim walked past, one of the suspects knocked him to the ground and began punching him. The suspects took the victim's cell phone, and the victim was slightly injured in the assault.

The victim chased the suspects as they fled across the Northrop Mall and was assisted by a University of Minnesota Security Monitor. One of the suspects was caught by University Police and was arrested. The other three suspects were not caught. The three suspects are described as young black males wearing dark clothing.

Anyone with information about this incident is asked to call the University of Minnesota Police Department at 612-624-COPS (2677). Reference case number UM-11-326673.

The University of Minnesota Police Department asks that you remember the following:

- An analysis of robberies that have occurred in the area in 2011 show that in at least two of the incidents the victim was on a mobile phone when they were approached from behind by the suspects. Always be aware of your surroundings because when you are distracted you make an easier target.
- When threatened with a weapon, it's best not to resist. Your personal safety is more important than a lost wallet or cell phone.
- Walk in well lit areas and don't walk alone. If you can't find someone to walk with, call the Campus Escort service at 612-624-WALK for a free security escort.
- Carry minimal amounts of valuables.
- Keep written records of valuables, including model and serial numbers, in a safe place.
- Call 911 immediately if you are the victim or witness to a crime.
- Document information about the suspect for police (i.e., clothing descriptions, facial features, piercings or tattoos, speech, etc.).

This Crime Alert is sent in compliance with the federal Clery Act which requires universities to alert the campus community of crimes that may pose an ongoing threat to students and employees. For updates on any developments in this case, please visit the Crime Alerts page on the UMPD website.

For more on campus safety and security, and for a list of campus safety resources available to you, visit the University's Safety and Security Web site.

This message was sent by the University Police Chief Greg Hestness to all Twin Cities students, faculty, and staff.

APPENDIX B

December 12, 2011
To: All Students, Faculty, and Staff, University of Minnesota-Twin Cities Campus

I am pleased to announce the call for nominations for the 2012 President's Student Leadership and Service Awards. These awards honor the accomplishments of outstanding students and their invaluable leadership and service contributions to the University of Minnesota-Twin Cities and the community. All staff, faculty, administrators, and students are encouraged to nominate current University of Minnesota - Twin Cities students for this prestigious award, presented annually to one-half of one percent of all University students.

Undergraduate recipients of the President's Student Leadership and Service Award may also be considered for the Donald R. Zander Award for Outstanding Student Leadership (a $1,000 scholarship given to two recipients) and the University of Minnesota Alumni Association Student Leadership Award (a $500 scholarship given to eight recipients). Graduate and professional student recipients of the President's Student Leadership and Service Award may also be considered for the Mary A. McEvoy Award for Public Engagement and Leadership (a $1,000 scholarship given to one graduate student and one professional student).

I look forward to presenting these awards at the annual President's Awards banquet on Monday, April 30, 2012.

Please join me in celebrating the contributions of outstanding student leaders by nominating deserving students for the President's Student Leadership and Service Awards. The deadline for submitting nomination forms is Friday, January 27, 2012.

For more information and online nomination forms, please visit the Student Unions and Activities at http://www.sua.umn.edu/involvement/awards/ or call Student Activities at 612-626-6919.

Sincerely,
Eric W. Kaler President

APPENDIX C

Please indicate your agreement with the following statements about the email you have just read by giving a ranking of 1 to 10, with 10 being the strongest answer. *(Please circle)*

1. The email was easy to read.
   1 2 3 4 5 6 7 8 9 10
2. The email was easy to understand.
   1 2 3 4 5 6 7 8 9 10
3. The email was written in a professional manner.
   1 2 3 4 5 6 7 8 9 10
4. There was information in the email that is personally important to me.
   1 2 3 4 5 6 7 8 9 10
5. I am interested in learning more information about the content of the email.
   1 2 3 4 5 6 7 8 9 10

Please answer the following questions by giving a ranking of 1 to 10, with 10 being the strongest answer. *(Please circle)*

1. Please indicate on scale of 1 to 10 **how afraid** you are of being a victim of crime **on campus during the day**
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid

2. Please indicate on scale of 1 to 10 **how afraid** you are of being a victim of crime **on campus at night**
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid

3. Please indicate on a scale of 1 to 10 **how afraid** you are of being a victim of the following crimes **on campus**: *(Please circle)*
   A. Being raped/sexually assaulted
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   B. Being beaten up
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   C. Having someone break into your dorm or apartment while you are there
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   D. Having someone break into your dorm or apartment while you are gone
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   E. Circle the number 4 below if you are paying attention
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   F. Having something taken from you by force/mugged
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   G. Having something stolen from you while in class
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   H. Having something stolen from you while in the library
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   I. Having your car stolen while on campus
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   J. Having your car vandalized while on campus
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   K. Being threatened with a knife, club or gun
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid
   L. Being murdered
   Not afraid at all 1 2 3 4 5 6 7 8 9 10 Very Afraid

