CONTENTS

Gender Differences in Internal and External Reactions to Infidelity in a Romantic Relationship

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Abstract--*This research project addressed whether or not there is a gender difference in external and internal reactions to infidelity in a romantic relationship. This study included 40 participants, 20 males and 20 females. The survey included basic demographic questions and six example situations of infidelity followed by a list of different internal and external reactions. There was not a significant gender difference in internal and external reactions to infidelity. However, males reacted to infidelity externally whereas women reacted more internally.*

Being in a relationship can be one of the most delightful experiences one can go through; however, if a problem arises this delight can quickly turn into uncertainty and stress. A common cause of this stress is a partner's infidelity or the temptation of one's own infidelity. It is important that infidelity be studied because it can bring many different emotions to people in different ways, possibly separating males from females (Lewadowski & Ackerman, 2006). If the reasons for these reactions are understood, then the emotional response can be better handled. The present study examined the way in which men and woman react to infidelity in a romantic relationship. This study showed that assessing infidelity can be difficult because there are different types of infidelity and reasons for it.

The focus of this study is on the consequence of the after-effect of the infidelity, but in order to understand that, the reasoning must first be explained. According to Lewandowski and Ackerman (2006), dissatisfaction in a relationship can make one more susceptible to participate in infidelity. Satisfaction with five components of a romantic relationship is necessary for it to run smoothly: sex, companionship, security, intimacy and emotional involvement. If these five factors are not strong aspects to the relationship, the relationship is more susceptible to infidelity.

There are gender differences in terms of jealousy in relationships and infidelity. Gender roles begin to form in childhood; this gender role may predetermine reactions to infidelity. In the interest of reproduction, many females are taught that every relationship is a chance for reproduction and should be taken seriously and attentively, whereas males are not taught this. As a result of this upbringing, a female's sense of personal territory and jealousy is aroused much earlier than when they first experience a serious relationship. This behavior differs from what can be seen in males; their jealousy arousal remains dormant until a relationship is at risk. Both males and females begin to realize that their relationship may be at risk when one of two types of infidelity occurs. (Murphy, Vallacher, Schackelford, Bjorklund & Yunger, 2006).

These two separate types of infidelity are sexual and emotional infidelity. Sexual infidelity is when there is a purely sexual relationship with someone other than your partner with no emotional attachment. Emotional infidelity is when there is a very strong emotional connection with someone other than your partner with no sexual attraction involved. When infidelity does occur in a romantic relationship, men and woman have different reactions to these types of infidelity. Women have been found to be more emotionally affected by emotional infidelity and men are more upset by the act of sexual infidelity (Buunk & Dijkstra, 2004; Murphy et al., 2006; Sabini & Green, 2004). It is important to note that these authors operationalized the two types as exclusive of each

other. Emotional infidelity is purely emotional with no sexual attraction in play, whereas sexual infidelity is pure sexual with no emotional attachments (Buunk & Dijkstra, 2004).

According to Frazier and Esterly (1990), this difference relates to which aspect of the relationship each gender values the most. For women, an emotional connection and dependability are more important then the sexual aspect of the relationship. As a result of this, when a male partner begins to create this same emotional bond with another female his partner's most treasured attribute of the relationship is being threatened. The fact that someone else is sharing in the connection begins to stir up feelings of jealousy and betrayal. For men, sexual dependence is ranked higher than the emotional connection of the relationship; therefore when their partner finds this sexual satisfaction with another man their sexual security is being threatened. If his partner had an emotional connection with another man it would not be as threatening to him. This difference in jealousy and reaction lies strongly in a woman's natural tendency to depend on a man for protection, time, energy and reproduction (Harris & Christenfeld, 1996). Men and women have different emotional definitions for both sexual and emotional infidelity. Men feel that women hold off on intercourse until they are truly in love with that particular person and see that person as being appropriate for reproduction. Therefore, when a woman is involved in a sexual act of infidelity the man thinks at a basic level that their partner sees a certain reproductive value in the other person. Men are also concerned with the idea that if the woman was to have a child through infidelity he would have to use his resources, time and energy on a child who is not his. Women, on the other hand, understand that men are able to have sex without the existence of love in the relationship; although women are still bothered and upset by sexual infidelity it is not the same degree that men are. In terms of women's concerns about the reproduction, they fear that if their partner becomes emotionally attached to another woman her security, commitment, and reproduction partner might be taken away from her. This would leave her with either no help or no chance for reproduction.

Aside from reproductive uncertainties, one's insecurities come to the surface when a relationship is threatened by a third party (Harris & Christenfeld, 1996). Individual insecurities are highlighted when infidelity occurs in a romantic relationship. Usually, the "other" man or woman becomes an enemy for the suffering partner. For women, the most noticeable attribute of the new enemy is their physical appearance. Males notice the other rival's social status and personality/physical characteristics. This shows that infidelity triggers self doubt and questions about one's worth and/or ability. By bringing up these insecurities and the feeling of betrayal, three basic emotions are brought to the surface: fear, anger, and sadness (Buunk & Dijkstra, 2004).

Men and woman differ in what types of infidelity they find most upsetting and what insecurities are highlighted; however, there are some aspects of infidelity that concern both genders. Both men and women experience fear and worry about the future of the relationship the idea of the partner leaving as a result of their infidelities or the idea of the person needing to leave for the loss of trust is worrisome in itself. Other emotions such as anger and hurt appear as well. Both men and woman claimed that anger was most accurately associated with sexual infidelity and a need to blame the partner. Emotional infidelity was said to bring up feelings of being hurt more than anything else (Sabini & Green, 2004).

Although the situation states that men and women share this emotional response to infidelities I noticed that there were not any studies on the different reactions to infidelity, I believe that this is a very important aspect of emotional responses. This study focuses on the effects of infidelity as a function of gender. External effects on an individual have been widely ignored in previous studies. Internal responses to infidelity include psychological and emotional reactions such as: lower self-esteem, feelings of inadequacy as well as depression, anger and resentment. External responses to infidelity include psychical responses such as: violence towards inanimate object, to oneself or to another person. The hypothesis was that men would respond to infidelity with external reactions, such as: yelling, violence, use of illegal substance, etc. Women would experience more internal reactions such as: crying, feeling sick, isolation etc.

Method

Participants

Data was collected from 40 participants (20 male, 20 female). Participants were students from undergraduate levels attending the University of North Carolina at Charlotte. The ages ranged from 18 to 30 years old (female $M=20$, $SD=2.52$ and male $M=20$, $SD=1.56$). The length of relationship was measured in months and varied from less than 1 month to 84 months (female $M=22.8$, $SD=19.25$ and male $M=17.5$, $SD=17.5$). The ethnic backgrounds of the females were 50% Caucasian, 35% African-American and 11.2% other. All participants were fluent in English even if it was not a first language; the participants were selected at random.

Materials

The questionnaire that was used was from an experiment on The Relationship Between Past Infidelity and Acceptance of Infidelity in Others (Mclendon, 2000; see Appendix). The questionnaire was administered on paper and consisted of two sections. The first section asked demographics such as gender, age and ethnic background; it also included past relationship experiences such as the length of most serious relationship, what type of infidelity makes you most upset (sexual/emotional), have you cheated on someone (if so was this the reason for the relationship to end) and have you been cheated on (if so was this the reason for the relationship to end). The second section consisted of six paragraphs of fictional situations where infidelity occurs. In these six situations infidelity was operationally defined as anything from kissing to intercourse.

Procedure

Males were given surveys describing infidelity by females, and females were given the same situations except that the unfaithful partner was male. After each paragraph there was a list of emotions and reactions presented in random order. The choices were kept in the same order after every paragraph. Internal reactions consisted of: relieved, depressed, sad, isolation, used, hurt, insecure, crying, inadequate, feel sick and betrayed. External reactions consisted of: yell, use of illegal substance, jealousy, call friends for advice, use of alcohol, resentment, fury, harm one's-self, harm an inanimate object, harm another, anger and address partner directly. The internal and external scores were calculated by adding up each participant's number of internal responses and external responses and averaging the results by gender and type of reaction.

Procedure

Students were selected at random at the *Outtakes* convenience store on campus. The students that came into the store were all addressed in the same manner, they were all greeted with the statement "Hello, would you like to take a short survey for a research methods class project?" If they said yes they were given a consent form. After the form was read, understood and signed they were given a survey (survey 1 for females and survey 2 for males). There was no time limit given for the survey and the participants were not in direct contact with the experimenter during the time the participants took the survey. Any questions students had about the survey were answered in simplest terms so that the experimenter had no influence on their answers. All questionnaires were completely anonymous and placed by the participant into an enclosed folder when they were finished.

Results

Forty participants completed a survey measuring the different reaction in males and females in terms of infidelity in a committed relationship. The following means are conclusive of the number of items represented in the entire survey. Males showed a very close score between internal reactions ($M=16.10$, $SD=10.76$) and external reaction ($M=20.55$, $SD=12.09$), $t(38)=.582$, $p=.564$, indicating they were equally likely to respond in an external and internal manner. Females showed higher levels of internal reactions ($M=26$, $SD=10.35$) and lower level of external reactions ($M=18.65$, $SD=8.18$), $t(8)=-2.96$, $p=.005$.

Discussion

The data indicated that males were not significantly more likely to express internal reactions then external reactions to infidelity, but females indicted a preference for internal reactions. The findings of the experiment

are directly related to the research discussed in the literature review; in the research wherein the literature review it is stated that males become more upset when their partners are involved in sexual infidelity and women are more upset about emotional infidelity. In the present study there is a slight, however not significant, indication that males express themselves externally and sufficient evidence shows that women express themselves internally; which is interesting in retrospect because sexual infidelity involves external acts and emotional infidelity involves internal changes. The literature indicated that males are bothered more by sexual infidelity and females become more upset about emotional infidelity (Buunk & Dijkstra, 2004).

One limitation of this study was the sample size; a larger sample size might have produced significantly more external responding by males, as was hypothesized. In addition, the informal atmosphere of the survey may have influenced participants' responses. It appeared that the females took the survey a lot more serious than the males did, which is something to be taken into consideration if the study was to be repeated. Another mistake made collecting data was the failure to ask for a certain maximum number of responses to be checked, for example, the five most prevalent responses. As a result of this I had some surveys with almost every reaction checked off and some with only one or two. I also was not clear enough on the type of sex the scenarios were referring to, oral sex or intercourse. This could have caused participants to have different responses depending on how they interpreted the type of sex in the scenario and how they felt about it. The value to this type of research is to help understand how males and females generally react to infidelity which can lead to tailoring better therapeutic interventions. If we know females hold everything in and bottle up, having them talk could be psychologically beneficial whereas males could be helped with redirecting anger external reactions.

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Gender Differences and Infidelity

Appendix A

Female Survey

Questionnaire

Section 1:

Please answer the following questions.

*For these questions, cheating will be defined as committing physical acts such as kissing or sex with someone when you have made an agreement to be monogamous to someone else.

1. What is your gender?......................Male/Female

2. Age………._____

3. Length of most serious relationship…….._____

4. What type of infidelity makes you most upset………..Sexual/Emotional

5. What is your ethnic background ………._____

6. Have you ever cheated on someone?........................Yes/No

7. If you answered "Yes" to Questions 6,

Was the relationship ended for that reason?…………...Yes/No

8. Has someone ever cheated on you?...................Yes/No

9. If you answered "Yes" to Question 8,

Was the relationship ended for that reason?...............Yes/No

Section 2:

Please read each of the following scenarios about relationships and answer each question based on your own interpretation of the situation.

*For these questions, monogamous will be defined as having a physical relationship (such as kissing or intercourse) with only one person at a time.

1. Marianne and Mark have been dating for six months. They consider their relationship to be good and potentially plan to remain together long- term. Although they had a mutual agreement to remain monogamous to one another, Mark slips up one night. He goes to see a movie with Jamie, a long time friend of his, and they end up kissing. After this happens, Mark feels horrible for deceiving Marianne. He apologizes and says that he will never do it again.

- If you were Marianne, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

2. Heather and John have been in a relationship for 4 and a half months. Since Heather really likes John, she plans to stay monogamous. Although John really likes Heather, he is not sure if he wants to be with only one person at this point in his life. He tells Heather that he will remain monogamous, but he meets up with Amanda one night and kisses her. When Heather finds out, John apologizes and tells Heather that he does like her, but he is not sure that he can handle being monogamous. However, he tells Heather that he would like to remain in the relationship.

· If you were Heather, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

3. Mindy and Rob have been together for over one year and they really believe that they are in love. They have discussed marriage, but no serious plans have been agreed upon. So far, they have both been completely monogamous. By month 15, Rob becomes restless and he decides to go on a date with one of the women who he works with, Jane. He does not plan to become intimate with her, but after the date is over, he is invited back to his co-worker's house. He agrees to go and before he really knows what he has done, he has sex with Jane. The next day, he confesses to Mindy the mistake he has made and he lets her know that he is truly sorry for hurting her and he says that he will never do it again. He asks her not to leave him.

· If you were Mindy, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

4. Rebecca and Stephen have been in a relationship for two years and they both have seriously agreed to be monogamous. Both Stephen and Rebecca have cheated in the past, but not on each other. Stephen, easygoing as he is, meets a girl at the mall one day when he is shopping and they engage in some casual conversation. She tells him that her name is Carly and she offers him her phone number. He takes it with the intention to talk to her as a friend. One night, Carly wants to meet up with Stephen and have a few drinks. Stephen agrees, but tells Rebecca that he is going out with friends. Stephen has a good time with Carly, but he feels guilty for lying to Rebecca. His guilt, however, is evidently not consuming enough. Carly initiates' sex and Stephen shows no signs of resistance. Later, when Rebecca finds out that that Stephen lied about where he was going and that he ended up having sex with someone, she is very upset. Stephen tells Rebecca how much he loves her and that it was an awful mistake and that he would never hurt her like that again. Rebecca does not know if she can trust Stephen.

· If you were Rebecca, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

5. Selena and Scott have been together for over 3 years. Selena and Scott are monogamous. Although he has been faithful for 2 and a half years, Scott has cheated on Selena before. After he did it, he felt worse for it than anything he had ever done. Selena truly loves Scott and she knows that he loves her too, so she stayed with him despite her fear. Lately, Selena and Scott have been talking about marriage very frequently. Scott begins to feel smothered. He goes out one night and has sex with someone that he just met. After he realizes what he has done, he is confused and upset. He tells Selena what he did and he explains that he really did not mean to do it because he loves her very much. He begs Selena to give him one more chance.

· If you were Selena, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

6. Joseph and Ann have been together for almost 5 years. They have had their share of ups and downs, but have always worked it out. In this relationship, they have had problems with fidelity in the past, but since they want to stay together they have agreed to forgive one another and move on. Since then, they have been completely monogamous and very happy with one another. They even plan to get married some day. Just before they reach the five-year mark, things between them get a little rough. They both reach a time of considerable stress in their lives and have trouble overcoming it. They frequently take it out on one another. Although they love one another very much, they drift apart and it becomes hard to work things out. Joseph and Ann decide to take it easy for a while. Even though they are technically apart, they still talk and continue their physical relationship. Conditions between them immediately improve and they get back together within two months. Once they are back together, things are going better than ever before. Ann and Joseph are very happy, but Ann soon finds out that Joseph had sex with someone while they were not together, even though Joseph and Ann still agreed to not sleep with other people. Joseph feels miserable for what he did to Ann and does not know how to let her know that it was a mistake and that it did not mean anything to him. He loves her and says that he will never do it again. Joseph even tells Ann that he really wants to be with her and only her for the rest of his life.

· If you were Ann, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

_____

Ψ

Appendix B

Male Survey

Questionnaire

Section 1:

Please answer the following questions.

*For these questions, cheating will be defined as committing physical acts such as kissing or sex with someone when you have made an agreement to be monogamous to someone else.

1. What is your gender?.......................Male/Female

2. Age……….._____

3. Length of most serious relationship……..._____

4. What type of infidelity makes you most upset………..Sexual/Emotional

5. What is your ethnic background ………._____

6. Have you ever cheated on someone?........................Yes/No

7. If you answered "Yes" to Questions 6,

Was the relationship ended for that reason?…………...Yes/No

8. Has someone ever cheated on you?...................Yes/No

9. If you answered "Yes" to Question 8,

Was the relationship ended for that reason?...............Yes/No

Section 2:

Please read each of the following scenarios about relationships and answer each question based on your own interpretation of the situation.

