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## From the Editor's Desk

As spring approaches for most of us in the country, we are pleased to present the newest edition of JPI. The articles within these pages represent some of the best and brightest undergraduate minds within the field of psychology. In this issue, you will find articles covering many relevant topics within psychology today.

and that you all enjoy this time of year!

Best regards,

Jenn Bonds-Raacke and John Raacke  
Managing Editors

Just as we indicated in the last issue, this is an exciting time for JPI. The last year and a half for JPI has seen a significant increase in submissions. We have been working hard to respond to this increase and are excited about the possibilities for the journal. In short, undergraduate research is alive and well in psychology! Given this increase, we are faced with an ever increasing need for reviewers. If you are willing to serve in this role and/or know of someone who is, please contact Jennifer (jmbondsraacke@fhsu.edu), John (jdraacke@fhsu.edu) or one of the Associate Editors at your earliest convenience!

Lastly, we want to draw your attention to one of the unique features of JPI, The Elizabeth A. Dahl, Ph.D., Award for Excellence in Undergraduate Research. This award recognizes one article which is deemed to distinguish itself in undergraduate research in each issue. The award was created to celebrate the distinguished contributions of Dr. Dahl, who for 25 years as faculty member and chair of the Psychology Department at Creighton University, challenged, guided, and supported numerous undergraduate students in the design and execution of research, and the scholarly communication of results.

To all readers, please know that we welcome communication on suggestions for new ideas and look forward to working with each of you in the future. We close with hope that your spring is productive

## **Acknowledgement: Reviewers**

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The following individuals reviewed manuscripts for this volume of the *Journal of Psychological Inquiry*. We gratefully acknowledge their valuable contributions to the journal.

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Avila University	Newman University
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Kansas State University	University of San Diego
Missouri Western State University	Webster University—St. Louis
Morningside College	Washburn University
Nebraska Wesleyan University	
Association for Psychological and Educational Research in Kansas	Nebraska Psychological Society

**Cover:**

**Logo:** The creation of the graphic for the logo came about by thinking of how ideas are formed and what the process would look like if we could see into our brains. The sphere represents the brain, and the grey matter inside consists of all the thoughts in various stages of development. And finally, the white spotlight is one idea that formed into a reality to voice. The entire logo is an example of creation in the earliest stages.

Cathy Solarana, Graphic Designer

**Cover Design:** The overall design was influenced by many aspects of psychology. Much of the inspiration was developed through the use of the iconic symbol for psychology as well as the beauty of psychology in its own right.

Brittney Funk, Graphic Designer

## A New Explanation of Choice Blindness in Terms of Visual Short-Term Memory

Heather B. Downs & Kenith V. Sobel \*  
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**Abstract**—In the change blindness paradigm, participants' external surroundings are changed and they typically fail to notice the change. Johansson, Hall, Sikstrom, and Olsson (2005) wondered if participants would notice changes to their internal states, specifically the choices they make. Participants viewed two images of faces presented simultaneously and indicated which they considered to be the more attractive. After the experimenter handed them the selected image, participants described the reasons for their selection. On some trials, the experimenter switched the images but most participants failed to notice the switch. In fact, the participants even described the reasons for selecting the presented image even though it was the image judged to be less attractive. The authors called this effect choice blindness. We thought that participants might not be blind to their choices but instead the simultaneous presentation eliminated the need to load the images in visual short-term memory. With this in mind, we examined how the presentation method of the images would affect the likelihood of choice blindness, and found that more participants noticed the switch if images were presented sequentially than if they were presented simultaneously. This result supports an account of choice blindness in which participants do not notice switches when there is no memory trace to clash with the presented image.

*Keywords:* choice blindness, short-term memory, attractiveness, change blindness

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People make choices all the time, such as taking their eggs scrambled or over easy, wearing a jacket or a pullover, or walking rather than driving to class. It is reasonable to expect that after making a decision, people know why they made it and can describe the reasons. Nevertheless, a provocative paper by Johansson, Hall, Sikstrom, and Olsson (2005) suggested that when asked to justify their decisions, people often don't know the reasons and merely fabricate a rationale. The current study was inspired by previous research examining a phenomenon called change blindness (Johansson, Hall, & Sikstrom, 2008). In one well-known change blindness study (Simons & Levin, 1998), an experimenter acted as if lost and asked a passerby for directions. Just after the participant began providing directions, a pair of (seemingly rude) men carrying a door walked between the experimenter and the participant. While hidden from the participant by the door, one of the door carriers switched

places with the man that had originally asked for directions. After the door carriers continued on their way, surprisingly few of the participants noticed they were then talking to a completely different person and most continued giving directions as if nothing was wrong. In this and other change blindness studies, some aspect of the participant's environment changed. Johansson et al. (2005) wondered if they could change something internal to the participants: the very choices they make. In other words, can internally generated choices be changed without people noticing?