4. Please indicate on a scale of 1 to 10 **how likely** it is, in your opinion, that you will be a victim of the following crimes **on campus:** *(Please circle)*
   A. Being raped/sexually assaulted
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   B. Being beaten up
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   C. Having someone break into your dorm or apartment while you are there
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   D. Having someone break into your dorm or apartment while you are gone
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   E. Having something taken from you by force/mugged
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   F. Having something stolen from you while in class
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   G. Having something stolen from you while in the library
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   H. Having your car stolen while on campus
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   I. Circle the word 'Very' below if you have read this
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   J. Having your car vandalized while on campus
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   K. Being threatened with a knife, club or gun
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely
   L. Being murdered
   Not likely 1 2 3 4 5 6 7 8 9 10 Very likely

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Professional Signs: Exploring Perceived Authority and Obedience

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Past research has demonstrated the link between obedience and authoritative appearance in situations of an authority figure or an authoritative object, such as hazard or warning signs. This study tested the hypothesis that signs with a more authoritative or professional appearance would yield more participant obedience than non-authoritative or unprofessional appearing signs. We conducted the experiment using a naturalistic, observational method in which unprofessional and professional signs were placed on exterior doors on two buildings at a large Midwestern university, and we recorded the degree of participant obedience. The results revealed that professional signs yielded more obedience than unprofessional signs. Professional signs may yield more obedience because they are perceived as carrying greater authoritative weight.

Pages: 31-33

Obedience to authority is a subject that has been studied extensively. There appears to be a connection between perceived authority and obedience, as shown through studies yielding a strong positive connection between authoritative pressure and submission (Milgram, 1963; Meyer & Jesilow, 1996). For example, Milgram (1963) explored how the presence of an authoritative figure—the researcher—had an effect on the subject's willingness to administer electric shocks to another person when he or she answered test items incorrectly. The study demonstrated that there was a relationship between the presence of authority and obedience; even though some subjects did not want to go on, they continued to follow instructions because of the perceived authority of the experimenter. This cognitive dissonance was displayed through behaviors reflecting extreme stress, such as crying. The degree to which subjects were willing to submit was an unprecedented finding; it was thought that not many would persist in obedience and yet the majority of the subjects continued to administer the highest level of shock. Following this influential work, many studies have extended Milgram's findings on the relationship between authority and obedience.

Meyer and Jesilow's (1996) examined the possible effects that authority has over a child's testimony concerning abuse or molestation. They found that when the authority figure questioning the child probes for answers that the child may not clearly recall, the result is often an unreliable and inaccurate testimony. The researchers suggested that when the child was questioned by the important authority figure, the child felt pressure to remember because an important person was asking the question. In a related study regarding obedience, Conway and Schaller (2005) examined whether the presence of an authority figure made a significant difference in participant decision making. They found that subjects were most likely to conform to the opinion of an authority figure when the authority figure was present versus when they were absent. This pattern of behavior persisted among the participants even if the opinions of the authority figure were

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known by participants to be incorrect and in direct opposition to the opinion of large group consensus. This study demonstrates how a figure of authority can change how people interact within the world.

These studies reveal the unique relationship between the perception of authority and obedience. When authority is used inappropriately, it may elicit unethical behavior (Milgram, 1963). Alternatively, authority applied in an appropriate context may help protect individuals. The literature seems to support a relationship between obedience and perceived authority in regard to signs (Wogalter & Laughery, 1996; Adams, Bochner, & Bilik, 1998). For example, Wogalter and Laughery (1996) studied the multiple factors that determine whether compliance will be elicited from warning signs. The researchers found that obedient behavior will positively or negatively be affected by factors such as attention to the signs, comprehension of what the sign is conveying, beliefs and attitudes about the sense of seriousness or danger, and motivation to obey the sign even if it is inconvenient. Similarly, Adams, Bochner, and Bilik (1998) explored the effectiveness of warning signs in a hazardous work environment. The researchers investigated whether the wording of a sign would be considered better if it held more information to warn people of the dangerous area, or if it would be rated worse if it held the bare minimum. They discovered that the signs that lacked information were still rated as good signs, when they were the only reference available, and participants reported that they would comply with these signs. However, it was found that signs that held more information were perceived as more authoritative (Adams, Bochner, & Bilik, 1998). Both of these studies did not explore whether participants would comply with the warning signs in a real-life setting or whether the professionalism and visual appearance of the signs would affect compliance. To extend these findings, it is important to study whether the professional appearance of signs will yield more or less compliance.

Clearly, perception of authority has an influence on individual behavior. Perhaps, the perception of authority can extend beyond a human presence to the authoritative tone of a sign. In the Adams, Bochner, and Bilik (1996) study, the appearance of a sign was shown to affect the level of its perceived authority. In this study, we will seek to determine whether the appearance of a written directive affects participant behavior. Specifically, we will examine the relationship between the level of professionalism in the physical appearance of signs and obedient behavior, as professional signs may convey greater authority

The present study took place on the campus of a large Midwestern university. 'Professional' and 'unprofessional' signs were displayed to compare participant behavior. In the unprofessional condition, participants encountered a sign written quickly with pencil on a piece of paper. In the professional condition, an identical message was typed and printed. Obedience was measured by the number of students who follow the directive written on the sign. It is hypothesized

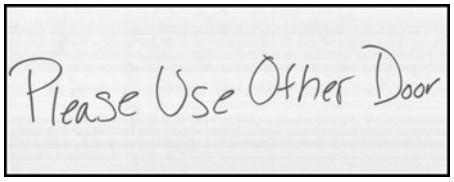

FIGURE 1. Unprofessional Sign.