*For these questions, monogamous will be defined as having a physical relationship (such as kissing or intercourse) with only one person at a time.

1. Marianne and Mark have been dating for six months. They consider their relationship to be good and potentially plan to remain together long- term. Although they had a mutual agreement to remain monogamous to one another, Mark slips up one night. He goes to see a movie with Jamie, a long time friend of his, and they end up kissing. After this happens, Mark feels horrible for deceiving Marianne. He apologizes and says that he will never do it again.

- If you were Mark, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

Gender Differences and Infidelity

2. Heather and John have been in a relationship for 4 and a half months. Since Heather really likes John, she plans to stay monogamous. Although John really likes Heather, he is not sure if he wants to be with only one person at this point in his life. He tells Heather that he will remain monogamous, but he meets up with Amanda one night and kisses her. When Heather finds out, John apologizes and tells Heather that he does like her, but he is not sure that he can handle being monogamous. However, he tells Heather that he would like to remain in the relationship.

· If you were John, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

3. Mindy and Rob have been together for over one year and they really believe that they are in love. They have discussed marriage, but no serious plans have been agreed upon. So far, they have both been completely monogamous. By month 15, Rob becomes restless and he decides to go on a date with one of the women who he works with, Jane. He does not plan to become intimate with her, but after the date is over, he is invited back to his co-worker's house. He agrees to go and before he really knows what he has done, he has sex with Jane. The next day, he confesses to Mindy the mistake he has made and he lets her know that he is truly sorry for hurting her and he says that he will never do it again. He asks her not to leave him.

· If you were Rob, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

4. Rebecca and Stephen have been in a relationship for two years and they both have seriously agreed to be monogamous. Both Stephen and Rebecca have cheated in the past, but not on each other. Stephen, easygoing as he is, meets a girl at the mall one day when he is shopping and they engage in some casual conversation. She tells him that her name is Carly and she offers him her phone number. He takes it with the intention to talk to her as a friend. One night, Carly wants to meet up with Stephen and have a few drinks. Stephen agrees, but tells Rebecca that he is going out with friends. Stephen has a good time with Carly, but he feels guilty for lying to Rebecca. His guilt, however, is evidently not consuming enough. Carly initiates' sex and Stephen shows no signs of resistance. Later, when Rebecca finds out that that Stephen lied about where he was going and that he ended up having sex with someone, she is very upset. Stephen tells Rebecca how much he loves her and that it was an awful mistake and that he would never hurt her like that again. Rebecca does not know if she can trust Stephen.

· If you were Stephen, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

5. Selena and Scott have been together for over 3 years. Selena and Scott are monogamous. Although he has been faithful for 2 and a half years, Scott has cheated on Selena before. After he did it, he felt worse for it than anything he had ever done. Selena truly loves Scott and she knows that he loves her too, so she stayed with him despite her fear. Lately, Selena and Scott have been talking about marriage very frequently. Scott begins to feel smothered. He goes out one night and has sex with someone that he just met. After he realizes what he has done, he is confused and upset. He tells Selena what he did and he explains that he really did not mean to do it because he loves her very much. He begs Selena to give him one more chance.

· If you were Scott, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

6. Joseph and Ann have been together for almost 5 years. They have had their share of ups and downs, but have always worked it out. In this relationship, they have had problems with fidelity in the past, but since they want to stay together they have agreed to forgive one another and move on. Since then, they have been completely monogamous and very happy with one another. They even plan to get married some day. Just before they reach the five-year mark, things between them get a little rough. They both reach a time of considerable stress in their lives and have trouble overcoming it. They frequently take it out on one another. Although they love one another very much, they drift apart and it becomes hard to work things out. Joseph and Ann decide to take it easy for a while. Even though they are technically apart, they still talk and continue their physical relationship. Conditions between them immediately improve and they get back together within two months. Once they are back together, things are going better than ever before. Ann and Joseph are very happy, but Ann soon finds out that Joseph had sex with someone while they were not together, even though Joseph and Ann still agreed to not sleep with other people. Joseph feels miserable for what he did to Ann and does not know how to let her know that it was a mistake and that it did not mean anything to him. He loves her and says that he will never do it again. Joseph even tells Ann that he really wants to be with her and only her for the rest of his life.

· If you were Joseph, how would you respond/feel? Check all that apply

O Yell	O Isolation	O Insecure	O Feel sick
O Relieved	O Jealous	O Cry	O Violence to an object
O Depressed	O Used	O Resentment	O Violence to another
O Use illegal substances	O Call friends to talk	O Fury	O Betrayed
O Sad	O Drink alcohol	O Inadequate	O Angry
O Nothing	O Hurt	O Violence to oneself	O Address partner

Other: _____

Ψ

Young Women's Perceptions of Overweight Children

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Abstract--*Despite the research on the health of overweight children, there is little psychological research that examines adult perceptions of these children. This experiment tested the prediction that young women would perceive an overweight girl more negatively than an average-weight girl. Sixty college-aged female participants were randomly assigned to view a photograph of either an average-weight or of an overweight child. They then completed a questionnaire to measure their perceptions of the child. A factor analysis of the perception scale revealed four dimensions of perceptions: expectations from others, social relations, neat appearance, and likeable personality. Among these factors, participants perceived the overweight child as having lower expectations placed on them, poorer social skills, and a less neat appearance compared to the average-weight child. These findings have considerable implications for overweight children's self-esteem and performance.*

The U.S. Surgeon General announced in 2001 that childhood obesity has become a national epidemic, with the number of overweight children doubling and the total number of overweight adolescents tripling within the last 25 to 30 years (Harper, 2006). Today, approximately one out of every seven youths is overweight (Kail, 2007). These overweight youth have to endure the social and psychological drawbacks of carrying this extra weight. The current research explored the differences between adult perceptions of overweight and non-overweight children and the characteristics of those perceptions.

Research suggests that being overweight as a youth is detrimental to a child's physical health, but it can be damaging to their psychological well-being as well (see Puhl & Latner, 2007 for a review; see also Mendelson & White, 1985; Pierce & Wardle, 1997). This is especially pronounced among girls. Israel and Ivanova (2002) showed that overweight females exhibit a lower self-esteem than overweight males. In addition to experiencing low self-esteem, overweight children and adolescents are at risk for peer victimization, such as bullying and teasing, because their classmates perceive them as different and undesirable (Robinson, 2006). Thus, an overweight child's low self-esteem may be directly influenced by negative perceptions from others.

Extensive research has investigated how overweight adults are perceived, stigmatized and stereotyped by other adults. For instance, Rothblum, Miller, and Garbutt (1988) showed that people who had to infer an applicant's attractiveness from a written description rated obese applicants more negatively than nonobese individuals. Thus, these results suggest that obese adults may be negatively perceived by future employers. Ryckman, Robbins, Kaczor, and Gold (1989) also found that, in comparison to average-weight individuals, overweight individuals tend to be perceived as less stable, as well as slower, dirtier, sloppier, lazier, and having less friends.

Additional studies on stigmatization of overweight adults have examined how children perceive overweight adults. Tiggemann & Anesbury (2000) revealed how children have consistent negative stereotypes of obesity in adults. As a result, overweight adults tend to internalize the strong social stigmas and negative perceptions that are placed on them by society, even when the stigmatization comes from younger members of the community (Wang, Brownell, & Wadden, 2004). However, while peer perceptions

of overweight children and child perceptions of overweight adults have been examined, research has not extensively explored the notion that overweight children may be subjected to negative stigmatization by adults.

There are a few noteworthy exceptions. Davison and Birch (2004) examined obesity stereotypes among 9-year-old girls and their parents with the finding that both the girls and their parents perceived significantly more negative characteristics (e.g., laziness) regarding obese persons compared to average-weight persons. Additionally, Adams, Hicken, and Salehi (1988) asked parents to create a story about three children based on their photographs (one average-weight, one obese, and one handicapped), and they found that among the three photographs, the parents perceived the obese child as having the lowest self-esteem. Other researchers have found significantly more negative perceptions of obese children than average-weight children among teachers (Greenleaf & Weiller, 2005; Neumark-Sztainer, Story, & Harris, 1999) and principals (Price, Desmond, & Stelzer, 1987), particularly regarding their expectations of the child's social skills and academic performance.

Although parents and teachers may be the primary adults with whom children come into contact in their daily lives, there are numerous other adults who may frequently interact with these children such as coaches, camp counselors, or employees at a number of venues such as restaurants, amusement parks, airports, or clothing stores. A large number of these adults in such environments are under the age of 30 and have had no prior contact with the child, which speaks to the importance of examining young adults' first impressions of obese children. Therefore, in order to further understand adult attitudes towards average-weight and overweight children, we sought to investigate the perceptions that young adults have based on their first impressions of the child's appearance.

In our experiment, we predicted that the young adults who viewed a photograph of an overweight girl would have more negative perceptions about her than the participants who viewed a photograph of an average-weight girl. We also investigated the different types of perceptions these adults had of the children, and examined how these perceptions differed depending on the target. Although

we expected to find some differences in the degree to which they viewed the two children, we predicted that the participants would have more negative perceptions of the overweight girl than of the average-weight girl on all types of perceptions.

Method

Participants and Procedure

The participants of this study were comprised of 60 female undergraduate students at Eastern Kentucky University ($M_{age} = 20.15$, $SD = 3.82$). The participants were volunteers who received course completion credit for their participation. Participants were randomly assigned to two groups. One group received a photograph of an overweight child, and the second group received a photograph of an average-weight child. Subsequently, they were given a perception questionnaire and asked to rate their first impressions of the child. Participants were given as much time as needed to complete the perception scale. When all participants were finished, any questions that they may have had were addressed and answered. Each participant was then debriefed and dismissed.

Materials

Photographs. The photographs that were used for this study included two photographs of different female grade-school students. Each photograph represented the female student of a particular body size; one photograph exhibited an average-weight girl and the second was of an overweight girl (see Appendix A for photographs).

Perceptions of Child. The Perception scale consisted of 20 items that were generated by the primary investigator to evaluate how the participants perceived the child in the photograph. (Cronbach's Alpha = .94). The perception items were created based on the primary investigator's opinion of what types of characteristics are formed through first impressions. For instance, an early study on forming first impressions found that participants' first impressions were based on how they viewed another person's psychological nature, grooming, physical characteristics, attire, and intelligence (Jacobson, 1945). The participant's perceptions of the child were rated on a scale of 1 (*not at all*) to 7 (*extremely*) for statements such as, "She is well liked by her peers." A

mean score of the overall perceptions of the child in the photograph was created with higher scores indicating more positive perceptions. The last item in the questionnaire served as a manipulation check for the two conditions. Participants were asked to rate how they viewed the child in the photograph using a scale from 1 *(slim)* to 7 *(obese)*. An independent samples *t*-test revealed that participants rated the average-weight child as significantly slimmer than the overweight child, average-weight $M = 2.16$, $SD = 0.91$, obese $M = 6.43$, $SD = 0.82$, $t(58) = 19.07$, $p < .01$.

Results

People judge each other on a variety of dimensions, such as physical appearance, personality, and the likelihood of being successful. Therefore, an exploratory factor analysis (EFA) was conducted across all items of the Perception scale to determine if the ratings participants gave of the children can be divided into subcategories, and subsequently if these perceptual categories differed depending on the target child's weight. Using eigenvalues greater than 1.00 as the cut-off criterion, the analysis extracted four factors from the perception scale which were subsequently labeled Expectations from Others, Social Relations, Neat Appearance, and Likeable Personality (see Table 1). The *Expectations from Others* factor explained 48% of the variance across the items and the *Social Relations* factor explained a little over 10% of the variance of items. Further, the factor *Neat Appearance* and *Likeable Personality* factor each explained between 5-7% of the variance across the items. The items designated as loading onto the *Neat Appearance* factor also loaded highly onto the *Expectations from Others* factor, but conceptually these items fit the *Neat Appearance* category. A bivariate correlation analysis was then conducted among these four factors (see Table 2). Results indicated that all types of the perceptions were positively associated with the other perceptions, although none of the correlations were strong enough to suggest redundancy of the factors.

The hypothesis of this experiment was that people who viewed a photograph of an overweight female child would have more negative perceptions of her than people who viewed a photograph of an average-weight female child. To test this prediction a Multivariate Analysis of Variance (MANOVA) was conducted. The independent variable was the condition of participants viewing a photograph of an average-weight or overweight child. The dependent variables were participants' perception scores of the average-weight and overweight child, including the individual perception scores calculated based on the EFA results and the overall perception score. The results of the multivariate omnibus test yielded a significant difference between conditions on the perceptions of the child, $F(4, 55) = 35.67$, $p < .01$. Follow-up univariate analyses revealed significant differences between conditions on Expectations from Others, Social Relations, and Neat Appearance as well as on the overall perception score (see Table 3). There was not a significant difference on Likeable Personality ratings between the overweight and average-weight conditions. With this one exception, the hypothesis was supported. The overweight child was perceived as having lower expectations from others, poorer social skills, and a less neat appearance than the average-weight child.

Discussion

The present experiment is unique in that it examines young adults' first impressions of overweight children. Previous studies have investigated how overweight adults are perceived by other adults and how overweight children are viewed by their peers, but little research has examined the characteristics of the first impressions that young adults have of overweight children.

In the current experiment, it was predicted that the participants who viewed a photograph of an overweight female child would have more negative perceptions about her than the participants who viewed a photograph of an average-weight female child. In support of this prediction, the results showed that adults perceived the overweight child more negatively than the average-weight child in several domains. Specifically, participants indicated that both parents and teachers would have lower expectations of the overweight child than the average-weight child. In addition, they viewed the overweight child as having poorer social relations, such as having fewer friends and talking less among their peers than the average-weight child. Furthermore, participants in this

experiment indicated that the overweight child had a less neat appearance than the average-weight child. For instance, they perceived the overweight child to be less clean than the average-weight child. They did not express a notable difference in likeable personality between the overweight and average-weight child. We conclude that in spite of adults viewing overweight children as having a likeable personality, negative implications still persist because adults are expecting less of overweight children, and they are viewing them as both physically undesirable and lacking in social competence. Thus, young adults may perceive an overweight child as likeable to off-set their negative perceptions of that child's potential and appearance.

Limitations & Future Directions

One limitation to the method of this study is that only one photograph of each type of child, average-weight or overweight, was presented in the experiment. This limitation increases the chance that confounding factors, such as photographic quality, may have influenced differences in the perceptions between the average-weight and overweight child. Additionally, this study only used photographs of females for the stimuli because of previous research that found that overweight females exhibit a lower self-esteem than overweight males (Israel and Ivanova , 2002). As a result, we focused on female targets only. Also, this study investigated perceptions among adult females due to the limited availability of male participants. Future applications of this experiment may employ a greater degree of *stimulus sampling* (see Wells & Windschitl, 1999) to determine the effects of being exposed to several obese children.

Another limitation to the method of this experiment is that participants were required to respond to the items on the questionnaire based on the child's appearance only because no additional biographical information was presented to them. Due to this factor, the results of this study may not generalize to situations in which adults who care for children use other information about the child that is available, such as their behavior, to form perceptions and judgments about them. As a result of these limitations, future research in this domain would benefit from providing multiple photographs of different types of average-weight and overweight children that are both female and male, in order to increase the study's external validity. Also, future research in this area should explore the perceptions of same- versus opposite-sex perceivers of overweight children. By doing so, insight can be gained on gender differences among perceptions of overweight children for both males and females. Based on how adult female participants perceived overweight children in this experiment, it is important to examine whether or not adult males also hold these same stereotypes because adult males are active in many areas of these children's lives such as medical care providers, educators, and coaches.

Implications & Conclusions

These findings support the work of Ryckman et al. (1989) who found that in comparison to average-weight individuals, overweight individuals tend to be stereotyped as less stable, as well as slower, dirtier, sloppier, lazier, and having less friends. We have built upon this work by showing that young adults' first impressions of overweight children are more negative than average-weight children. These negative perceptions may influence how these children will be treated by young adult women who interact with them on a daily basis. With a majority of child caregivers, nurses and teachers being female, these negative perceptions may alter how young women interact with overweight girls.

These results consequently bear significant implications for overweight children's performance in school (Datar, Sturm, & Magnabosco, 2004). For instance, if teachers have low expectations of them, overweight children may not be provided the opportunity to obtain high academic achievement because less is expected of them in the classroom (Saracho, 1991). Jussim (1986) explained negative teacher-student self-fulfilling prophecies as stemming from the teacher developing expectations of a student based on stereotypes. Second, the teacher treats the student differently because of these stereotypes. Finally, the student reacts to this treatment by confirming the teacher's expectation. As a result, the adult perceptions noted in this experiment can alter both the treatment and performance outcomes of overweight children.