To interfere with a person's choices, Johansson et al. (2005) developed a simple sleight of hand technique. In their study, the experimenter successively presented 15 pairs of faces to participants. For each pair, participants were asked to choose the face they considered to be the more attractive of the two. After the participants' decision, the experimenters handed the selected image

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to the participants and asked them to describe why they had chosen it. On some trials, the experimenter switched the images so that the participants were given the image they had judged as *less* attractive. Intriguingly, in only 26% of the switch trials did participants notice the change. For the other 74% of the switch trials, participants were happy to devise a reason why they chose the presented image, even though it was not the image they had originally chosen. Researchers coined the term choice blindness (CB) to denote the inability to notice a change in a choice, as indicated by the willingness to justify it (Johansson et al., 2005; Johansson, Hall, Sikstrom, Tarning, & Lind, 2006).

Although the willingness to mistakenly justify choices in switch trials is called choice blindness, this term is not intended to imply that participants are literally blind. Instead, just as for change blindness, choice blindness is a lack of visual attention rather than visual perception. It is reasonable to wonder how participants could possibly select one of two faces without visually attending to them. Presumably, participants attend to the faces' *relative* attractiveness rather than each face's individual attractiveness. After reading Johansson et al. (2005), we suspected that an alternative explanation may be that participants never stored images in their visual short-term memory (VSTM). The concept of VSTM was initially proposed to explain the ability to notice differences between two images separated by a brief interval (Phillips & Baddeley, 1971); VSTM briefly stores the first image so it can be compared to the second image. In the CB paradigm, both images are simultaneously visible so participants have no need to store the images in VSTM. After participants make their selection and the experimenter hands them an image to examine, if there is no memory trace for comparison, participants will fail to notice any discrepancy between the image they selected and the image presented to them by the experimenter. With this hypothesis in mind, we wondered what would happen in the CB paradigm if participants were encouraged to store the two images in VSTM during the initial, decision-making phase. With a memory trace for comparison would participants be more likely to notice the switch?

As a way to encourage memory storage, we looked to a study performed by Ihssen, Linden, and

Shapiro (2010) showing sequential presentation of stimuli improves retention in VSTM. A common method for measuring the capacity of VSTM is the change-detection method, in which a stimulus array is presented briefly, then after a short interval a test array appears in which some of the stimuli are different. Vogel, Woodman, and Luck (2006) found participants to require around 50 msec per item to successfully encode and consolidate items into VSTM. In addition, Ihssen et al. (2010) found presenting stimuli sequentially improved VSTM performance as compared to simultaneous presentation. This happens even if the total amount of time the items are visible is the same in the sequential and simultaneous displays. That is, if each stimulus is presented for 50 msec sequentially and the pair is presented for 100 msec simultaneously, the stimuli in the sequential condition are encoded better.

This leads one to wonder, does choice blindness occur because participants do not visually attend to the two images, or because participants do not store the images in VSTM? Here we aimed to distinguish between visual attention and VSTM as the mechanism underlying choice blindness. As in Johansson et al. (2005), we presented faces simultaneously to half of the participants. Then extending Johansson et al., we presented the faces sequentially to the other half of the participants. Participants in the sequential condition but not the simultaneous condition needed to load images in VSTM to compare one image to the other. If choice blindness occurs due to lack of visual attention, the presentation method should make no difference. That is, comparing one visual image to a memory trace of an image (sequential condition) doesn't require more visual attention than comparing one visual image to another visual image (simultaneous condition). On the other hand, if choice blindness occurs because there is no memory trace in VSTM to clash with the presented image in switch trials, the presentation method *should* make a difference. That is, participants in the sequential condition are likelier than participants in the simultaneous condition to have a memory trace that clashes with the presented image in switch trials. In summary, the visual attention account predicts the number of participants noticing a switch will be the same in both conditions, whereas the VSTM account pre-

dicts more participants will notice a switch in the sequential condition than in the simultaneous condition.

## Method

### Participants

We obtained permission to carry out the experiment from the University of Central Arkansas Institutional Review Board before gathering any data, and treated participants in accordance with the ethical guidelines stipulated by the American Psychological Association. A total of 90 students (61 female and 29 male) participated for course credit. Participants were randomly assigned to one of two conditions: 45 were assigned to the simultaneous condition and 45 to the sequential condition. Although we had not deliberately balanced the assignment of women and men to conditions, 31 female and 14 male participants were assigned to the simultaneous condition, 30 female and 15 male participants were assigned to the sequential condition.