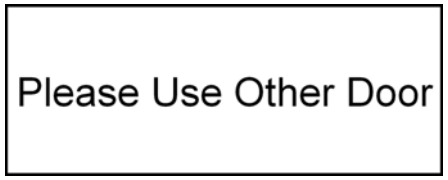

FIGURE 2. Professional Sign.

that the professional sign will yield more obedience than the non-professional sign.

METHOD

Participants

One hundred thirty two participants were involved in this study. Participants consisted of 81 men and 51 women. The participants were students who attended a large Midwestern university. Participants were sampled and observed in two buildings on the university campus through convenience sampling. The participants' ages were estimated to range from 18 to 23 years old, the typical ages of college attendees. No compensation for participation was offered.

Materials

This study incorporated the use of two signs which provided the written directive, "Please Use Other Door." The first sign, used in the professional or authoritative condition was typed in Helvetica font with black ink. The second unprofessional or non-authoritative condition was written in marker. Both written directives had a roughly equivalent font size of 72. These signs are respectively illustrated in Figures 1 and 2. Whether or not the participant obeyed the sign was recorded on a data sheet along with the participant's gender.

Procedure

The researchers separated into two groups at the two buildings where observations were made. The buildings have the same structural exterior with three sets of double doors on the entrance. Two observation periods were scheduled at the noon hour, six days apart. Participants were observed for a period of an hour. Both signs were rotated between the two buildings, one sign on the right door of the far left set of doors at one building, while the other sign was placed on the right door of the far right set of doors at the other building. The researchers sat at a large distance from the doors and pretended to be reading a book. Participants were observed and it was noted whether they obeyed the directive, or if they disobeyed the directive and went through the door anyway. As this was a

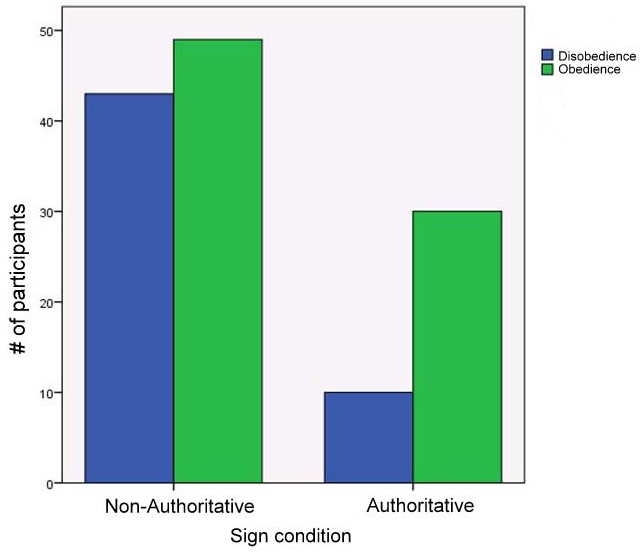

FIGURE 3. Bar graph for number of participants who obeyed or disobeyed the authoritative and non-authoritative signs.

naturalistic observation, no informed consent or debriefing procedures were used.

RESULTS

We coded obedience as "1" and disobedience as "0," and the authoritative condition as "1" and the non-authoritative condition as "0." Results of a chi-square test of independence indicated that the proportion of participants in the authoritative condition who yielded and obeyed the sign (75%) differed significantly from the proportion of participants in the non-authoritative condition who obeyed the sign (53%), $\chi^2(1) = 5.48$, $p = 0.02$. The numbers of participants who obeyed and disobeyed the signs in each condition are illustrated in Figure 3.

DISCUSSION

The results supported the hypothesis that signs with a more professional appearance will yield more obedience than non-professional appearing signs. The results are consistent with the findings of previous studies. Wogalter and Laughery (1996) demonstrated that obedience was determined by attention, comprehension, beliefs and attitudes, and motivation. Some participants did not obey the sign because there was a clear lack of attention, and at times comprehension was low because the sign would become obscured by the wind. Adams *et al*. (1998) expected that warning signs would be obeyed when they appeared more authoritative through message phrasing on signs. Our signs tested the physical appearance since the written directive on each sign was the same.

One limitation of this study involves the generalizability of the results. It is possible that college students are either more or less likely to obey or disobey signs than other populations. The results also may not be generalizable the buildings that were used hold specific class types, meaning that the population of these students who attend these classes may not accurately represent all college students. These methodological issues could be addressed in future replications.

In future research, it may be interesting to explore whether gender moderates obedience, as well as studying alternate settings with diverse age groups. The font Helvetica was used in this experiment, but it may be worthwhile to explore if different font types and sizes would be more effective.

To summarize, our results showed significantly higher levels of obedience for more authoritative and professional appearing signs. Although more research is needed, it may be worthwhile for sign makers to take note of these results and attempt to make their signs look as professional as possible.