With 1 out of every 7 children and adolescents being overweight (Kail, 2007), these results emphasize

the importance for further investigation of the characteristics of the negative perceptions placed on overweight youth. Additionally, it is essential that society and future research look for ways to proactively dissolve and prevent these social stigmas as well as reduce childhood and adolescent obesity. In doing so, the social, psychological and health problems facing overweight youth can be significantly alleviated.

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Ψ

Appendix A

Photograph of Overweight Child

Photograph of Average-Weight Child

Table 1. Exploratory Factor Analysis with Verimax Rotation on the Perception Items.

Items	Factor Loadings			
	Expectations from Others	Social Relations	Neat Appearance	Likeable Personality
She probably makes high grades in school	**.85**	.26	-.13	.12
Her parents have high expectations of her	**.76**	.15	.34	.01
She is an attractive youth	**.63**	.56	.34	.10
She probably makes low grades in school (rev)	**.70**	.34	-.30	-.04
She is a lazy child (rev)	**.63**	.45	.17	-.03
Her teachers like having her in class	**.79**	.07	.04	.32
She is liked well by her peers	.57	**.64**	.21	.16
She has many friends	.51	**.67**	.35	.10
She is talkative amongst her peers	-.03	**.80**	.24	.18
She has few friends (rev)	.20	**.76**	.04	.05
She has high self-esteem	.34	**.73**	.44	.11
She lacks confidence in herself (rev)	.11	**.77**	.07	.26
She is an active child	.48	**.63**	.37	.19
She is a lonely child (rev)	.12	**.66**	.15	.52
She is a clean child	.50	.13	**.45**	.27
She is neat in appearance	.62	.25	**.45**	.23
She is a fun-loving child	.18	.46	.00	**.64**
She is a humorous child	-.12	.02	.13	**.83**
She has a good natured personality	.29	.08	.10	**.71**
She is fun to be around	.24	.38	.40	**.56**

Table 2. Correlation Matrix among Factors.

Variables	1.	2.	3.	4.
1. Expectations from Others	—	.72**	.68**	.39**
2. Social Relations		—	.64**	.60**
3. Neat Appearance			—	.48**
4. Likeable Personality				—
Mean	4.88	4.02	5.38	5.03
SD	1.26	1.36	1.35	0.91
α	.88	.91	.76	.77

$**p < .01$

Table 3. Differences in Perceptions between Conditions.

Variables	Average-Weight		Overweight		
	M	*SD*	*M*	*SD*	*F*
Expectations from Others	5.87	0.58	3.87	0.90	103.37**
Social Relations	4.97	1.05	3.05	0.86	59.53**
Neat Appearance	6.15	0.76	4.61	1.37	28.44**
Likeable Personality	5.24	0.83	4.81	0.94	3.39
Overall Perception Score	5.41	0.67	3.81	0.74	76.48**

$**p < .01$

Adult Attention Deficit-Hyperactivity Disorder and Emotional Intelligence

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Abstract—*Considerable research has been conducted on attention-deficit/hyperactivity disorder (ADHD) among children. The purpose of the present investigation is to examine the affects of adult ADHD symptomatology on university students' emotional regulation and private emotional preoccupation. The results reveal that the aspects of adult ADHD are significantly associated with certain aspects of emotional intelligence. In particular, the results indicate that the attention deficit and hyperactive/impulsive components of adult ADHD are found to be negatively correlated to emotional clarity and emotional repair, and show no significant difference to emotional attention. This discussion focuses on how specific aspects of adult ADHD may contribute to maladaptive cognitive functioning, while other aspects of adult ADHD may have a detrimental effect on emotional functioning.*

Few studies have examined the relationship of emotional intelligence among individuals with attention-deficit/hyperactivity disorder (ADHD). Research in this particular area is lacking especially among adults with ADHD, despite evidence that many adults with ADHD struggle socially and emotionally. The purpose of the present research is to examine (on a subclinical basis) the relationship between adult ADHD and emotional intelligence among college students. Symptoms of ADHD may affect emotional intelligence and in turn may correlate with irrational behavior and an inability to understand one's own and others' feelings and emotions. Problems associated with emotional intelligence may cause complications socially. Such problems may also be detrimental to an individual's ability to rationally and emotionally adapt to life's changes.

ADHD is a developmental neurobehavioral disorder that is defined by the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV-TR;* American Psychiatric Association [APA], 2000*)* as a persistent pattern of inattention and/or hyperactivity-impulsivity that is displayed more times than not and is more severe than typically observed in others of a comparable stage of development. For a diagnosis of ADHD, patients must have six or more symptoms of inattention or hyperactivity /impulsivity which have persisted for at least 6 months.

Individuals with ADHD display signs of the three primary ADHD characteristics: inattention, hyperactivity, and impulsivity at school, work, or in social settings. Research by Miller, Nigg, and Faraone (2007) found that ADHD in children and adolescents is associated with an excess of externalizing disorders such as oppositional defiant disorder. This pattern of behavior is found to not only correlate with excess dysthymia, alcohol and drug dependence-abuse, learning disorders, and psychological distress (also associated with inattentive ADHD). But the combined form of ADHD is often associated with oppositional defiant disorder, suicide attempts, arrests, interpersonal hostility, and paranoia (Miller, Nigg, & Faraone, 2007).

The inattention component of ADHD is marked by failure to give close attention to details, careless mistakes in work or tasks, failure to complete tasks, and complications following through with requests (Jackson & Farrugia, 1997). Tasks that require sustained mental effort or that require organizational effort are experienced by the individual as difficult and unpleasant. Hyperactivity is marked by an inability to sit still in appropriate situations, excessively talking, feelings of restlessness, and/or difficulty in delaying responses. Impulsivity is marked by impatience and interrupting or intruding on others to the extent that it causes problems in social situations. Adults with ADHD may also experience some secondary characteristics, which

include substance abuse, learning disabilities, low self-concept, incarceration, inconsistent work records, and gambling disorders (Jackson & Farrugia, 1997).

Other psychological problems should be taken into consideration when ADHD is diagnosed or has previously been diagnosed. It is not unusual for patients diagnosed with ADHD to also experience depression and anxiety; usually not due to problems associated with ADHD (Weiss & Murray, 2003). Due to the possibility of comorbidity the psychiatric history of the patient, as well as the psychiatric history of the family should be reviewed.

One psychiatric condition that is of importance to this study is oppositional defiant disorder (ODD). In adults diagnosed with ADHD, comorbidity of ODD may often occur. Research by Taylor, Burns, Rusby, and Foster (2006) suggests that children with hyperactivity have an increased risk of also developing oppositional defiant behavior. Research by Woods, Lovejoy, and Ball (2002) suggests that comorbidity of anxious and depressive disorders is commonly observed in adults with ADHD.

ODD is defined by the *DSM-IV-TR* (APA, 2000) as a recurrent pattern of defiant and hostile behavior toward authority figures or peers that persists for at least 6 months. These behaviors must occur more times than not than is seen in individuals of comparable age or developmental level. The behaviors must also cause significant impairment in social, academic, or occupational functioning. The above mentioned criteria are used to assess children and adolescents. Currently there is not a set criteria mentioned in the DSM-IV-TR (APA, 2000) to assess ODD in adults. The onset of ODD usually becomes evident before the age of 8 and usually no later than the adolescent years.

Though little research exists in regards to adult ADHD, some scholars suggest that an ADHD diagnosis during childhood will persist into adulthood. Suggestions that more research needs to be done regarding comorbidity of ADHD and other psychological disorders are also mentioned (Miller, Nigg, & Faraone, 2007). Many symptoms of ADHD are nonspecific, show high variability, and are commonly noticed among other disorders with 70-75% of adults diagnosed with ADHD having at least one comorbid diagnosis (Ramsay & Rostain, 2007).

The purpose of the present research investigation was to examine the relationship between adult ADHD and emotional intelligence. Emotional intelligence is a type of social intelligence that is often applied as a standard of adaptation (Mayer & Salovey, 1995). Emotions aid in motivating adaptive social behavior and individuals can use the information provided by their feelings to help motivate appropriate social behavior. Features of emotional intelligence combine to aid in people's ability to adapt to life's changes through the use of both rational and emotional coping skills. Previous research on the functions of emotions shows that emotions affect performance tasks in learning, memory, problem solving, and creativity (Izard, 2001). Individuals with low emotional thresholds or a high reactive emotions system may place severe restraints on their information processing.

Emotional intelligence involves the ability, capacity, or skill to perceive and understand one's own and others' feelings and emotions, the ability to discriminate among these feelings and emotions, the ability to integrate emotions to facilitate thought, and the ability to regulate emotions to promote personal growth (Salovey & Mayer, 1990). Emotional intelligence in individuals can vary with some individuals being better able to understand their own and others' emotions and feelings. Individuals that are considered more adaptive in emotional intelligence have the ability to regulate their emotions to a logically consistent model of emotional functioning. Proponents of the emotional intelligence construct argue for its use in explaining various psychological phenomena (Law, Wong, & Song, 2004).

Rapport, Friedman, Tzelepis, and Van-Voorhis (2002) suggest that early ADHD symptoms may influence the development of adult personality which further supports that learning to understand one's emotions would contribute to mental health in a positive way. Such concerns suggest that individuals with ADHD are prone to having difficulties interpersonally and with emotion regulation.

Individuals with ADHD may suffer from a low ability in emotional clarity and they may find it hard to regulate their mood. Gohm (2003) suggests that overwhelmed individuals are more likely than others to regulate their mood. Individuals with ADHD may find themselves overwhelmed in social situations. This is usually due to extreme levels of their own emotions and the inability to regulate these emotions. In turn these problems may affect an individual's emotional clarity, attention to emotions, and emotional intensity.

Certain traits that may be more prevalent in individuals with ADHD in regards to emotional intelligence are shown to be low as compared to others who do not have ADHD (Salovey, Mayer, Goldman, &

Palfai, 1995). Individuals with ADHD also show a higher rate of oppositional defiant behavior problems which may contribute to their low rating of certain emotional traits.

Gohm (2003) explains that emotional feelings are critical for judgment and decision making. Individuals with ADHD tend to experience their own emotions more intensely than those without ADHD which could possibly cause a disruption in their ability to be sensitive or give recognition to others emotions. Experiencing such intense emotions could also cause trouble in regulating emotions and so the individual may try to distance themselves from emotional experiences which in turn effect's their judgments and decision making. In accordance to the effects on judgments concerning individuals with ADHD, it is suggested by Friedman et al. (2003) that those with ADHD have difficulty in facial affect recognition and matching intonations of the voice with emotional expressions. Patients with ADHD may also suffer consequences in emotional competence, which include increased emotional reactivity, decreased frustration tolerance, and a diminished ability to self-regulate emotions (Friedman et al, 2003).

Summary

Individuals with psychological disorders have shown identified impairments with emotional intelligence (Leible & Snell, 2004; Levine, Marziali, & Hood, 1997; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). However, there is no previous research indicating a correlation between adult ADHD symptomatology and emotional intelligence. The present study is designed to examine whether symptoms of adult ADHD are associated with the emotional intelligence of college students.

Hypotheses

It is anticipated that adult ADHD symptomatology in university students will be associated with both emotional regulation and private emotional preoccupation. More specifically, it is predicted that individuals who score higher on the ASRS or SNAP-IV measure of inattention will be more likely to experience less emotional regulation, as measured by the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) and will also be more likely to experience less private emotional preoccupation, as measured by the Multidimensional Emotional Awareness Questionnaire (MEAQ; Snell, 1999). The basis for this prediction is

seen from the rationale that individuals with the inattention component of ADHD experience their own emotions more intensely than those without ADHD. This could cause complications in recognizing emotions in self and others. Previous research suggests that problems in facial affect recognition as well as in matching prosodic and emotional expressions arise from the inattentive component of ADHD. Such problems cause a failure to attend to affect in the interpersonal environment (Friedman et al., 2003). According to a study on ADHD and emotional reactivity, Rapport et al. (2002) found that adults with ADHD demonstrated greater emotional reactivity than did the controls and that emotional reactivity is negatively correlated to accuracy on tasks assessing affect recognition. These previous findings support the notion that individuals with ADHD may display an inability to regulate their emotions. And individuals with primarily inattentive ADHD may more prominently display an inability to regulate their emotions.

Method

Participants

The participants in the present research are drawn from several lower division psychology courses at a small Midwestern university. The sample consists of 56 participants (30 males; 26 females) who were assessed during the spring of 2008. The participants volunteered to participate in the research projects as one way to partially fulfill requirements in their course. About 78% of the sample ($n = 44$) are lower-division students, and the others are juniors ($n = 8$), seniors ($n = 3$) or some other academic status ($n = 1$). About 73% of the sample ($n = 41$) reports that they are at least 20 years of age, and the others report being older ($n = 15$). Exactly 100% of the sample ($n = 56$) reports that they have never been married. Roughly 95% of the sample ($n = 53$) reports that they have no children, and the others report having one or more children ($n = 3$). About 79% ($n = 44$) report being Caucasian-American, and the others are African-American (11%; $n = 6$), Hispanic American (7%; $n = 4$), Asian-American (2%; $n = 1$), or else some other ethnicity (2%; $n = 1$).

Measures

ASRS measure of adult ADHD. The Adult ADHD Self-Report Scale (ASRS; Kessler et al., 2005) is designed to assess the inattentiveness and hyperactivity-impulsivity characteristics of adult ADHD.

There are 18 questions generated about ADHD symptoms commonly exhibited by adults, and these questions are then overlapped with the 18 *DSM-IV* (1994) Criterion A symptoms (Kessler et al., 2005). In the questionnaire 9 of the 18 questions reflect inattentiveness symptoms, and the remaining half of the questions reflect hyperactivity-impulsivity symptoms (Kessler et al., 2005).

In responding to the ASRS measure of adult ADHD, the participants are asked to indicate how much each statement characterizes them within the past 6 months, using a 5-point Likert scale with each item being scored from 0 to 4: *never* (0), *rarely* (1), *sometimes* (2), *often* (3), *very often* (4). Subscale scores are calculated by averaging the item scores within the domains of inattentiveness (I) and hyperactivity-impulsivity (HI). Higher scores correspond to greater inattentiveness (I) and/or hyperactivity/impulsivity (HI). There is evidence for the reliability and validity of the ASRS (e.g., Kessler et al., 2005).

SNAP-IV measure of adult ODD. Participants respond to a 10-item subscale of SNAP-IV, which measures oppositional/aggressive symptoms (MTA Cooperative Group, 1999). A 4-point Likert scale is used, with each item being scored from 0 to 3: *not at all* (0), *just a little* (1), *quite a bit* (2), *and very much* (3). Eight of the ODD items are summed to create subscales for ODD symptoms. Higher scores corresponded to greater ODD symptoms. Evidence is provided for the reliability and validity of the SNAP-IV measure of ODD (e.g., MTA Cooperative Group, 1999; Swanson et al., 2001).

SNAP-IV measure of adult ADHD. The Swanson Nolan and Pelham-IV (SNAP-IV; Swanson et al., 2001) measure for ADHD is designed to measure both ADHD and ODD in adult participants. More specifically the SNAP-IV is designed to assess inattention, hyperactivity/impulsivity, and opposition/ defiance characteristics in respondents. The questionnaire consists of 26 multiple choice questions pertaining to symptoms associated with ADHD and ODD.

The responses to the SNAP-IV are to be marked on a 4 point scale based on severity described by the participant. Participants are able to mark: (0) *not at all*; (1) *just a little*; (2) *pretty much*; or (3) *very much*. Evidence for the reliability and validity of the SNAP-IV is provided by March et al. (2000) which shows that the SNAP-IV showed excellent construct validity and test-retest reliability in ADHD samples.

Multidimensional Emotional Awareness Questionnaire. The Multidimensional Emotional Awareness Questionnaire (MEAQ; Snell, 1999) consists of 20 items designed to measure three aspects of emotional awareness: (a) private emotional attention; defined as the dispositional tendency to pay attention to, to be concerned with, and to be aware of one's internal and privately felt emotional experiences, (b) private emotional preoccupation and rumination; defined as the dispositional tendency to be preoccupied with and to ruminate about one's internal and privately felt emotional experiences, and (c) public emotional monitoring; defined as the dispositional tendency to pay attention to, to be concerned with, and to be aware of public reactions to one's privately felt emotional experiences.

The research participants are asked to respond to the MEAQ statements based on how much each statement characterizes them, using a 5-point Likert scale with each item being scored from 0 to 4: (0) *not at all characteristic of me;* (1) *slightly characteristic of me;* (2) *somewhat characteristic of me;* (3) *moderately characteristic of me;* and (4) *very characteristic of me.* Higher scores correspond to greater amounts of each respective subscale. Evidence for reliability and validity for the Multidimensional Emotional Awareness Questionnaire is provided by Snell (1999) and Leible and Snell (2004).

Trait Meta-Mood Scale. The Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) is an objective self-report instrument designed to measure several aspects of emotional intelligence. The TMMS is divided into 5 item domains: an individual's clarity of his or her emotional perception, strategies used in regulating his or her emotions, integration of his or her feelings, attention to his or her emotions, and attitudes about his or her emotions.

Participants respond to randomly ordered TMMS items along a 5-point scale anchored by 1 = *strongly disagree* and 5 = *strongly agree*. From these responses a three-factor solution concerning emotions is determined: attention, clarity, and regulation (repair). This three factor solution corresponds with findings in the Mayer and Gaschke (1988) study which finds three primary domains of reflective mood experiences: monitoring moods, discriminating among moods, and regulation of moods.

Procedure

When the participants arrived at the testing room, the purpose of the study was briefly described to them and they were asked to read and sign an informed consent form. They were guaranteed complete anonymity and were assured that their responses will be kept in complete confidentiality. All participants who entered the experiment agree to participate. Each participant then received a questionnaire booklet containing the various measures. The presentation order is as shown above. Following the completion of the measures, the participants received a written debriefing that explains the purpose of the study. The completion of the questionnaire booklet required approximately 30-60 minutes. Small groups of up to 20 participants were tested during each of the 4 separate sessions.

Results

To examine the affects of ADHD symptomatology on people's emotional intelligence, Pearson correlation coefficients are computed. Table 1 presents the correlations between the measures of adult ADHD and private emotional awareness (MEAQ), private emotional preoccupation (MEAQ), and private emotional monitoring (MEAQ), emotional clarity (TMMS), emotional attention (TMMS), and emotional repair (TMMS).

TMMS emotional regulation

An inspection of Table 1 reveals a statistically significant negative correlation between emotional regulation and each of the components of ADHD: inattention, hyperactivity/impulsiveness, and the combined form.

MEAQ private emotional preoccupation

An inspection of Table 1 reveals a significant negative correlation between two of the three components (hyperactivity/impulsiveness and the combined form) of ADHD as measured by the ASRS. Table 1 reveals that there was no statistically significant difference between the inattention component of ADHD and private emotional preoccupation.

Results for ASRS measure of adult ADHD

An inspection of Table 1 indicates that there is a positive correlation between hyperactivity/impulsivity and the MEAQ measure of private emotional preoccupation/rumination ($r = .44$, $p < .001$). An inspection of Table 1 also indicates that the ADHD

measure of inattentiveness is found to be negatively correlated with the TMMS emotional clarity subscale ($r = -.51$, $p < .001$) and the TMMS emotional repair subscale ($r = -.44$, $p < .001$). A negative correlation was also found between ADHD hyperactivity/impulsivity and the TMMS emotional clarity subscale ($r = -.37$, $p < .006$) and the TMMS emotional repair subscale ($r = -.44$, $p < .001$).

Results for SNAP-IV measure of adult ADHD

An inspection of Table 1 indicates that the SNAP-IV measure of ADHD inattentiveness is found to be negatively correlated with the TMMS emotional clarity subscale ($r = -.48$, $p < .001$) and the TMMS emotional repair subscale ($r = -.39$, $p < .003$). Also, an inspection of Table 1 indicates that there is a negative correlation between the SNAP-IV measure of hyperactivity/impulsivity and the TMMS emotional clarity subscale ($r = -.32$, $p < .017$) and the TMMS emotional repair subscale ($r = -.34$, $p < .010$).

Results for SNAP-IV measure of adult ODD

An inspection of Table 1 indicates that the SNAP-IV measure of ODD is found to be negatively correlated with the TMMS emotional clarity subscale ($r = -.32$, $p < .019$) and the TMMS emotional repair subscale ($r = -.58$, $p < .001$).

Discussion

The purpose of the present research is to examine the affects of ADHD symptomatology on people's emotional functioning, defined in terms of emotional intelligence. The present research hypothesized that individuals who scored higher on the inattention component of ADHD would show less emotional regulation and repair and experience less private emotional preoccupation. This prediction is based on the rationale that individuals with the inattention component of ADHD experience their own emotions more intensely than those without ADHD, which could cause complications in recognizing emotions in self and others. The prediction is supported in that there was a negative correlation between the inattention component of ADHD and emotion regulation. The results are consistent with the hypotheses in that individuals who scored higher on the measure of inattention on both the ASRS and SNAP-IV reported less emotional regulation and repair. However, the prediction was not supported, in that the results show that individuals who scored

higher on the measure of inattention on both the ASRS and SNAP-IV reported no significant difference in private emotional preoccupation. As such, this research evidence supports the conclusion that individuals with the inattention component of ADHD have problems with emotional regulation and repair but show no significant difference in private emotional preoccupation.

The findings of this study imply that the inattentive and hyperactive/impulsive components of ADHD may have a detrimental impact on the clarity and repair of emotions among individuals with combined ADHD, primarily inattentive ADHD, or primarily hyperactive/impulsive ADHD. The findings also imply that there is no significant difference between the components of ADHD and private emotional awareness, private emotional monitoring, or emotional attention. This further implies that Individuals with ADHD symptomatology may direct a lot of attention to their own emotions possibly to the extent that it causes difficulties with emotional clarity and repair. Or, it may be that the difficulties confronted with emotional clarity and emotional regulation cause individuals with ADHD symptomatology to pay more attention to their emotions as to compensate for a lower than average ability in understanding and regulating their moods.

Significant inverse relationships are found for both major aspects of ADHD (i.e., inattentive and hyperactive/impulsive) and the ability to clearly understand one's own moods and the ability to regulate one's own moods. A significant inverse relationship is also found for the ADHD component hyperactivity/impulsiveness and the combined form of ADHD and one's private emotional preoccupation. Overall adults with symptoms of ADHD may experience less emotional clarity, may find it difficult to regulate their emotions, and may engage in emotional preoccupation and rumination more often than would be considered average.

The results reported in the present research are similar to the findings of Friedman et al. (2003), in that adults with ADHD show evidence of impaired social-emotional competence. The present research, for example, shows that people with greater ADHD symptomatology are more likely to experience their emotions in a less clear fashion and have difficulty regulating their moods in accordance with socially appropriate standards. The present findings are consistent with research reported by Rapport et al.

(2002), in that adults with ADHD often experience heightened emotional responsiveness and receptive deficits in their affect recognition.

Although not directly observed in this study, the implications of feeling overwhelmed seem to have an impact on individuals with ADHD symptomatology and may possibly be problematic in one's ability to regulate moods. The findings in the present study show that inattention and hyperactivity/impulsivity affect emotional repair so it would not seem unlikely that either component could directly contribute to feelings of being overwhelmed. This is consistent with the findings presented by Gohm (2003) in that individuals who feel overwhelmed (e. g., those with ADHD) may regulate their moods much quicker than others and this may in turn cause them to experience negative consequences in their interpersonal relations and in their own self-concept.

The present results have a number of important implications. In the present study adults who score higher on the ASRS and SNAP-IV measures of inattention and hyperactivity/impulsivity show that they may experience complications with the clarity and understanding of their own and/or others emotions and with the regulation of their own emotions. Problems with emotional intelligence may cause complications in an individual's ability to function in society. Such problems could also contribute to disruptions in their interpersonal relationships and/or their intrapersonal understanding.

Considering the social and personal ramifications these complications may have, more research needs to be conducted on ADHD and its effects on emotional intelligence. Also, since these functional/emotional impairments affect society and peoples own self concept in a less desirable fashion, there needs to be greater social consideration, acknowledgement, and awareness of these complications. The ability to comprehend and to understand the impact that ADHD has on emotional intelligence will influence and improve individual and societal understanding. By finding ways to properly handle specific symptoms of ADHD society will be better able to accommodate the needs of those with ADHD in educational settings, work settings, and in parenting.

Several limitations about the present research need to be mentioned. The present study is limited by a small sample size consisting of undergraduates at a small Midwestern college. In addition, most of the participants

are relatively young and consist of Caucasian Americans. The present research represents a preliminary step in the direction of studying adult ADHD and the potential affects that this disorder may have on emotional intelligence.

Future research may want to examine the impact personality disorders have on emotional intelligence. The most important aspect of the present research was how ADHD affects emotional intelligence. Within this study it is noticed that adults with ADHD may commonly be misdiagnosed with a personality disorder. Future research in regards to personality disorders and emotional intelligence may lead to a better understanding of this disorder and the affects it has on emotional intelligence.

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Table 1

Correlations between the Measures of Adult ADHD/ODD and both the Multidimensional Emotional Awareness Questionnaire (MEAQ) and Trait Meta-Mood Scale (TMMS) Among University Students in a subclinical setting

Adult ADHD and ODD	MEAQ			TMMS		
	PEA	PEP	PEM	EC	EA	ER
ASRS:						
Inattention (I)	-.09	.23	-.05	-.51[d]	-.07	-.44[d]
Hyperactivity/Impulsiveness (HI)	.13	.44[d]	-.05	-.37[b]	.18	-.44[d]
Total (I & HI)	.02	.37[b]	-.04	-.50[d]	.05	-.49[d]
SNAP-IV:						
Inattention (I)	-.15	.24	-.02	-.48[d]	-.03	-.39[c]
Hyperactivity/Impulsiveness (HI)	-.06	.14	-.06	-.32[a]	-.05	-.34[a]
Total (I & HI)	-.12	.21	-.04	-.45[d]	-.05	-.41[c]
SNAP-IV:						
Oppositional Defiant Disorder (ODD)	-.16	.21	.04	-.32[a]	-.25	-.58[d]

Note. N = 56. PEA = private emotional awareness. PEP = private emotional preoccupation/rumination. PEM = private emotional monitoring. EC = emotional clarity. EA = emotional attention. ER = emotional repair. ODD = operational defiant disorder. Higher scores on the measures of adult ADHD correspond to greater amounts of the symptoms associated with each instrument. Higher ODD scores correspond to greater symptomatology associated with operational defiant disorder. Higher MEAQ scores correspond to greater private emotional consciousness (PEC), private emotional preoccupation (PEP), and public emotional monitoring (PEM), respectively. Higher TMMS scores correspond to greater emotional clarity (EC), emotional attention (EA), and emotional regulation and repair (ER), respectively.

[t] $p < .10$ [a] $p < .05.$ [b] $p < .01.$ [c] $p < .005.$ [d] $p < .001.$

The Great Ape Cognitive Mind: A Fundamental Evaluation of the Evidence

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Abstract-*The purpose of this paper is to evaluate the cognitive mind of the great ape. This assessment will examine the multiple facets of ape cognition, what it consists of, and its many dimensions. The current investigation seeks to demonstrate evidence of cognition and mind. Recent primate literature will be reviewed with an interdisciplinary approach, taking into account research in anthropology, biology, ethology, primatology, and psychology. The science of studying the faculty of apes will be highlighted, and examples that suggest cognitive processes will be provided. Focusing on empirical evidence, the following cognitive abilities of great apes will be explored: complex and meaningful use of language, deception, manipulation, imagination, and understanding. Cognition and language are highly intertwined. The inferior capacity of animals to use language may in fact be a consequence of cognitive and learning limitations. After all, without the ability to think, there would be little need for language, because there would not be any ideas to communicate. Therefore, the progression of ape research and ape language research must consider the evolution of the animal mind. Examples will be used to illustrate evidence of thinking, problem solving, social interaction, and the use of social information.*

This assessment seeks to demonstrate great ape cognition. The science of studying the faculty of apes will be highlighted, and examples that suggest cognitive processes will be provided. Focusing on empirical evidence, the cognitive abilities of great apes will be explored, specifically the following: complex and meaningful use of language, deception, manipulation, imagination, and understanding. "Language and cognition are intimately related," and the "…constraints on language use by animals may be imposed by the limitations of their thought processes" (Pearce, 2008, p. 358). After all, without the capacity to think, people would have little need for a language, as they would not have any ideas to communicate (Pearce, 2008). Therefore, the progression of ape research and ape language research must consider the evolution of the animal mind. Examples will be used to illustrate evidence of thinking, problem solving, social interaction, and the use of social information. Furthermore, the study of animal behavior may provide significant contributions to other disciplines with applications to the study of human behavior and the interpretation of biological and evolutionary influences on human society. Issues of ethical treatment and animal welfare must also be considered, as well as to contend with the difficulty in addressing conservation matters.

The great apes may form a unique bridge linking humans to the natural world. They have an array of attributes which give them special significance, particularly in regards to genes, morphology and physiology, individual capacities, social organization, and behavior (Report of the World Summit on Sustainable Development, 2002). The great apes comprise four different species: the bonobo (*Pan paniscus*), the chimpanzee (*Pan troglodytes*), the gorilla (*Gorilla gorilla*), and the orangutan (*Pongo spp.*). In the wild, the bonobo is found only in the Democratic Republic of the Congo; chimpanzees are found across 21 countries in west, central, and east Africa; gorillas, divided into western and eastern gorillas, are found in ten countries from Nigeria to Uganda; and orangutans are found in Sumatra and Borneo, Indonesia (Rowe, 1996; Strier, 2007).

When attempting to assess the mind of an organism, test cognitive skills, and give evidence for cognition, one must first give an operational definition of the entity in question. For example, *intelligence* is a subjective term, and it can mean different things when applied to various situations (Shumaker & Beck, 2003).

Here, we define cognition as "…the mechanisms by which animals acquire, process, store, and act on information from the environment" (Shettleworth, 1998, p. 5). In other words, "[a]nimal cognition is concerned with explaining animal behavior on the basis of cognitive states and processes, as well as on the basis of observable variables such as stimuli and responses" (Griffin, 1992, p. 21). These mechanisms include learning, memory, perception, problem solving, planning, rule and concept formation, recognition, communication, and decision making (Rogers & Kaplan, 2004; Shettleworth, 1998).

Historical Background

Most of what is known about the mental abilities of primates has been discovered in the last half of the twentieth century (Shumaker & Beck, 2003, p. 111). The earlier accounts started with Darwin, when interest in primates became scientific. The behaviorist movement started by John Watson and continued by B.F. Skinner was quite influential in discouraging interest in subjective animal mentality and animal consciousness (Page, 1999). However, "[n]otable exceptions occurred around the turn of the nineteenth century, and each made a valuable contribution to the study of primate intelligence" (Shumaker & Beck, 2003, p. 112). At the end of the 1800s, Richard L. Garner began to explore the mental complexity, intelligence, and communication of monkeys, and although much of his research is seen as anthropomorphic today, his playback methodology for vocalizations is still commonly used (Shumaker & Beck, 2003).

In the early 1900s, Wolfgang Köhler embarked on his groundbreaking studies of chimpanzee cognition, with practical and theoretical rationale for his work. His early contributions to primatology were profound, because he "…provided the first experimental evidence to support the idea that nonhuman primates [were] capable of tool use, problem solving, planning, and insight" (Shumaker & Beck, 2003, p. 113). Köhler carefully designed studies and detailed observations and was especially interested in documenting "insight" rather than more traditional forms of learning, such as trial and error (Shumaker & Beck, 2003). Insight shows diversity in behaviors, abilities, and adaptations and denotes a more sophisticated, innovative, and efficient way of solving problems (Rumbaugh & Washburn, 2003; Shumaker & Beck, 2003, p. 134). Providing no instruction or guidance related to potential solutions, Köhler presented nine chimpanzees with a variety of experimental situations:

His most famous experiments presented the chimpanzees with out-of-reach foods that could be obtained only with the aid of a tool. The chimpanzees demonstrated a variety of different techniques for solving the problems. For foods that were suspended overhead, the apes moved boxes underneath and stacked up to three together in order to obtain the reward. In some cases, one chimpanzee would steady the boxes while another climbed to the top. Other individuals stood a tall pole underneath the food, rapidly climbing and successfully grabbing the reward as the pole fell over. If food was placed beyond reach outside their enclosures, the chimpanzees constructed and used reaching tools. The most elaborate of these was a combination of three different hollow sticks that were joined end to end to make one long tool (Shumaker & Beck, 2003, p. 113).