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The Halo Effect: The Influence of Attractiveness on Perceived Promiscuity

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Past research has indicated that males' perceptions of traits that are closely related to sexual attraction and mate selection are influenced by the level of females' attractiveness. This study attempted to decipher if males would perceive females as being more promiscuous as their rating of the female's attractiveness increased. Participants were asked to look at photographs of females that ranged in levels of attractiveness and then rate them on dimensions of promiscuity and attractiveness. The results showed a high correlation between attractiveness and perceived promiscuity. The participants, who rated women as being attractive, also rated the women as being highly promiscuous. These results suggest that promiscuity, which is a trait involved in mate selection, is perceived in an individual when the trait of attractiveness is also present. This information is important for females, as they may want to be informed that if males perceive them as being attractive, they may also perceive them as promiscuous.

Pages: 34-37

A wealth of previous research has shown that there is a correlation between attractiveness and perceived socially desirable personality traits. This phenomenon has come to be referred to as the "Halo Effect" (Dion, Berscheid, & Walster, 1972). Socially, desirable traits are a major component of success. Analyzing the influence of attractiveness on desired personality traits is therefore important to study as it will lead to a better understanding of why certain individuals are better able to succeed in interpersonal interactions.

Lucker, Beane, and Helmreich (1981) found three specific attributes with which attractiveness was most often correlated. The participants were asked to rate pictures of males and females on attractiveness and fourteen personality dimensions. The results indicated high correlations between attractiveness and perceived sexiness, masculinity/femininity, and likability. Lucker *et al.* concluded that the Halo Effect is more limited than previously thought, and that later studies needed to begin concentrating on the effect of attractiveness in the realm of male and female interactions where these three attributes play key roles.

Many researchers have, therefore, begun concentrating on attractiveness and perceived personality characteristics in male and female interactions, especially relating to mate choice and dating behavior. For example, Berry and Miller (2001) looked at the evaluations of interactions between men and women. In this study, each participant was asked to have a short conversation with another participant of the opposite sex. Following their conversation they were to rate their perception of the other participant's attractiveness, personality, and the quality of the interaction. The results indicated that for men attractiveness was the factor that contributed the most to a positive evaluation, but this outcome did not exist with women. Personality, especially the trait of extraversion, led to the most positive evaluation of men by women. Thus, the study revealed that the effect of attractiveness on perceived personality traits and a resulting preference may be more prominent in men than in women. In another study on male dating preferences, participants were set up with a member of the opposite sex and asked to go on a date with them (Walster, Aronson, Abraham, & Rottman, 1966). After the date, they rated their partner on dimensions of personality, likability, attractiveness, and whether or not they would like to go on another date with the individual. The study indicated that for men, attractiveness was the main determinant in deciding the likability of their date, as well as if they wanted to go on another date with the individual.

This finding has led many researchers to question the generalizability of the Halo Effect across genders. Dushenko, Perry, Schilling, and Smolarski (1978) looked at the generalizability of the physical attractiveness stereotype with

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regard to gender and age. Participants were asked to look at photographs of members of the opposite sex and then rate the individuals on nine positive personality traits (i.e., more friendly, kind, exciting, sincere, outgoing), five high quality of life dimensions (i.e., who would: have a happier marriage, be a better friend, be more successful at their job, have a happier life overall), and level of attractiveness. The results of the study showed that although the physical attractiveness stereotype was found in both genders, men displayed the stereotype more than women. They also found that although the effect of the physical attractiveness stereotype was prominent in young girls, it faded in women as they progressed through adolescence into adulthood.

Subsequent research has suggested a large correlation for males between perceived attractiveness females and the perception of socially desirable traits. In a study by Tanke (1982), male participants were given a folder with biographical information and either a photograph of an attractive female or an unattractive female. The participants were then asked to rate the females on a number of factor analytic dimensions of personality. The largest correlation was found between attractiveness and the trait of Sexual/Social Excitement. This factor analytic trait, once broken down, refers to the amount of perceived sexual warmth, arousal, and excitement the individual has. This study showed that attractiveness influences the amount of sexual attraction men feel towards women, which increases the level of success attractive women have in regards to interpersonal interactions between genders.

Previous research has shown that attractiveness does indeed influence perceived socially desirable traits. This effect has been found to be especially prevalent in males. Many studies have looked at the association between attractiveness and perceived attributes such as Sexual/Social Excitement (Tanke, 1982) and Sexiness (Lucker *et al*., 1981). However, there have been no studies that have directly looked at attractiveness and its influence on perceived promiscuity. Because the perception of traits that are closely related to sexual attraction and mate selection have been shown to be influenced by attractiveness, especially in studies involving male participants, attractiveness may also be associated with the perceived level of promiscuity of women.

The present study attempted to examine this relationship by looking at men's ratings of women's attractiveness, as well as their perceived level of promiscuity. Male participants were given a survey with 30 pictures of unknown females and asked to rate each on scales of 1-10 for attractiveness and promiscuity. Based on studies by Lucker *et al*. (1981) and Tanke (1982), which showed that women's level of attractiveness influences perceived sexually related traits, it was hypothesized that as the level of attractiveness of a woman increases, the level of promiscuity that males perceive will also increase.

METHOD

Participants

The 25 male participants ranged in age from 19 to 26 (M = 22.16, SD = 2.03). With regard to racial demographics, 56% were Caucasian, 24% were Asian/Pacific Islander, 16% were African American and 4% were Chicano/Latino. The participants were selected using purposive convenience sampling and were all undergraduates from the University of Minnesota campus. The participants were located around campus in the student center and available classrooms. The participants were not given any compensation.

Materials

For this study, a self-designed survey was used containing 30 different pictures of females, each of which was followed by the same five questions (see Appendix). The headshots of the 30 females varied on a range of attractiveness, age, racial composition (e.g., Caucasian and African American), and hair color (e.g., blonde and brunette). The photographs were all black and white photographs that were approximately 2 inches by 1 inch in size.

The photographs were found on Facebook through randomized searches of public profiles of females who do not attend the University of Minnesota. This search was randomized by simply putting nothing in the search box in Facebook and pressing enter. The profiles of people that the user was not friends with then showed up and public profiles were found from this list. This method of finding photographs was used to prevent any participants from knowing the individuals in the photographs and to prevent a selection bias. These females all appeared to be college aged and they were judged as ranging from unattractive to attractive by the group of researchers performing this study.

For each picture, the participants were asked to respond to five questions on perceived attributes by circling a number on a rating scale of 1 to 10, with extremes of each trait in question at the end of each scale. The 1 represented the lowest amount of the given trait present in the individual, and the 10 represented the highest amount of the given trait present in the individual. The independent variable of attractiveness and the dependent variable of promiscuity were measured through two of the five questions. The other three questions, fillers placed in the survey to prevent the participants from determining the hypothesis, asked for ratings of perceived levels of success, likability, and extraversion. The survey also included a section to obtain demographic information.

Procedure

The participants were given a paper consent form to read and sign. They were then given the self-administered paper survey to fill out. They were instructed to look at the pictures and to answer the questions that followed with their immediate impressions (see Appendix). The participants were

given all the time they needed to fill out the survey. We then gave the participants a paper debriefing statement that explained the purpose of the study and thanked them for their involvement.

RESULTS

Promiscuity was measured and scored through the second question on the survey, which asked the level of promiscuity on a 10-point rating scale. Attractiveness was assessed and scored through the fourth question on the survey, which asked the level of attractiveness on a 10-point rating scale. The promiscuity and attractiveness scores for each of the 30 photographs were then averaged across participants, and a Pearson correlation was computed to determine the nature of the relationship.

Results indicated that attractiveness was significantly correlated with perceived promiscuity, $r(28) = 0.84$, $p < 0.001$. Figure 1 shows a positive relationship between the variables such that as the level of attractiveness increased, the perceived level of promiscuity increased.

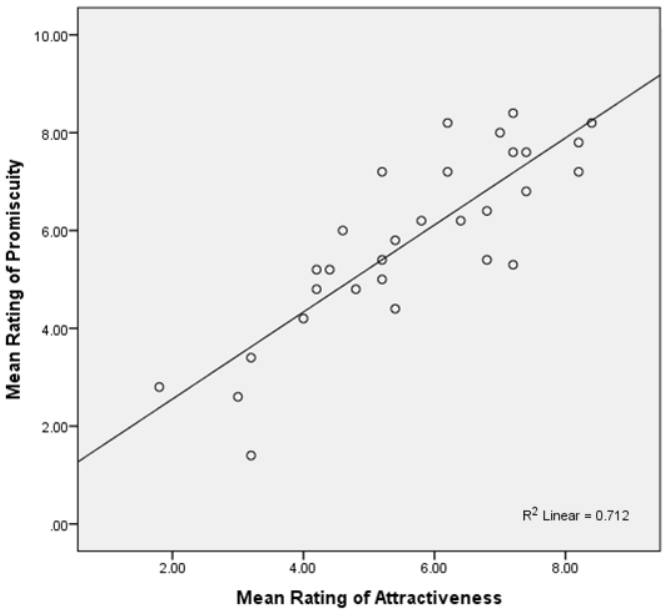

FIGURE 1. Scatterplot and regression line for mean level of promiscuity and mean level of attractiveness for ratings of each picture, averaged across participants.

DISCUSSION

The results of this experiment supported the hypothesis that, as the level of attractiveness of a woman increased, the level of promiscuity that males perceived would also increase. Although no other past research has specifically looked at the relationship between promiscuity and attractiveness, past studies have provided evidence of a positive correlation between similar constructs. For example, Lucker *et al.* (1981) showed that the three specific attributes with which attractiveness was most often correlated were perceived sexiness, masculinity/femininity, and likability. All of these traits pertain to sexual attraction and mate selection, which led to the notion that other traits involved in mate selection may be correlated with attractiveness. Tanke (1982) further examined this idea, and showed a high correlation between attractiveness and the factor-analytic trait of Sexual/Social Excitement, which breaks down to the three components of perceived sexual warmth, sexual arousal, and excitement. Our study's results are therefore consistent with the previous findings, which indicate that traits which are associated with mate selection and sexual attraction have a positive correlation with attractiveness.