Having the capacity to learn and finding new ways to solve problems is essential for survival. Although the making and use of tools has often been observed in the field, it has also been verified in the laboratory, where apes have discovered new tools and have become quite skilled at using them (Pruetz & Bertolani, 2007; Wasserman & Zentall, 2006). Social learning and active teaching from mother to infant have also been documented (De Waal & Lanting, 1997; Povinelli, 2000; Shumaker & Beck, 2003; Washburn, 2007).

Later, in 1916, Robert M. Yerkes established the foundation for primatology in the United States and began his research on the behavior and cognition of great apes (Shumaker & Beck, 2003, 114). Broadening the scope of research, his studies included orangutans, gorillas, gibbons, and chimpanzees. Yerkes utilized controlled studies on ape intelligence to examine memory, perception, communication, tool use, problem solving, insight, and virtually any other relevant aspect of ape behavior. He devoted his entire career to the study and promotion of the field of primatology, and the Yerkes National Primate Research Center of Emory University was named in honor of his scientific leadership and contributions to science. (Shumaker & Beck, 2003).

However, in the last two decades, we have witnessed nothing less than a "cognitive revolution" (Page, 1999). Donald Griffin, the scientist responsible for the increasing acceptance of cognitive ethology as

a valid field of study, defines cognition as "processes by which the sensory input is transformed, reduced, elaborated…" and thinking as "attending to the animal's internal mental images or representations" (Page, 1999, p. 44). In *Animal Minds*, Griffin speaks of appropriate adaptation of complex behavior to changing circumstances, in other words, versatile behavior, conscious thinking, awareness, and ingenuity (Griffin, 1992). More importantly, he illustrates the philosophical, ethical, and scientific significance of animal consciousness.

Previous research on primate behavior and intelligence is the groundwork for today's exploration of cognitive abilities and higher learning in the larger-brained mammals. The majority of primate cognitive research has indeed focused on chimpanzees and bonobos due to possible kinship and similarities with humans. Fewer controlled observations and experiments with gorillas and orangutans are readily available, but it seems that research is expanding and progressing to other species. Modern technology has contributed greatly to the study of ape cognition (Wasserman & Zentall, 2006). The notion of animal language has inspired stories for centuries, but only in the past 100 years have lingual abilities among animals become the object of much research (Washburn, 2007). In fact, research increasingly shows great apes surpassing other nonhuman primates in their mentality, achieving abilities traditionally considered uniquely human (Barret et al., 2003; Rogers & Kaplan, 2004; Russon & Begun, 2004). Furthermore, neurobiological studies have shown that at the behavioral level, primate vocal perception actually shares many features of speech perception by humans (Ghazanfar & Hauser, 1999). Although the great apes do not anatomically have the ability to speak, as humans do, alternate forms of communication have been eagerly explored (McGrew, 2004; Zuberbühler, 2006).

Cognitive Capacities
Language, Communication, and Expression

The origin of language has long been pondered, beginning with Johann Gottfried von Herder in 1770, who believed that humans first mimicked animal sounds to communicate (Kenneally, 2007). Later, Jean-Jacques Rousseau, heavily influenced by Herder and Ètienne Bonnot, became "…a key representative of an important period in language evolution, standing at the brink of modern thought and theorizing" (Kenneally, 2007, p. 19).

Philosophers, linguists, and other thinkers have added to these theories, often arguing that "…an understanding of the faculty of language requires substantial interdisciplinary cooperation" (Hauser et al., 2002, p. 1569). In 1871, Darwin published *The Descent of Man* and claimed that "…language [was] not a true instinct" and that "…language was half art, half instinct, and he made the case that using sound to express thoughts and be understood by others was not an activity unique to humans" (Kenneally, 2007, p.21). Additionally, in the early 1960s, Noam Chomsky became infamous for his views and hot debates in the field of linguistics, claiming that "…universal grammar exists in some part of our brain in a language organ that all humans possess but no other animals have" (Kenneally, 2007, p. 25). No single grand theory of the emergence of language exists. Studying the evolution of language itself has a basic uncertainty about its validity, because there is no definitive way to answer many questions. However, "[l]earning can do what instincts cannot: it can afford creatures flexibility and problem solving" (Rumbaugh & Washburn, 2003, p. 37).

Earlier ape language studies had successfully taught chimpanzees to comprehend language, but attempts to teach them to mimic human sounds simply failed (Brown, 1975). However, Allen and Beatrice Gardner initiated an ape-language project in 1966 using American Sign Language (ASL) with Washoe, a wild-born female chimpanzee; by 1972, Washoe had a vocabulary of some 150 signs and an apparent ability to make up sentences, albeit short ones (Savage-Rumbaugh & Lewin, 1994). During the early 1970s, at the University of Oklahoma, Roger Fouts demonstrated that a three-year old chimpanzee named Booee, could recognize and name a series of objects, using the ASL system. Also, in the early 1970's, David Premack, at the University of California, Santa Barbara, taught Sarah, a female chimpanzee, to use plastic shapes as 'words' answering questions aimed to determine whether she possessed the cognitive "functional prerequisites" of language competence (i.e. negation, class concept, and characterizations of change of state) (Savage-Rumbaugh & Lewin, 1994, p. 39). Around the same time, Duane Rumbaugh began the LANA (LANguage Analogue) project at Yerkes Primate Center by inventing a computerized keyboard display of arbitrary symbols, known as lexigrams. In some cases, these special boards generate English words via computer speech production in order to explore the limits

of ape comprehension and production of a human-designed language (Hillix and Rumbaugh, 2004, p.9). Meanwhile, at the Oklahoma Primate Institute, Bill Lemmon developed his own breeding colony of apes, and Lucy, an adolescent female chimpanzee, became a subject in his cross-species rearing experiments. And in 1972, Penny Patterson at Stanford University began her lifelong experiments teaching sign language to Koko, the gorilla (Savage-Rumbaugh & Lewin, 1994; Terrace & Metcalfe, 2005).

Nevertheless, Sue Savage-Rumbaugh came along in the 1970s and made her place in history as the "…researcher who has most successfully bridged the species gap by teaching an ape to produce and understand aspects of language" (Kenneally, 2007, p. 41). Savage-Rumbaugh would ultimately work with Kanzi, a bonobo. However, for the first-generation of language-trained apes, she believed language was a one-way street and only functioned as a tool for getting what they wanted, and there was no listening (Kenneally, 2007). An important discovery was made when she further realized that apes were best taught indirectly rather than explicitly. Kanzi, as an adolescent had observed his mother in language lessons and was raised in a language-rich environment. When he spontaneously used the picture keyboard to combine symbols and communicate with Savage-Rumbaugh, telling her what he wanted her to do or what he wanted to do next, she was in disbelief that Kanzi had been learning language all along (Kenneally, 2007). This was observational learning in action (Hillix & Rumbaugh, 2004; Savage-Rumbaugh & Lewin, 1994).

Kanzi, and soon another bonobo called Panbanisha, picked up words by being regularly spoken to during feeding, grooming, and playing; having symbols on the picture keyboard pointed out to them with the spoken word; and even by watching television. Over the course of many years, the bonobos have learned to have two-, three-, and four-way conversations, converse about objects, intentions, actions, and state of mind, and comprehend spoken English, coming to understand hundreds of single words, as well as longer constructions. Even more, declare Hillix & Rumbaugh (2004):

> Kanzi has demonstrated more understanding of spoken English under controlled conditions than any other non-human animal in history. He comprehended almost exactly ¾ of over 600 sentences that he had never heard before, a percentage slightly higher than that achieved by the 2 ½-year-old child, Alia, with whom he was compared (p. 292-293).

"When Savage-Rumbaugh first said to Kanzi, 'Can you make the doggie bite the snake?' he had never heard that sentence before. Yet, he searched among the objects present until he found a toy dog and a toy snake, put the snake in the dog's mouth, and used his thumb and finger to close the dog's mouth on the snake" (Hillix & Rumbaugh, 2004, p. 10). Later, as Kanzi's language matured, Savage-Rumbaugh demonstrated that his utterances included grammar, syntax, and semanticity. Kanzi has shown great efficiency in understanding and responding to novel situations, and it also seems that his language skills have enhanced his ability to learn other skills, such as the manufacture of Oldowan-type rock tools (Savage-Rumbaugh & Lewin, 1994; Savage-Rumbaugh et al., 1998). Savage-Rumbaugh has clearly demonstrated that language can be acquired spontaneously and observationally without planned training, that comprehension precedes production and drives language acquisition, and that early exposure to language can greatly improve the level of competency attained (Segerdahl et al., 2005; Taglialatela et al., 2003).

It is also important to note that the apes were not using communication simply to obtain rewards. They were voluntarily participating in the learning and communication, they were not being deprived or punished, and they had access to food at all times.

As well as developing an aptitude for language and comprehension abilities at the level of a three- to four-year-old child, apes have demonstrated creativity in their manipulation of language (i.e. creating new words and making up new sentences in response to novel situations) (Savage-Rumbaugh et al., 1998). For instance, Lucy, a chimpanzee trained in ASL by Roger Fouts, constructed a unique combination of signs when she first encountered radishes and watermelons, for which she had no sign. Upon biting the radish, she signed "Cry hurt fruit," and she called the watermelon "candy drink" or "drink fruit" (Hillix & Rumbaugh, 2004, p. 62). The ape Sherman, who was raised in a different experiment, once rushed into the lab in order to tell the scientists inside, "Scare outdoors." Sherman had just seen a partially anesthetized ape being carried past in a stretcher.

Sherman and Austin, both chimpanzees, at the Language Research Center in Georgia, have successfully participated in groundbreaking interchimp communication experiments. In fact, they were the

first to demonstrate that chimpanzees could communicate with each other to solve problems that could not be solved without the use of symbols (Hillix & Rumbaugh, 2004). By focusing on peer communication, rather than that between experimenter and subject, the issue of human cuing was largely overcome (Great Ape Trust of Iowa, 2007). "Accordingly, Dr. Savage-Rumbaugh designed a test that would reveal whether or not a particular lexigram was functioning at a representational level" (Hillix & Rumbaugh, 2004). The testing was performed in three stages, each with a training phase and a test phase: 1) Sorting and labeling real objects; 2) Labeling photographs; and 3) Labeling lexigrams. Hillix & Rumbaugh (2004) explain:

> The test demonstrates first that the chimpanzee can use symbols to represent items not necessarily present, and second, that the chimpanzee conceptualizes and categorizes things in a way that includes use of the learned symbols (word-lexigrams) (p. 138)… Remarkably, Sherman categorized the novel lexigrams correctly on 15 of 16 trial-1 presentations, and Austin categorized them correctly on 17 of 17 trial-1 presentations. It was concluded that the chimpanzees had to refer cognitively to the specific referent of each symbol and, based on the recalled characteristics of that referent, assign it to a class of functionally related items through use of another symbol (p. 138).

Deception, Manipulation, Imagination, and Understanding

In *How Homo became sapiens: On the evolution of thinking*, Peter Gärdenfors addresses an inner world with different levels of theory of mind and distinguishes between four levels of causal understanding. He explicitly focuses on the understanding of emotions, of attention, of intentions, and of what others know. Understanding cause and effect is associated here with self-consciousness (Gärdenfors, 2006).

This line of reasoning would suggest that if an ape has the ability to recognize that her interlocutors had separate minds and that communication with them could alter their perceptions, this would indicate a level of self-awareness (Kenneally, 2007). For example, Kanzi and Panbanisha seemed to have acquired a theory of mind along with language. They could deceive, pretend, and structure their interactions around statements of planned intent:

> When Panbanisha saw her trainer remove candy from a box, replace it with a bug, and then give the box—supposedly still with candy—to Kanzi, she called her "bad"… She herself scared Kanzi when she used language to tell him there was a snake nearby, when in fact there was no snake (Kenneally, 2007, p. 47).

Like many children, Kanzi reveals an understanding of the difference between what is and what we may believe to be the case by engaging in games of pretend, many centered around imaginary food. Independent of reality, he has learned to apply language to such situations. "He pretends to eat food that is not really there, to feed others imaginary food, to hide such food, to find it, to take it from other individuals, to give it back to them, and to play chase and keep-away with an imaginary morsel" (Savage-Rumbaugh et al., 1998, p. 59). As with a real object, Kanzi remembers the location of the imaginary invisible object and the fact that he has placed it in a specific location on the floor for five to ten minutes or more. Sometimes, he even puts a piece of imaginary food on the floor and acts as if he does not notice it until someone else begins to reach for it, and then he grabs it before they can get it. Often these games begin by noting a picture of food on some object, for example, a picture, the television, and even the peach on the Georgia cars' license plates; he often pretends to eat and share bites (Savage-Rumbaugh et al., 1998). Kanzi also plays with toy chimpanzees; he carries them around, tickles them, hugs them, play-bites them, and shares food with them. Other pretend games that Kanzi engages in have to do with danger. He may pretend that a toy gorilla or a toy dog is chasing him and biting him or someone else. He also likes to wear scary monster masks and chase others while pretending to bite. Savage-Rumbaugh et al. (1998) add:

> He may also ask me to pretend to be such a monster and to chase and bite him. Occasionally, as I chase him, he will even scream, as though he is pretending to be afraid of me. When I stop in response to such screams to see if he is really afraid, he seems puzzled as to why I have stopped the game and gives no evidence of real fear at all (p. 60).

Games of pretend are not as elaborate as those seen in children, but they are engaged with enthusiasm nonetheless, and the understanding of pretense versus reality is quite evident. "Vickie, the first chimpanzee who participated in a language project, was reported to have a great time pulling an imaginary toy with an imaginary string" (Savage-Rumbaugh & Lewin, 1994, p. 276-277). Sometimes, the imaginary toy would even seem to become stuck between the wall and the toilet as she ran around the room with it. Other instances include Sherman who liked to pretend-fight with King Kong dolls, and Austin, who would use an imaginary dish and imaginary spoon to eat imaginary food. "He would carefully place the nonexistent food in his mouth and then roll it around on his lips, watching it just as though it were real food" (Savage-Rumbaugh & Lewin, 1994, p. 277).

Deception has also been recorded by multiple investigators of ape behavior (Gouzoules & Gouzoules, 2002; Griffin, 1992; Hillix & Rumbaugh, 2004; Rogers, 1997; Shettleworth, 1998; Shumaker & Beck, 2003). A classic example is that of Lucy, the chimpanzee who learned ASL beginning in 1969-70 by Roger Fouts. Lucy's use of sign language revealed several interesting phenomena. Fouts reported a case of attempted lying, involving Lucy's defecation on the rug (the translations of Lucy's signs are in capital letters) (Hillix & Rumbaugh, 2004, p. 62):

> Roger: What's this?
> Lucy: LUCY NOT KNOW.
> Roger: You do know. What's that?
> Lucy: DIRTY, DIRTY.
> Roger: Whose dirty, dirty?
> Lucy: SUE'S.
> Roger: It's not Sue's. Whose is it?
> Lucy: ROGER'S.
> Roger: No! It's not Roger's. Whose is it?
> Lucy: LUCY DIRTY, DIRTY. SORRY
>   LUCY.

Panbanisha has recently shown understanding of deception in a conversation with one of her human caretakers, in fact raising the question, as to if an ape can really know what it means to keep a secret. In this example, Panbanisha was communicating by pointing to symbols on a lexigram board, each symbol standing for a single word; Liz was talking back in English (Hillix & Rumbaugh, 2004, p. 9):

> Panbanisha: Milk, sugar.
> Liz: No, Panbanisha, I'd get in a lot of trouble

> if I gave you milk with sugar.
> Panbanisha: Give milk, sugar.
> Liz: No, Panbanisha, I'd get in a lot of trouble.
> Panbanisha: Want milk, sugar.
> Liz: No, Panbanisha, I'd get in so much trouble.
>   Here's some milk.
> Panbanisha: Milk, sugar. Secret.