Given these past research findings and the results of the current study, the positive correlation between attractiveness and promiscuity appears to be well founded. These results might best be accounted for by the same process that appears to lead to other trait dimensions being predicted by attractiveness, namely, the Halo Effect (Dion, Berscheid, & Walster, 1972). With respect to mate selection, this Halo Effect occurs when males look for potential female partners. After finding an attractive woman, the male then associates other desirable attributes with the female. The results of this study suggest that promiscuity is one of the traits that males may look for in potential partners during mate selection. This is important information to recognize in the analysis of the influence of physical attractiveness on mate selection.

This study does have its limitations. The study only provided correlational data, which does not allow for a causal inference to be made. The association between attractiveness and promiscuity can only be seen as a positive correlational relationship and not one in which a cause and effect relationship can be deduced. Another caveat is the generalizability of this study. It needs to be taken into consideration that participants in the study only consisted of males between the ages of 19 and 26 that attended the University of Minnesota. In future research, the study should be conducted with a larger and more randomized sample in order to assess the generalizability of the data. Another limitation in this study is the photographs that were chosen for the survey. Other factors in the photographs may have influenced perceptions of promiscuity, such as type/amount of clothing worn in the photograph or whether or not the women were smiling. This may have had a significant effect on the results of the study. Future research should attempt to eliminate these factors and others that may impact the participants' perceptions of promiscuity.

As demonstrated by previous research, the Halo Effect suggests that attractiveness is highly correlated with socially desirable traits. However, results from the present study indicate a correlation between attractiveness and perceived promiscuity, which can be seen as an undesirable trait. Although perceived promiscuity may be desirable to males and lead females to higher rates of success in mate selection, it is not a way in which women desire to be perceived (Reich & Ray, 2006). Since promiscuity is not often perceived as a socially desirable trait, future research may want to examine

what other negative traits attractiveness is associated with. This research needs to take into account that the desirability of the perceived traits may differ between the perceiver and the person who is being perceived in a certain way. Also, the relationship between the variables may be affected by the male's intentions during mate selection. Although promiscuity is a characteristic that males may find desirable and look for in the short term, this could change when they are looking for a permanent mate. Future research should look at what roles attractiveness and perceived promiscuity play in the search for a short-term versus a long-term mate.

This study demonstrates the high, positive correlation between a female's perceived attractiveness and the amount of promiscuity that males perceive her to have. These results add to the existing body of evidence suggesting that the perception of traits related to mate selection have high correlations with attractiveness. In regards to mate selection, this high correlation is important for females, as they may want to be informed that if males perceive them as being attractive, they may also perceive them as promiscuous. This high correlation is also important because it shows an aspect of the Halo Effect in which attractiveness leads to the perception of undesirable traits, not desirable ones.

APPENDIX

Instructions: Please take a close look at the female in each photograph and then answer the questions about your immediate perception of the individual in the photograph. Take as much time as you need and circle the number on the ratings scale that corresponds best with what you think. Then please answer the questions about yourself that follow.

1. How successful do you think this individual is?

Not very successful — Very successful

1 2 3 4 5 6 7 8 9 10

2. How promiscuous do you think this individual is?

Not very promiscuous — Very promiscuous

1 2 3 4 5 6 7 8 9 10

3. How likable do you think this individual is?

Not very likable — Very likable

1 2 3 4 5 6 7 8 9 10

4. How attractive do you think this individual is?

Not very attractive — Very attractive

1 2 3 4 5 6 7 8 9 10

5. How extraverted do you think this individual is?

Not very extraverted — Very extraverted

1 2 3 4 5 6 7 8 9 10

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The Effects of External Visual and Auditory Stimuli on Memory Recall in Young Adults

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Previous research has suggested that external stimuli negatively affect working memory in young adults. This study attempted to determine whether there was a difference in memory recall when young adults were exposed to external stimuli compared to no stimuli. Undergraduate participants were given three different passages to read and a set of questions pertaining to each passage. There were three different test conditions paired with the passages: auditory plus visual stimuli, auditory stimuli only, and no stimuli. Memory recall was assessed by number of questions answered correctly. We found a significant difference between the conditions with external stimuli and the no stimuli condition suggesting that external stimuli decrease working memory. Exploring the effects of external stimuli on memory is important because many young adults study with external stimuli in the background and more information could help them make better choices.

Pages: 38-41

People are exposed to many distracting visual and auditory stimuli throughout their daily lives, such as the television and radio. Previous research has shown that these external stimuli have a negative impact on memory retrieval in older adults (Wais, Martin, & Gazzaley, 2011). However, studies have shown that irrelevant visual stimuli negatively affect episodic memory retrieval in young adults as well (Wais, Rubens, Buccanfuso, & Gazzaley, 2010). Exploring this topic further is important because approximately 80% of high school students regularly do homework with a radio on and approximately 50% of students do homework with a television on in the background (Beentjes, Koolstra, & van der Voort, 1996). More information on the effects of external visual and auditory stimuli may help young adults make better decisions when doing homework in order to maximize their performance and learning.

There have been numerous studies done on the effects of external visual and auditory stimuli on memory retrieval. Wais *et al*. (2011) found that, when exposed to distracting visual stimuli, adults had greater disruption in their ability to retrieve details. Participants in the study were asked to remember a number of objects with their eyes closed, with their eyes open looking at a grey screen, or with their eyes open looking at distracting stimuli, and then asked to recall the objects. Participants with their eyes open looking at distracting stimuli recalled fewer details than the other two test conditions.

In a follow-up study Wais and Gazzley (2011) tested the impact of external auditory stimuli on memorization. Participants viewed the same pictures that were used in the visual study while listening to silence, white noise, or ambient sounds recorded at a busy café. Researchers found that retrieval of relevant visual details significantly declined in the café noise group in comparison to the white noise and silence group. They compared this data with the data from the visual distraction condition and concluded that external visual and auditory distractions have equivalent negative effects on the retrieval of episodic memory.

Researchers have hypothesized that the reason for the negative impact of visual and auditory stimuli on memory recollection is potentially due to two, non-mutually exclusive neural mechanisms (Wais *et al*., 2010). The first is that bottom-up visual processing of external information may result in a decrease in the reliability of internal visual imagery because they both rely on overlapping regions of the visual cortex. The second mechanism is that attentional resources are limited and, as a result, distracting visual stimuli draw resources away from relevant visual sources. Although the exact mechanism is still unknown, it is clear that the network

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that supports visual imagery and successful recollection is interrupted when there is external distraction.

While the studies mentioned previously present a clear connection between distracting stimuli and memory, there has been no extensive research on comparing the effects of auditory stimuli with visual stimuli. Wais and Gazzley (2011) paralleled the data on visual stimuli with the data on auditory stimuli and suggest that they both contribute to decreased recall. However, there has been no research done on the impact on memory when participants are exposed to both visual and auditory stimuli in comparison to only auditory stimuli or no stimuli.

In our study, participants of college age will be given three short passages to read. During the reading of one passage a video with sound will be played in the background. During another passage an auditory clip will be played. No sound or videos will be played during the last passage. After each passage participants will be asked a set of questions pertaining to details of the passages that they read. Recall will be measured based on the number of questions answered correctly. A greater number of correct answers will mean greater recall. Based on the previous studies done on external visual and auditory stimuli and memory we hypothesize that having both visual and auditory stimuli will negatively affect memory the most, followed by only auditory stimuli, and having no distracting visual and auditory stimuli will negatively affect memory the least.

METHOD

Participants

Fifteen participants, eight male and seven female, were involved in the present study. Participants were selected using a convenience sampling procedure of soliciting students that were enrolled in the same introductory research methods class as the researchers. Participants were approached during class, given information about the study, and asked if they were interested in participating. All participants were between the ages of 18 and 22 (M = 20.47, SD = 1.46) and enrolled at a large Midwestern university. Ninety-three percent of the participants reported themselves as Caucasian and seven percent were African American. No compensation for participation was offered.

Materials

Participants sat in a room with white walls that contained no auditory or visual stimuli except what was presented to them. A PowerPoint slide show displayed on a computer screen was created to present the participants with different text passages and stimulus conditions. On each test slide the top half of the screen contained a passage for the participants to read and the bottom half of the screen contained either a video or was left blank. The background color of all of the slides was white and all of the text was black.

Participants read three different passages taken from SAT reading comprehension tests. All of the passages that were selected were designed by the College Board to take 10 minutes to complete. The PowerPoint was preset to give the participants three and a half minutes to read each passage, and then advance to the next slide, which contained a set of questions pertaining to details in the passage as a test of reading comprehension. There were six questions total for each passage; the questions were broken up into two sets of three, and participants were given two minutes to answer each set of three questions. The questionnaire consisted of questions that were paired with the passages in the SAT reading comprehension section. An answer sheet with the appropriate form letter printed on it was provided to the participants to record their answers on.

There were three different versions of the PowerPoint, labeled Form A, B, or C, that the participants could have received. The order of the stimuli as well as the passage paired with the test condition varied between these different versions. In Form A, the auditory plus visual condition was presented first, followed by the auditory condition, and lastly the control condition. In Form B, the auditory condition was presented first, then the control condition, and lastly the auditory plus visual condition. In Form C, the control condition was first, followed by the auditory condition, then the auditory plus visual condition. The order of the passages stayed the same for all three forms. The three combinations were randomly chosen and not selected in any systematic way.

Audio plus visual and audio stimuli were manipulated by playing a sound clip from “Lonely Boy” by the Black Keys in the auditory stimuli condition and a video clip titled “PEOPLE ARE AWESOME” in the auditory and visual condition. (The video clip can be found at www.youtube.com/watch?v=Vo0Cazxj_yc.) Both stimuli were chosen because they were gender neutral and contained non-controversial topics. The stimuli were also designed to simulate everyday background stimuli such as a TV or radio; therefore, stimuli that contained particularly shocking content that might have drawn a greater amount of attention than usual from the participant were not selected.

Procedure

All participants were randomly assigned to either Form A, B, or C. An informed consent paragraph was presented to the participants on the first slide to ensure them of the anonymity of their responses and their options to stop answering or withdraw answers. Participants were then given instructions to read the following passages and record their answers on the sheet provided to them. The following slides contained passages paired with a video clip, music, or nothing, followed by six questions pertaining to each the passages. After the PowerPoint participants were given a short survey in order to obtain demographic information. Participants were also provided with a debriefing statement describing the goals of the study.