Discussion

As a consequence of recognizing the cognitive abilities of the great apes, this knowledge has profound implications for moral and ethical treatment of apes, as well as importance of conservation strategies to protect our closest living relatives. "We argue that apes are sentient, feeling, sensitive-to-pain, intelligent creatures in ways not foreign to us. They have symbolic thought, basic dimensions of language, elemental numeric skills, impressive memory and planning capabilities, and other cognitive skills…[even] personalities…" (Beck et al., 2001, p. 246). Thus, human treatment of the great apes has been addressed not only for the rights of captive apes utilized in research but also for the legal rights and moral decisions about apes in the wild. Zoo education, sanctuaries for ape refugees, and laws in regards to bushmeat hunting, illegal sale and trade, and animal abuse aim to find solutions to the conservation battle facing ape populations (Beck et al., 2001). The great apes are unique creatures with complex social systems, confirmed reasoning and innovation, behavioral flexibility, mental mapping, mental time travel, emotion, traditions, and highly-developed cultures. They should be given the opportunity and respect to reach their cognitive potential and to successfully co-exist (Maestripieri, 2003; Tomasello & Call, 2005; Whiten et al., 2003). Kanzi and Panbanisha, for instance, continue to expand their linguistic world with music, art, writing, tool making, and tool using (Boesch, 2003; Fragaszy & Perry, 2003).

An overview of language research with apes during the last 50 years provides strong evidence for their use of words (manual gestures or graphic patterns) as meaningful symbols that refer to things and their qualities (temperature, color, etc.), persons or peers, activities, or as places for foods, rest, chasing, and so on (Great Ape Trust of Iowa, 2007). Apes can also comprehend new sentences with fairly complex structures. They can use language to achieve outcomes that they would otherwise not be able to achieve, for example to formulate names for new items based on novel word combinations. Apes can use manual signs

and graphic symbols to communicate about things that are not present. They can learn to communicate their needs and to fulfill one another's requests for specific tools, foods, and games, and they can integrate their language skills and apply them creatively even several years later in new contexts (Great Ape Trust of Iowa, 2007). If reared in a way similar to a human child, apes can come to understand complex human speech and its syntax (Great Ape Trust of Iowa, 2007).

Language acquisition using lexigrams is optimized if it occurs in the course of social rearing in an environment that is language structured. Ideally, this provides a running vocal narrative to the apes as infants, describing what things are, what is about to happen, and so on. This narrative should be integrated with the use of graphic symbols that are to function as words (Great Ape Trust of Iowa, 2007). Although their capacity for language is much more limited than that of humans, results show that apes can enter the world of language as a result of cross-fostering and instruction (Great Ape Trust of Iowa, 2007; Rumbaugh et al., 1998; Segerdahl et al., 2005).

Conclusion

Much research is being conducted in efforts to learn more about animal intelligence and mentality, especially that of the great ape. Being so closely related to humans, cognitive studies of apes can possibly open new avenues of learning and cognitive processes in humans. A plethora of questions exist, and the possibility for new knowledge is endless. Thus, this field is likely to thrive and continue to draw from the advances of other sciences such as cognitive, affective, and evolutionary neuroscience, neuropsychology, psycholinguistics, and other realms of comparative cognition. Perhaps, metacognition and metalinguistics can explore deeper into the cognitive ape and uncover the mystery of the animal mind. A great deal remains to be learned. Future research promises to continue to blur the boundary between the basic principles of human and animal learning, language, symbolic function, and complex behaviors (Great Ape Trust of Iowa, 2007).

Ψ

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Ψ

Psychological Predictors of Substance Use: An Examination of Depression, Self-Esteem, and Religiosity

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Abstract—*This study examined the hypothesis that depression, self-esteem, and religiosity uniquely predict specific types of substance use, with religiosity being the strongest predictor. Two hundred participants completed self-report surveys regarding self-esteem, symptoms of depression, beliefs and practices regarding religion, and how often they used various substances. The results indicated that religiosity was a significant predictor (and the strongest predictor) of both alcohol and illegal drug use while controlling for depression and self-esteem. Religiosity did not predict tobacco, prescription drug, or over-the-counter drug use. Other results showed that depression predicted unique variance in alcohol and tobacco use, whereas self-esteem predicted unique variance in prescription drug use. Implications for substance use disorder treatment programs are discussed.*

Substance use disorders have become a major problem in the last few decades and the costs are projected to rise. Substance use disorders destroy families and careers, productivity and health, and place enormous costs on individuals and societies. In 1998 alone, societal costs such as health care, productivity losses, costs related to the criminal justice system and to reducing the supply of drugs, as well as social welfare costs were $143.4 billion. Other costs incurred pertaining to police protection and incarceration was $88.9 billion (NIDA, 2001). Not only are illegal substances used, prescription and over-the-counter medications are as well.

Among college students in the United States, there is evidence that non-medical use of prescription drugs has also increased between 1993 and 2001. Abused prescription drugs include stimulants, sedatives, sleeping medications, and opiates (McCabe, West, & Wechsler, 2007). Over-the-counter drugs are abused as well. In the United States, it is estimated that between 2 and 4 million teenagers have abused over-the counter medications, with dextromethophan (found in cough suppressants) being the most typical abused over-the-counter medication (Feinburg, 2006). Individuals suffering from extreme weight control behaviors show a tendency to abuse diet pills, laxatives and diuretics (Fonseca, Ireland, & Resnick, 2002). Over-the-counter medications containing acetaminophen, acetylsalicylic acid, and codeine have been used in suicide attempts (Lo, Shalansky, Leing, Hollander, & Rabound, 2003).

Such negative outcomes have been shown to be associated with low self-esteem, and depression (Michaels, Barr, Roosa, & Knight, 2007), but there may be other correlates. Determining what uniquely predicts a person's likelihood of using specific substances would enable intervention programs to tailor their treatments to specific substance types. The current study investigates three predictors of substance use - depression, self-esteem, and religiosity - to determine if they have a unique relation to specific types of substance use.

Depression and Substance Use

In the United States, depression has become one of the greatest mental health problems (Bromberger & Costello, 1992; NIMH, 2000; Oswalt & Finkleberg,

1995), affecting more than 19 million American adults (NIMH, 2000). Every generation since WWII shows higher rates of depression (Burke, Burke, Rae, & Regier, 1991; Klerman, 1988). Depression is one of the most frequently occurring and undiagnosed health problems in the United States (NIMH, 2000). During any given month the prevalence of major depressive disorder is close to 4 percent of men and 6 percent of women, but approximately 17 percent of Americans will experience major depression in their lifetime (Ustun, 2001). Not only is depression prevalent in adults it is also steadily increasing among adolescents (Bromberger & Costello, 1992; NIMH, 2000; Oswalt & Finkleberg, 1995; Rosenthal & Schreiner, 2000).

Several studies have shown depression and substance use to be positively related and that depression, specifically, is a predictor of cigarette, alcohol, and marijuana use (Kandel, Johnson, Bird, & Camino, 1997; Wu & Anthony, 1999). Depression has been found to be a risk factor for substance use problems as well as an outcome. Substance use problems can arise from self-medicating in order to cope with depression or substance use can create neurobiological changes that increase the risk of depression (Libby, Orton, Stover, & Riggs, 2005). Instances where major depressive disorder and substance use occurred at the same time can range from 20% and 30% (Birmaher, Ryan, & Williamson, 1996). It has been well documented that common stressors place adolescents and adults at increased risk for later depression and substance use problems (Volkow, 2004). Therefore, depression is commonly associated with substance use.

Self-Esteem and Substance Use

People with high self-esteem tend to have more positive attitudes toward life in general than people with low self-esteem and studies indicate that youth who have a positive self-worth typically refrain from acting out behaviors and oppose the use of harmful substances (Michaels, Barr, Roosa, & Knight, 2007). Low self-esteem is associated with several risk behaviors such as suicide attempts, sexual promiscuousness, pregnancy, and eating disorders. In addition, adolescents with low self-esteem have been found to use a variety of substances such as tobacco, alcohol, marijuana, inhalants, and psychoactive drugs (Wild, Flisher, Bhana, & Lombard, 2004; see also Michaels, Barr, Roosa, & Knight, 2007). Kaplan (1975) proposed that adolescents who have feelings of self-rejection due to experiences within their normative peer group lose their desire to comply with conventional group norms, therefore, there is an increased likelihood to associate with delinquent peers and adopt risk behaviors that are acceptable and valued within the deviant group. Other theorists propose that substance use may be a coping mechanism for dealing with stress in individuals with low self-esteem who want to escape the negative feelings associated with low self-worth (Wild, Flisher, Bhana, & Lombard, 2004). Thus, low self-esteem is associated with risk behaviors, one of which is substance use.

The Role of Religiosity

People who believe in a higher power and find meaning in life through religion have experienced several positive outcomes including a lowered amount of substance use. Adults and adolescents who believe that religion is important are less likely to use tobacco, alcohol, and illicit drugs than individuals who do not believe that religion is important (Cotton, Zebracki, Rosenthal, Tsevat, & Drotar, 2006; Donahue & Benson, 1995; Free, 1994; Wallace & Williams, 1997). Religious activity helps lessen the desire to participate in substance use, which is known to be associated with depression and mental health problems (Kendler, Gardner, & Prescott, 1997). The avoidance of substance use is partially due to the association of religiosity with self-control and a low tolerance for deviant behavior (Walker, Ainette, Wills, & Mendoza, 2007). Although previous work has shown that the protective effects of religiosity depends on the individual's denomination (Merrill, Folsom, & Christopherson, 2005), region (Bahr, Maughan, Marcos, & Li, 1998), ethnicity (Barnes, Farrell, & Banerjee, 1994), parenting style (Farmer, Sinha, & Gill, 2008; Stewart & Bolland, 2002), and sexual orientation (Rostosky, Danner, & Riggle, 2007), most researchers have observed a direct, inverse relationship between religiosity and substance use.

Recent studies indicate that religion has a positive effect on mental health outcomes (George, 2002; Koenig, McCullogh, Larson, 2001; Mills, 2002; Thoresen & Harris, 2002). Mechanisms that have been found to account for the relationship between religion and health are positive health behaviors, social support, a sense of meaning or purpose in life, a sense of belonging, hope, compassion, locus of control, and a religious coping style that maximizes positive affect (Park, 2007). People who are more religious score lower on measures of depression and those who participated more in religious activities were less depressed (Koenig, McCullogh, & Larson, 2001). On the other hand, many studies

concerning the effects of religious beliefs on depression show that religion does not alleviate depression (Schnittker, 2001). Among whites, church attendance was associated with less depression; however, the same was not true for Blacks (Parker, Roff, Klemmack, Koenig, Baker, & Allman 2003).

There is also evidence to suggest that a religious orientation supports the development of self-esteem more than it hinders it (Williams, Francis, & Robbins, 2006). Studies have found a negative correlation between self-esteem and the rejection of Christianity (Williams, Francis, & Robbins, 2006), and participation in religious activities has been found to provide individuals with high self-esteem, the ability to thrive and grow, and fewer anti-social behaviors (Knox, Langehough, Walters, & Rowley, 1998). Having a value system that includes participation in organized religious activities may help produce positive self-esteem or may make up for low self-esteem by counteracting risk behaviors by providing positive role models and an environment that promotes abstinence from risk behaviors (Sinha, Cnaan, & Gelles, 2007).

The current study builds upon previous work by examining three predictors: depression, self-esteem, and religiosity simultaneously to determine their unique relation to substance use. In order to understand the relationship among these three predictors and specific types of substances there is a need to control for shared variance. It is possible that these predictors are redundant, but it is also possible that one will each predict specific types of substance use over the others. Other studies focus primarily on one or two substances whereas this study examines a variety of substances, legal and illegal. Also, few studies have been done to show that religion reduces the amount of mild substance use, as opposed to extreme levels of substance abuse. Thus, the hypotheses for this study are that depression, self-esteem, and religiosity will predict unique variance in substance use, with the expectation that religiosity will be the strongest predictor and that self-esteem and religiosity will be positively associated with substance use while depression will have a negative association.

Method

Participants and Procedure

Participants for this study were 200 students at a mid-sized university, who were enrolled in a psychology research methods class. The participants ranged in ages from 18 to 30. Participants registered via on online data collection system where they immediately began to answer self-report questionnaires, online, pertaining to self-esteem, religiosity, depression, and substance use. Upon completion of the surveys the participants saved their responses into the system and were debriefed.

Materials

The participants for the study filled out four self-report questionnaires regarding self-esteem, religion, depression, and substance use.

Depression. The Beck Depression Inventory (*BDI*; Beck, 1967) was used to measure depression. The BDI consists of 21 questions in which the participant circles statements that best describe their feelings. Each item includes four choices such as, "0 = I do not feel sad," "1 = I feel sad," "2 = I am sad all the time," and "3 = I am so sad or unhappy that I can't stand it" (Cronbach's alpha = .90).

Self-Esteem. The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) was used to measure global self-esteem. The Rosenberg Self-Esteem Scale consists of ten statements in which participants rate whether they agree or disagree (1 = *strongly agree*, 5 = *strongly disagree*) with each statement. Statements include items such as, "I do not have much to be proud of," "I take a positive attitude toward myself," and "I feel that I have a number of good qualities" (Cronbach's alpha = .88).

Religiosity. The scale used to measure religiosity was a sub-scale of the Personal Values Scales (Scott, 1965). The religiosity scale consisted of twelve questions and the participants were asked to rate how important (1 = not at all important, 5 = very important) each item was to them. Some examples of the questions asked were, "How important to you is being devout in one's religious faith," "Always living one's religion in his daily life," "Seeking comfort in the Bible in time of need," "Having faith in a being greater than man," and "Being an atheist" (Cronbach's alpha = .87).

Substance Use. To assess the frequency of substance use, participants were asked how often they used substances (1 = never, 5 = daily). Substances were categorized by tobacco use (cigarettes, cigars, pipe tobacco, chewing tobacco), alcohol use (beer, wine, liquor), illegal drug use (marijuana, cocaine), prescription medication use (prescription antidepressants, prescription pain medication), and over-the-counter medication use (diet pills, St. John's Wort, Tylenol/aspirin).

Results

Preliminary Analysis

To examine the association among the three predictor variables and the substance use variables, bivariate correlation analyses were conducted to compute standardized betas (see Table 1). The results showed that depression scores were positively correlated with all substance use scores. Self-esteem scores were negatively correlated with illegal drug use, prescription drug use, and over-the-counter drug use scores, but they were unrelated with alcohol use or tobacco use. Religiosity scores were negatively associated with alcohol use and illegal drug use scores, but they were unrelated to the other substance use scores. Therefore, depression appeared to be the variable that was associated the most frequently with substance use when only zero-order correlations were examined. The results also indicated that depression was negatively associated with both self-esteem and religiosity, and that self-esteem and religiosity were positively associated.

Predictors of Substance Use

To test the hypothesis that depression, self-esteem, and religiosity predict unique variance in substance use, with religiosity being the strongest predictor, a linear regression analysis was conducted with depression, self-esteem, and religiosity scores entered as the independent variables and the five substance use scores entered separately as the dependent variables (see Table 2). This analysis was used because the three predictors tend to be associated with each other, so it was important to use this form of statistical analysis to determine the unique relationship of each predictor with the various forms of substance use. The results indicated that religiosity was a significant predictor (and the strongest predictor) of both alcohol and illegal drug use scores while controlling for depression and self-esteem. Religiosity did not predict the other three types of substance use. In addition, depression scores predicted unique variance in alcohol use and tobacco use, whereas self-esteem scores predicted unique variance in prescription drug use. None of the predictors were associated with over-the-counter drug use. Therefore, the hypothesis was supported in that the three variables predicted unique variance in substance use, but they appeared to differentially predict types of substance use. Specifically, religious participation predicted less alcohol and illegal drug use

but not tobacco or prescription drug use; depression was uniquely associated with the use of alcohol and tobacco, and self-esteem was uniquely associated with the use of prescription drugs.

Discussion

The present study was conducted to determine if there was a unique relationship between specific types of substance use and depression, self-esteem, and religiosity. The hypothesis that religiosity would be the strongest predictor of substance use was supported for alcohol and illegal drugs. Individuals who reported depressive symptoms tended to use alcohol and tobacco, whereas people who had low self-esteem were more likely than others to use prescription medications on a frequent basis. These findings indicate that it may be beneficial to tailor intervention programs that target specific substances by attending to the predictor most related to that substance.