RESULTS

Overview of the Statistical Analyses

The dependent variable, memory recall, which was measured by the number of questions correct on the questionnaire, was assessed in three different conditions: visual and auditory stimuli, auditory stimuli, and no stimuli. Three different passages were paired with the stimuli; a within groups ANOVA test was used to confirm that all three passages and questions were of equal difficulty. A within groups ANOVA test was also used to evaluate whether or not there was a significant difference in memory recall between the three conditions. Post-hoc dependent *t*-tests were then used to compare the dependent variables and determine between which two conditions there were significant differences.

Equivalence of the Passages

If the passages were all of the same difficulty, there would be no significant differences between the recall scores for the three passages. To test whether the passages were of equal difficulty, recall scores for each passage were averaged across the visual-plus-auditory, auditory, and no stimuli conditions. A within-groups ANOVA confirmed that all three passages and questions were of equal difficulty, $F(2,12) = 3.766$, $p = 0.054$.

Comparison of the Experimental Conditions

A separate within-groups ANOVA indicated that there was a significant difference between the three stimulus conditions in terms of the level of memory recall, $F(1,12) = 14.95$, $p = 0.002$. Post hoc analyses showed that the auditory plus visual condition ($M = 3.33$, $SD = 1.18$) and auditory condition ($M = 2.8$, $SD = 1.52$) did not differ significantly from each other on their level of memory recall, $t(14) = 1.35$, $p = 0.2$. The auditory plus visual condition ($M = 3.33$, $SD = 1.18$) and the control condition ($M = 4.9$, $SD = 1.23$) did significantly differ from each other on their level of memory recall, $t(14) = 3.1$, $p = 0.007$. Similarly, the auditory condition ($M = 2.8$, $SD = 1.52$) and control condition ($M = 4.9$, $SD = 1.23$) were significantly different on their level of memory recall, $t(14) = 4.67$, $p = < 0.001$. This result is illustrated in Figure 1.

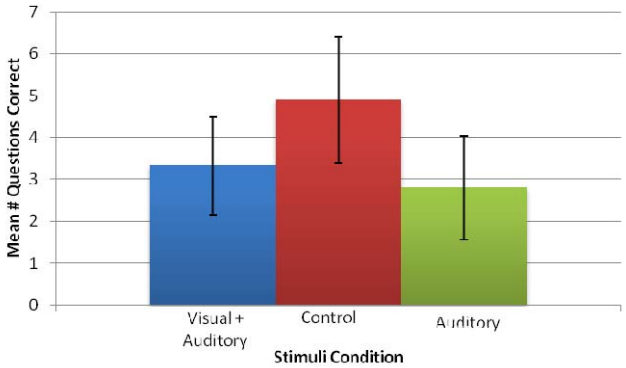

FIGURE 1. Mean number of questions correct for auditory plus visual, auditory, and control conditions. Error bars represent standard deviations.

DISCUSSION

Our results partially supported our hypothesis that participants who were exposed to no stimuli would have the greatest memory recall, followed by participants who were exposed to only auditory stimuli, and participants who were exposed to auditory and visual stimuli would have the worst memory recall. Significant differences were found between the control and auditory and auditory plus visual conditions; however, no significant differences were found between the auditory and auditory plus visual conditions. The results that external stimuli decrease memory recall is consistent with the findings of past research, such as the study by Wais *et al*. (2011) that found visual distraction negatively impacted memory retrieval. Previous studies by Wais *et al*. (2011) and Wais and Gazzaley (2011) demonstrated that visual stimuli alone and auditory stimuli alone negatively impacted memory retrieval. Therefore, we hypothesized that having both stimuli would negatively impact memory retrieval more than having just one stimulus.

One limitation to our study was that there were only six questions for each passage used to assess memory recall. It may be that there is a difference between having only auditory stimuli and having both auditory and visual stimuli, but our test was not sensitive enough to measure this. Having a greater number of questions at the end of each passage may have stratified the scores of the different stimuli conditions more and given us a significant difference between the auditory only condition and the auditory plus visual stimuli condition.

Another limitation to our study was that we did not utilize a complete counterbalanced design. While our within groups ANOVA test showed that the passages were of equal difficulty, a complete counterbalanced design would have increased the internal validity of our study by further reducing the potential for order effects. Even though the order of the stimulus conditions and the pairings of the passages with the stimuli were different for the three different versions of the test, the order of the passages remained the same for all three tests. This could potentially have affected the results in some way. While this is unlikely because the differences between our passages were not significant, a complete counterbalanced design should be used in follow up studies to strengthen and improve the experimental design.

Our study adds to the body of evidence that suggests that background visual and auditory stimuli decrease recall performance in young adults. However, our auditory and auditory plus visual conditions were not significantly different as expected. This may because maximum distraction is achieved with either visual or auditory stimuli alone. A follow-up study should be done with a more extensive test for memory as well as a complete counterbalanced design to determine if these results were accurate. Many students listen to music or watch TV while doing homework and more information about the impact of these stimuli could help them develop better study habits.

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