Implications

In theoretical models of intervention, religious and spiritual components to health are gaining increased acceptance (Crowther, Parker, Koenig, Larimore, & Achenbaum, 2002). The results of the current study suggest that the tendency for highly religious individuals to avoid alcohol and marijuana goes beyond religion's ability to alleviate depression and to raise one's sense of worth. This may be explained by the multiple functions that religion serves. Participation in religious activities provides a source of social support (Carothers, Borkowski, Lefever & Whitman, 2005) and a sense of purpose (Steger & Frazier, 2005), presents opportunities for prosocial activities with peers (Marsiglia, Kulis, Nieri, & Parsai, 2005), and provides some relief from the threat of harm or death (Jonas & Fischer, 2006). It also generates rules for living, which usually include avoidance of illegal or intoxicating substances (Marsiglia, et al., 2005). This last component may explain why religiosity provides some protection against alcohol and illegal drug use but not the other types of substances. The behavioral consequences of using alcohol, marijuana and cocaine are more pronounced than those of using tobacco and prescription drugs, which may make them more easily recognized as a hindrance to moral reasoning. It may be that increased attention in religious communities toward the negative outcomes of tobacco and prescription drug use would strengthen the inverse relation between religiosity and these other substances.

Despite the strong, negative association between depressive symptoms and self-esteem, these two predictors were distinctly associated with substances. Specifically, depressive symptoms were the only significant predictors of tobacco use, and self-esteem was the only significant predictor of prescription drug use. The difference between these two substances, specifically the manner through which they are obtained and the social consequences of using them, may explain why this effect occurred. First, obtaining tobacco does not require the involvement of other people; most people can purchase tobacco without the permission of someone else. Conversely, prescription drugs by definition must involve a physician's allowance to obtain them. Because low self-esteem has been linked to feelings of social exclusion (Leary, Tambor, & Terdal, 1995), the social interaction required for obtaining prescription drugs may fulfill a need for acceptance. Second, tobacco use carries with it a social stigma (Banning, 2001), whereas prescription drug use may be more easily attributed to uncontrollable causes and therefore less responsibility is ascribed to the user. Thus, using prescription drugs allows for the person low in self-esteem to fulfill their need for acceptance by engaging in self-medication that a) involves social interaction, and b) carries less social stigma than other forms of substance use. Treatment programs that target prescription drug use may consider incorporating a social acceptance component to counteract these feelings of social exclusion.

If tobacco use is a stigmatized behavior, why would individuals show a tendency to use it? Past research has shown that individuals with mild forms of depression will sometimes seek to validate their feelings of worthlessness by encouraging negative feedback from others (Swann, Wenzlaff, Krull, & Pelham, 1992; Swann, Wenzlaff, & Tafarodi, 1992) and engaging in self-handicapping behaviors (Hill, Weary, & Williams, 1986; Pettit & Joiner, 2006). The known social and physical consequences of tobacco use may provide an easy way for depressed people to verify their negative sense of self-regard, and self-sabotage their ability to have a happy and healthy lifestyle.

Limitations and Future Applications

One of the main limitations for the current study was the use of measures for religiosity, depression, and substance use that were too narrow in scope or outdated, and researchers who wish to build upon this work should consider using more up-to-date measures. Measures of religiosity should include assessment such as whether or not the participant belongs to a religious organization and if they turn to prayer when dealing with personal issues. Questions regarding nonreligious spirituality and non-Christian religiosity should be addressed as well (Walker et al., 2007). Regarding the BDI, none of the participants in our sample were above the cut-off for clinical depression, so conclusions made from these data should be applied to prevalence of depressive symptoms rather than used as a clinical diagnosis. Future researchers should employ the Beck Depression Inventory II (*BDI-II*; Beck, Steer, & Brown, 1996), which asks questions that are more compatible with the depression criteria in the Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition (DSM–IV) as well as distinguishing between cognitive-affective and somatic symptoms of depression (Whisman, Perez, & Ramel, 2000). Finally, the Composite International Diagnostic Interview Substance Abuse Module (CIDI-SAM) would be a more thorough and reliable assessment for substance use (Cottler, Robins, & Helzer, 1989). The CIDI-SAM provides information regarding alcohol and tobacco as well as nine classes of psychoactive drugs. This module can distinguish between active and remitted cases of substance use disorders. The CIDI-SAM also provides information pertaining to the age of first regular use, withdrawal symptoms, and whether or not specific physical and psychological consequences occurred.

Future applications of this research would also provide added insight by addressing some of the unanswered questions of the current study. First, the distinction between substance use and substance abuse would allow the researcher to make important distinctions, particularly in the case of prescription drugs. In addition, this study used a volunteer convenience sample that consisted only of college students, which restricts the ability to generalize these findings to people in various settings and stages of development. Future research should incorporate people from a variety of age groups and environments.

The correlational nature of this study did not allow for a test of causality. A longitudinal study, where participants are followed over time, may prove more beneficial than a cross sectional study to determine whether or not substance use increases, decreases, or remains the same when depressive symptoms have been alleviated, when self-esteem has been raised, or

when religiosity has become more salient in an individual's life. Further research is needed to determine if religious participation causes less alcohol and illegal drug use, or if the use of these substances leads to a decrease in religious participation. This is also important for the results concerning self-esteem and depression, which can just as easily be a consequence of drug use as it can be a cause of it.

Conclusion

The current study contributes to the substance use literature by showing that depression, self-esteem, and religiosity are uniquely associated with specific substances, but not necessarily all substances. The results of this study suggest that interventions, which aim to protect individuals from substance use, should be geared toward improving self-esteem, alleviating depression, or introducing religion into people's lives depending on their specific substance problem.

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Table 1

Descriptive Statistics and Correlations among the Predictor Variables and Substance Use Variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.
1. Depression	—	-.68**	-.16*	.16*	.15*	.18**	.27**	.16*
2. Self-Esteem		—	.18**	-.11	-.13*	-.11	-.32**	-.16*
3. Religiosity			—	-.20**	-.15*	-.10	.00	-.01
4. Alcohol				—	.33**	.47**	.09	.31**
5. Illegal Drugs					—	.32**	.05	-.06
6. Tobacco						—	-.01	.21**
7. Prescription Drugs							—	.27**
8. Over-the Counter Drugs								—
Mean	0.40	3.09	3.67	2.19	1.35	1.44	1.43	1.84
SD	0.38	0.49	0.80	0.84	0.93	0.59	0.78	0.50

$*p < .05, **p < .01.$

Table 2

Standardized Beta Coefficients of Depression, Self-Esteem, and Religiosity Predicting Types of Substance Use

	Dependent Variables				
	Alcohol	*Illegal Drugs*	*Tobacco*	*Prescription Drugs*	*Over-The-Counter*
Depression	.14*	.10	.20*	.10	.10
Self-Esteem	.02	-.05	.05	-.27**	-.10
Religiosity	-.18*	-.12*	-.07	.06	.02

$*p < .05, **p < .01$

The Tone-Range Rectangle as a Memory Cue: An Investigation of SymTone, a Bimanual Image Manipulation Program

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Abstract—*SymTone is a bimanual (two-handed) symmetric image manipulation program that allows users to manipulate photographs using two USB mice, which control a rectangle adjustment tool referred to as the Tone-Range rectangle. In this study, the use of this rectangle as a spatial memory cue was examined through a image manipulation and reproduction experiment. Participants will manipulate and recall digital images either with or without the Tone-Range rectangle. It was found that participants reproduced their images more accurately when the rectangle was present. There were no significant differences in time to reproduce or in the number of explorations between the modes. These results lead the researchers to believe that the Tone-Range rectangle acts as a memory cue. This opens the door for further research on the Tone-Range rectangle and other components of SymTone that facilitate photo editing.*

SymTone is a dual-mouse, symmetric image manipulation computer program that allows users to manipulate digital images using two standard USB mice. This program allows users to use their right and left hands simultaneously to manipulate images on their computer. The two mice cursors work together to control the input and output tone value ranges (the darkness or lightness of the image). The input tone determines the initial tone level, while the output tones determine the range these tones can be mapped onto. The same input and output tone ranges can be manipulated on a program such as Adobe Photoshop, but only through a complicated process involving several levels tools, making this program inaccessible to the novice user. SymTone offers a substantially more user-friendly method. As the two cursors are clicked by the user, they form a rectangle which controls the input ranges of the image through its width and horizontal position and output ranges of the image through its height and vertical position. The input and output tone ranges then interact and allow the user to simultaneously control image brightness, contrast, and tone salience. Thus, a two-handed, symmetrical (meaning the two hands are working together) technique such as this is intended to be more convenient and user-friendly than tools in complex photo manipulation programs such as Adobe Photoshop.

Two-handed computerized techniques have been found to provide more efficiency when completing a computerized task. In 1986, Buxton and Myers found that participants using a two-handed controller technique out-performed participants using a one-handed controller technique on the same task. There was also a less of a difference in performance between two-handed technique experts and novices than there was between one-handed technique experts and novices. These results indicate that bimanual techniques provide ease of use and efficiency to all users. Similarly, in a recent

NASA Task Load Index (TLX)—a workload assessment tool—survey of SymTone, participants reported this program as being less frustrating, requiring less effort, and being less temporally, physically, and mentally demanding than single mouse and asymmetrical dual-mouse photo manipulation approaches (Latulipe, Bell, Clarke, & Kaplan, 2006).

The ToneZone, or Tone-Range rectangle, was added to SymTone to even further decrease participant frustration and mental demand. The rectangle, displayed as a thickly dotted green line, serves as a reference point for the input and output ranges of the image being manipulated. A screenshot of SymTone with the Tone-Range rectangle being utilized can be seen in Figure 1. Interestingly enough, this rectangle is not necessary for the functioning of SymTone; the left and right cursors, when clicked, control the input and outputs (and thus, the color, contrast, salience, etc. of the image). The rectangle was added purely as a navigation tool for users. The necessity for such a navigation tool is recommended by Balakrishnan and Hinkley (2000) who, in an early study of a bimanual computer interaction program, found that the use of the different cursors divided the user's attention and did not provide an adequate visual field on which the users could focus, resulting in poorer performance. The tone range rectangle was devised to act as a navigation tool to allow users to more easily control two cursors.

It is possible that the Tone-Range rectangle serves as more than a simple navigation tool. It is postulated that this rectangle serves as a visual memory cue for individuals using this program. When experimenting with image manipulation, users may decide, after some time, to return to a particular input/output level that produced a desirable image. It is plausible that the tone range rectangle may assist a user's spatial memory and allow them to find the desired image more effectively and efficiently.

A considerable amount of research supports this theory. In Umea, and Garling's 1987 study of memory for two-dimensional spatial location, the researchers found, through presenting young adults with several locations to remember either with or without reference points, that the presence of reference points increased memory precision. These reference points also served as effective recognition cues for recalling locations later in the experiment. The researchers concluded that the presence of visual reference points allow the individual to more effectively recall spatial location. Similarly, Plumert and Hund (2001) found similar results in test of the effects of spatial prototypes on estimates of item location. They had adults and children learn placements of dots in two modes, one where lines divided the space and one where the space was undivided. When participants were asked to recollect the dots, the lines were removed. These researchers found that the presence of definite boundaries correlated with increased accuracy of spatial memory. These results are similar to the findings of Laurence, Thomas, Newman, Kaszniak, Nadel, and Jacobs (2002), who examined visual memory in relation to age through a series of computer-generated spatial memory tests. They discovered that younger participants (aged 22 through 29), as compared to the older participants (aged 64 through 81) excelled in the experiment when a spatial memory cue was present to aid them in the memory task.

The impact of visual reference points and recognition cues have been also been examined in computer programs. In a recent study of a user interface designed specifically to facilitate data retrieval using spatial memory, Data Mountain, Robertson, Czerwinski, Larson, Robbins, Thiel, and van Dantzich (1998) compared Data Mountain to a standard Microsoft Internet Explorer (IE4) Favorites data retrieval program. They found that participants demonstrated a faster reaction time, fewer failed trials, and fewer incorrect retrievals when using Data Mountain than the standard IE4 program. These results suggest that the spatial recognition cues provided by the Data Mountain program offers a more efficient alternative to current retrieval programs.

Cockburn and McKenzie (2003) tested digital and physical prototypes similar to Data Mountain, comparing the effectiveness of this three-dimensional model of spatial memory with a two-dimensional model

of spatial memory. Unlike the findings of Jones and Davis (1986), who, comparing the effects of spatial metaphors in two and three-dimensional conditions, discovered that participants in a three-dimensional environment had a higher rate of recall than participants in the two-dimensional environment, Cockburn and McKenzie found no signs of superiority of the 3-D model. In fact, they found that participants using the physical 2-D model performed better than participants using the physical 3-D model. These results bode well for SymTone, which operates in a 2-D environment. Even In a 3-D environment, however, researchers Hinkley, Pausch and Proffitt (1997) found that a two-handed technique yielded more accuracy than a one-handed technique in a computerized memory task where participants were instructed to, with eyes closed, use hand controllers to re-plate a digital image on the computer screen.

Based on the aforementioned research, we propose that the Tone-Range rectangle serves operates as more than a simple navigation tool, but rather as a reference point and memory cue for users. Thus, the aim of this study was to determine if the rectangle possesses any memory cue capabilities through participant manipulation and replication of digital images using SymTone both with and without the aid of the Tone-Range rectangle. As the presence of a reference point or memory cue has been shown to increase participant accuracy in memory tasks (Cockburn and McKenzie, 2003; Hinkley, Pausch and Proffitt, 1997; Plumert and Hund, 2001; Robertson, et al., 1998; Umea, and Garling, 1987), we hypothesized that participants would reproduce their manipulated images more accurately when the Tone-Range rectangle was present than when it was absent. Also, as the presence of a reference point of memory cue has been shown to decrease the amount of time taken by the participant to complete a task (Robertson et al., 1998), we hypothesized that participants would reproduce their manipulated images more quickly when the Tone-Range rectangle was present than when it was absent.

Method

Participants

Twenty-nine undergraduate students, 18 females and 11 males, from a large southeastern university participated in this study. Participants were recruited through the undergraduate Psychology Participant Pool and were compensated for their participation by being awarded extra credit. Seventy-five percent of the participants were between the ages of 18 and 21. Sixty-eight percent of participants reported their computer skill level as "intermediate," while 27% considered themselves to be a "beginner." Only one participant reported as having an "advanced" computer skill level. The only eligibility limitation in this study was that no participants could be left-handed, a common practice in bimanual interface research, based on the observation of the advising faculty member and colleagues that left-handed users are highly variant in their pointing device usage. While students were required to be 18 to participate, no limitations were put in place for gender or race.

Materials

Timbuktu Pro is a program that allows users at one computer to observe and/or control another computer with Timbuktu software over a network such as the Internet. The Human-Computer Interaction lab at the University of North Carolina at Charlotte has a multi-platform license for Timbuktu that allows users sitting at a Windows PC to observe and/or control an Apple computer. This program was used to observe participants from an unobtrusive distance as they manipulated images using SymTone. Also, this program allowed for observation of Macintosh computers, upon which SymTone runs exclusively (*Netopia: Timbuktu Pro Remote Control Software*, 2009).

Morae is a usability recording and analysis tool that records user interactions on a Windows PC. Morae can record audio and video of a user through a webcam. In addition, Morae can record the screen, keyboard presses, mouse movements, and mouse clicks. Morae synchronizes this data in a way that can be easily viewed, much like a movie, by a researcher. The

viewing feature includes many helpful options for the researcher, including annotation options through flags and notes, the ability to create video clips of computer interactions, and picture-in-picture video of the user (*Morae Usability Software*). Morae was used in combination with Timbuktu Pro (as Morae does not run on Macintosh computers) to record participant actions through both webcam and the computer. These results were analyzed when later compiling the data.

Procedure

Two participants were able complete the experiment at one time, but were seated at individual computers and visually blocked from each other to facilitate individual work. Participants were told that they could adjust the screen on the computer to an angle that best suited them. Laptops were arranged at approximately the same distance from each participant's chair, but participants were allowed to lean forward to better see the screen. After signing the consent and audio/video release forms, all participants watched a short instructional PowerPoint on the methodology of the study and how to use SymTone. During this study, participants manipulated images in two modes—one in which the Tone-Range rectangle was constantly present and one in which the Tone-Range rectangle was constantly absent. Mode order was randomly assigned. Participants were presented with a digital image and instructed to engage in image manipulation with SymTone. After exploring for thirty seconds, the participant was instructed to continue exploring and save the image configuration they preferred the most. After doing so, they were presented with another image and instructed to do the same task. After saving six configurations (with the first image acting as a practice round), the participants were briefly re-shown their manipulated configuration for five seconds. Participants were then presented with an unaltered version of each image that they previously manipulated, with the instructions to use SymTone to re-manipulate the image so as to reproduce their original edited versions. Participants were first presented with the initial image they manipulated and continued re-manipulating images sequentially until they reproduced, to the best of their

ability, all six saved images. After completing each reproduction, participants were shown the time they took to reproduce the image as well as a letter grade (e.g. "A," "B," etc.) scoring their accuracy after reproducing each image. After manipulating all six images, participants completed a NASA-TLX survey. Participants then repeated the same task in the second mode, with the NASA-TLX survey following.

Results

Data were compiled and analyzed using the JMP statistical package. A one-way analysis of variance (ANOVA) was used, with accuracy of reproduction (as measured by distance between the original cursor coordinates and the replication cursor coordinates) and amount of time (measured in seconds) taken to reproduce were the dependent variables examined. The first hypothesis was supported, as participants reproduced their manipulated images more accurately in the mode in which the Tone-Range rectangle was present than in the mode in which the rectangle was absent, $M = 15.12$, $SD = 14.56$; $M = 25.57$, $SD = 16.29$, $F(1, 249.4) = 33.6$, $p < .01$. The accuracy levels for the mode in which the rectangle was present maintained at an almost constant level between the first, $M = 15.61$, $SD = 2.16$, and second trials, $M = 14.97$, $SD = 2.10$, while the accuracy levels for the mode in which the rectangle was absent rose considerably between first, $M = 30.18$, $SD = 2.08$, and second trials, $M = 20.50$, $SD = 2.16$. This trend, however, was not significant, $F(1, 26.84) = 3.38$, $p = 0.077$, and participants still demonstrated significantly more accuracy when the rectangle was present, regardless of mode order, $M = 17.74$, $SD = 1.51$; $M = 22.89$, $SD = 1.50$; $F(1, 249.4) = 8.85$, $p < .01$.

The second hypothesis was not supported. There was no significant difference between the amount of time it took participants to reproduce their original image when using the mode in which the Tone-Range rectangle was always present and the mode in which the rectangle was absent, $M = 11.67$, $SD = 6.52$; $M = 13.15$, $SD = 6.05$, $F(1, 247.8) = 0.447$, $p = 0.504$.

Exploration, meaning the number of unique image configurations discovered by the participant, was

also examined. Interestingly, there was no significant difference in exploration between the mode in which the Tone-Range rectangle was present and the mode in which the rectangle was not present, $M = 1077$, $SD = 491.89$; $M = 1066$, $SD = 493.31$; $F(1, 247.6) = 0.07$, $p = 0.79$, meaning that the presence of the rectangle did not influence the participant's ability to find new images. This is an unusual finding for a bi-modal study and will be discussed further in the following section. In addition to exploration, gender differences were examined. Gender effects were minimal, although there was a significant tendency for males to reproduce their images more accurately than females, $M = 20.43$, $SD = 2.55$; $M = 25.39$, $SD = 2.09$, $F(1, 25.08) = 5.1$, $p = 0.033$.

Discussion

As predicted, participants reproduced their manipulated images with more accuracy when the Tone-Range rectangle was present than when it was absent. These results are important for SymTone and the Tone-Range rectangle in general. The increased accuracy shown by the participants indicates that the Tone-Range rectangle does, to some extent, aid the user in re-locating and reproducing their original image configuration. The bright green, dotted rectangle was, more than likely, easier to remember when superimposed on an image than two small cursors, making the reproduction substantially easier.

This increased accuracy paired with the presence of the Tone-Range rectangle was seen regardless of mode order; participants tended to reproduce their images with less accuracy when the Tone-Range rectangle was absent regardless of the mode in which the rectangle was absent. Participants showed increased accuracy when completing the task in the rectangle-absent mode after completing the task with the rectangle present in the initial trial, but still showed significantly greater accuracy when the rectangle was present, regardless of the trial.

The fact that there was a substantial improvement in accuracy between first and second trial use of the rectangle-absent mode while the rectangle mode maintained the same level of higher accuracy

between trials is an interesting finding. As participants showed increased accuracy when completing the task without the rectangle after using the Tone-Range rectangle in the previous trial, it could be inferred that the exposure to such a tool could help the participants develop strategies as they reproduce their manipulated image. For example, the participant might picture the rectangle in his or her mind while manipulating images without the rectangle; perhaps even this imaginary rectangle can make the image recall task easier. This further supports the idea of the Tone-Range rectangle serving as both a memory cue and a navigation aid.

Contrary to the second hypothesis, participants did not reproduce their manipulated images in significantly less time when the rectangle was present than when it was absent. While participants reproduced their images slightly faster in the mode in which the Tone-Range rectangle was present, the difference was only by an average of a few seconds; this was not enough of a difference to be statistically significant. This indicates that the absence of the Tone-Range rectangle did not impede on a user's performance so much as to cause a decrease in efficiency, or that the presence of the rectangle was helpful in locating an accurate replication, but not helpful enough to do so quickly. It should be noted, however, that the sample size was only 29; a larger sample size may yield a statistically significant difference in time.

Another possible explanation for this lack of difference in time could be the result of participant belief that the experiment required them to reproduce their original image as quickly as possible. This belief was most likely reinforced by the report of their time that was shown to them after they reproduced each image. Participants may have struggled to finish quickly, thus resulting in similar completion times between modes, but may have sacrificed accuracy, especially in the mode without the Tone-Range rectangle present, in order to complete the tasks quickly. This is something that needs to be taken into consideration in future research. In further studies, perhaps the time to reproduce should not be reported to the participant after each reproduction, or participants should be instructed to take as long as

they needed to reproduce the image.

In addition to the lack of impact on time, there was not a significant difference in number of exploration between modes. In fact, the exploration numbers for each mode are extremely similar, which, in a bi-modal experiment such as this, is rare. It is very possible that these findings are the result of the small sample size or the similarities in recall time between the two modes— if one does not spend more or less time in either mode, it stands to reason that the exploration would be similar. Nevertheless, these findings contradict a basic assumption of the researchers when planning this study. The Tone-Range rectangle was originally included in SymTone to serve as a motor control aid and focal point, as it was thought that the absence of such a focal point would cause too much of a division in the user's attention, resulting in poorer performance. However, the similarities in both exploration and time regardless of the presence or absence of the rectangle might indicate that the main benefit of the tone-range rectangle is not a focal point or motor control tool, as was originally thought. The fact that the only significant difference in participant performance between the two modes was accuracy indicates that the tone-range rectangle has distinct memory cue capabilities.

It is evident that the Tone-Range rectangle serves as a useful tool for users, helping them reproduce and re-find a particular image configuration and serving as a navigation tool. While the results of this study provide some support for the notion that the rectangle may possess memory cue capabilities, more research is needed to more concretely support this claim, especially in regards to the time hypothesis. Another study with more relaxed time constraints is needed to determine whether or not the Tone Range rectangle allows users to recall image configurations quickly, or if it simply aids with accuracy and navigation.

Nonetheless, the Tone-Range rectangle tool adds to the user's SymTone experience and allows them to conveniently and accurately re-find and reproduce digital image configurations. With further research, SymTone, with the help of the Tone-Range rectangle, can substantially increase the degree of use and enjoyment a novice user can find in a digital image manipulation computer program.

Figure 1—SymTone and the Tone-Range Rectangle

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The Focus Factor: How Suggestibility Influences Levels of Focus

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Abstract—*The goal of this project was to test different variables relating to focus and concentration. An experimental group was told that a certain drink had been developed to help students increase their level of focus when studying. The reason behind this effort was to note if suggestibility had an effect on the level of focus reported by participants in the experimental group when compared against participants in a control group. The hypothesis stated: students experiencing the placebo drink (experimental group) will report higher levels of focus and concentration when compared against the group of students who were not exposed to the placebo treatment. All participants were asked to read a paragraph and answer a short survey relating to the passage and how well they were able to concentrate. Once all 30 participants completed the survey their results were scored and put through a series of statistical test. After analyzing the results it was concluded that the hypothesis was supported. Participant who drank the placebo drink reported better levels of focus and concentration when compared against the control group. The variable of suggestibility should continue to be researched for future studies to examine other possible relationships.*

It can be a difficult task for college students to keep up with their long list of multiple assignments and lengthy exams. In fact some students have even doubted themselves at times and have searched for better methods to help with adjusting to the college workload. College students have often claimed that they feel like they need the help of some medication to assist with focus and concentration.

Some students who have reported these claims have been diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD). ADHD affects about 3-5 percent of the population and manifests itself with symptoms such as hyperactivity, forgetfulness, poor impulse control, and distractibility (Wadsworth & Harper, 2007). If this were the case, then it would be easy to see why college students are having such difficulties with focusing and studying for class. However, the symptoms of ADHD are very general and as a result many students think they have ADHD when in actuality they do not. ADHD doesn't affect everyone and some students claim they have ADHD just so they can get prescribed medications that help them in the area of concentration. Basically this means students are looking for the easy way out and instead of putting time and energy into studying, they simply swallow a pill and hope they will perform well on the current midterm coming up. The problem with this is that it is a waste of resources as well as creates a dependency and students actually believe that if they do not take these pills then they will do poorly in school (Buitelaar, 2007). This develops false reasoning and in some cases students do not even attempt to study unless they have the proper medication. Students have stopped working hard for grades and instead are abusing medication in hopes to prepare for assignments. Is there perhaps a method students could be taught to help control their own focus and concentration levels without relying on medications to do it for them?

There have been several studies on biofeedback training. Biofeedback training is a form of complementary and alternative medicine that involves measuring a subject's bodily process, such as blood pressure, heart rate, and skin temperature (Linden & Moseley, 2006). During these studies individuals have actually been trained to control the rate of their heart and have the ability to lower or raise their blood pressure (Linden & Moseley, 2006). If individuals can be trained to control their heart and blood pressure could one be trained to control other systems of the body as well?

Could an individual be trained to control levels of focus?

Another point of interest would be to examine studies that have involved placebos. A placebo is a medicine that is pharmacologically inert, but may have a desired medical effect based solely on the power of suggestion (Kradin, 2004). Placebos can have a powerful affect on an individual (Bootzin & Baily, 2005). Link and Haggard (2006) examined this effect by giving a group of students a placebo that was said to enhance cognitive performance. This experimental group was compared against a control group who received the same placebo drug, but this time they were told that it was an actual placebo and that it didn't bestow the power of cognitive enhancement. Interestingly enough participants who believed they ingested the special cognitive pill reported that they experienced significantly more symptoms than those who believed they received the placebo (Link & Haggard, 2006). These results suggest that belief concerning a certain treatment can actually affect the symptoms of a particular drug (Link & Haggard, 2006). Could an individual subconsciously raise their level of focus and concentration if they believe a certain placebo medicine or beverage has the power to enhance their cognitive abilities? This study will answer this research question.

To build on past research, this project will be based on the suggestibility of students as well as the effects of a particular placebo. The students will be told a certain drink (placebo) has the ability to enhance levels of focus and concentration. The results will be compared against a control group that will not experience the drink. The hypothesis is the students who drink the placebo drink will report higher levels of focus when compared to students who are not exposed to the placebo drink.

If concluded significantly students might be able to rediscover self-confidence in their ability to focus on a particular task. Significant results could also help lower the number of students who seek the help of prescribed medication (e.g, Adderall) that may have undesirable side effects that may include aggression, abnormal behaviors, growth suppression, and even mania (Shillington & Reed, 2006).

Methods

Participants

There were 30 participants for this particular study and all were students from the University of North Carolina at Charlotte that were over the age of 18. The participants were gathered from an online subject pool consisting of students enrolled in an introduction to psychology course. The participants were informed that the research project was being used to collect data on focus levels among college students. All personal information regarding the participants was kept confidential.

Design

This particular project used an experimental between-subject design. The independent variable was if the participant received a placebo or not. This caused the independent variable to have only two levels: Placebo or No Placebo. The dependent variable of the study was the level of focus participants reported.

Materials

A scale was developed by the researcher for this study that would measure the level of focus from a participant. The scale developed was called the Focus Measure Scale (FMS) and it contains nine questions that pertain to a person's level of focus after reading a paragraph. The nine questions from the Focus Measure Scale provide the participant with five possible responses: 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, and 5 – Strongly Agree. A score of 45 would indicate that the participant had a lot of difficulty when it came to concentrating on the reading and the paragraph. A score of 9 would indicate that the participant had no trouble at all and was able to make it through the reading with very little or no distractions.

The paragraph used in this study was an excerpt taken from the book, "Tale of Two Cities". This paragraph was chosen in no particular fashion, but was needed to provide participants with a reading task so that their level of focus could be measured and scored.

The placebo for this study was grape flavored water drink from the company, Dasani. The label of the drink reported that it contained purified water with zero caffeine and no trace minerals or vitamins. Each participant in the experimental group was told that the beverage was a special drink used to increase levels of focus among students. In order for the drink to be effective participants were told they have to consume at least 8oz of the water before they read the paragraph. If the participant was in the control group this step was skipped and the participant went directly into reading the paragraph after being told the assignment would be used to measure their concentration.

Procedure

After informed consent was received from each participant involved they were instructed to read

a short paragraph and then complete a survey (to the best of their ability) that contained the Focus Measure Scale. The participants were given as much time as needed to complete the task. Before reading the paragraph, participants that fell into the Placebo group were instructed to partake in an energy drink that they believed heightened their level of focus. More specifically they were told: "To help reduce the risk of students abusing prescribed drugs to assist in studying habits a certain company has developed a water based drink that would be absorbed instantly by the body and help increase levels of focus and concentration after consuming only 8oz without any serious or long term effects." If not in the Placebo group this step was skipped and the participant went directly into the reading task and then on to complete the Focus Measure Scale. The scale contained 9 items that were set to measure the participant's level of focus. The participants were asked to respond honestly and circle the best corresponding answer. The responses were kept anonymous to protect the confidentiality of the participant. After the survey was completed patients underwent a debriefing sessions in which the true nature of the placebo was revealed along with the intentions of the project.

Results

An independent t-test was done to conclude if the scores reported on the focus survey was due to the suggestibility of the placebo, $t(28) = 2.56$, $p = .016$. The variables were concluded statistically significant. The Mean for the Placebo group's score on the Focus Measure was 18.86. The Mean for the control group's score on the Focus Measure was 23.81. The Standard Deviation for the placebo group was 5.489. The Standard Deviation for the control group was 5.089. The Cronbach's Alpha (Scale Reliability) for the Focus Measure Survey was .879. The self developed Focus Measure Survey had a very strong reliability rating. The hypothesis was supported. The level of focus reported after reading the given paragraph depended on whether the participant received the placebo that were told would increase their level of focus when compared against the control group who only read the paragraph and filled out the focus survey.

Discussion

The purpose of this research project was to make a connection between focus and suggestibility. If shown to positively affect one another, a student could learn to better prepare their mind when studying and reading for assignments instead of participating in harmful use of mood enhancing drugs such as Adderall. There currently was no scale that measured focus levels, however a brief nine question survey was developed by the researcher to record levels of focus reported by participants after engaging in the task of reading. This developed survey was found to be strongly reliable. The results were found to be significant which meant that the hypothesis was supported.

The results of this research project share common characteristics with Link and Haggard (2006) study that informed participants after ingesting a special cognitive pill they might experience certain undesirable consequences. Even though the cognitive pill was just a placebo participants still reported more symptoms then the control group. The same results were experienced when it was discovered that participants who thought a certain drink would increase their focus reported a higher level of focus when compared against the group that didn't partake in the beverage. This study has shown that students are very susceptible to drugs to improve memory.

Even though the results of this particular project were significant there still were some limitations. Due to a lack of activity from subject pools this studied was only able to gather a sample size of 30 participants. Future research should be done with a larger sample size if possible. Also one has to consider if consuming water helped levels of focus and not suggestibility in this study. Future research should explore this by duplicating the study by designing the experimental and control groups to both consume the water before beginning the reading assignment. Future studies should also attempt to duplicate the results by presenting a mathematical assignment to explore if the hypothesis would remain supported if a subject outside of reading were introduced.

In conclusion this study has shown that suggestibility and placebos helped the students in the experimental group concentrate better on the given reading assignment. If similar studies produce similar results then suggestibility and placebos could be explored in the school systems as a way to help increase levels of concentration among students and help decrease the number of students who abuse prescription medications and other drugs.

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