### Materials

In an e-mail exchange with the first author of Johansson et al. (2008), we requested and obtained the images used in their study. The file Johansson sent contained approximately 50 grey-scale images of female faces. For the 12 non-switch trials, we selected 12 pairs of faces such that each face was similar to the other in the pair but still distinguishable from it. For the three switch trials, we used the same three pairs as in the study done by Johansson and colleagues. We printed the 15 pairs then glued them to lightweight cardboard material with red backing. We glued a second copy of the three switch pairs to cardstock with black backing. The same black cardstock was glued to the tabletop.

### Procedure

When participants entered the laboratory, they sat at a table across from the experimenter and read the informed consent form, after which the experimenter explained the procedure. In the simultaneous condition, both images in the pair were shown at the same time for four seconds. In the sequential condition, each image was shown one at a time for two seconds. At the end of the viewing time, the experimenter placed the images

## MEMORY VERSUS ATTENTION IN BLIND CHOICE

face down on the table and asked the participant to point to the image they had considered to be more attractive. The experimenter slid the selected image across the table to the participants. Participants picked up the image to examine it and then told the experimenter why they had chosen it.

For the three switched pairs (trials 7, 10, and 14 out of a total of 15 trials), the experimenter held two images in each hand so that only one image per hand was visible to the participant. This was accomplished by concealing the second image behind the first. After the experimenter placed all four images face down on the tabletop, the red-backed images (previously hidden) were lying on top of the black-backed images (previously visible). When the experimenter slid one of the red-backed images across to the participant, the black-backed image underneath it remained in place so that the experimenter's arm concealed it. Not only was the image concealed by the experimenter's arm, but the black backing of the image was the same paper that covered the tabletop so it was much less salient than the red backing of the image that had been slid toward participants. Except for the switch itself, these trials were identical to the other trials. If participants noticed the switch, the experimenter halted the experiment at once and debriefed the participant. Otherwise the experimenter continued through all 15 image pairs.

### Results

In the simultaneous condition, 9 of the 45 participants detected the switch, whereas 17 of the 45 participants in the sequential condition detected the switch. Sequentially presenting the images increased the likelihood that participants noticed the switch,  $X^2(1, N = 90) = 3.46, p = .038$ .

### Discussion

In the present study we manipulated the method of presentation in a CB paradigm with the intention of distinguishing between two hypothetical mechanisms. We argued that an account based on lack of visual attention predicts no difference between conditions, whereas an account based on lack of storage in VSTM predicts that sequential presentation should reduce choice blindness relative to simultaneous presentation. Our results support the hypothesis that choice blindness occurs



due to a lack of memory trace in VSTM. In the original CB procedure and in our simultaneous condition, participants didn't need to load images into VSTM. Thus, the participants were unlikely to have a memory trace that clashed with the image handed to them in switch trials.

Perhaps the main limitation of our study is the same limitation as for the choice blindness paradigm in general: the participants' willingness to defend their choices in switch trials is taken as evidence that they failed to notice the switch. Alternatively, perhaps participants *do* notice the switch but are too polite to object (or for some other reason do not object) when the experimenter switches the images. In our paradigm and the traditional choice blindness paradigm, there is no way to distinguish between failure to notice the switch and the alternative hypothesis that the switch was noticed but did not elicit any objection. To address this limitation, in the future we intend to replicate the procedure described here but use different images. By using images that are clearly different, participants will be likelier to notice switched images. If the alternative hypothesis (participants are too polite to object to the switch) is false, participants should object to the switch when the switch is obvious.

Although we disagree with Johansson et al. (2005) as to the mechanism underlying choice blindness (i.e., lack of storage in VSTM rather than lack of visual attention), our results replicate the most intriguing aspect of the CB paradigm: in switch trials participants generally confabulate the reasons for their selections. Although there is only evidence for confabulation in switch trials (i.e., participants describe the reasons for making their selection when in fact they selected the other image), there is no reason to believe that switch trials are the only trials in which participants confabulate the reasons for their choices. We believe that in both switch and non-switch trials, participants generally select the image they consider to be more attractive without bothering to store the preferred image in VSTM. Instead, participants only store the location of the preferred image. When presented with one of the images and asked to describe why they selected it, participants don't remember their reasons, yet they describe why the presented image is attractive.

If this is how people justify their decisions after making them, there are some intriguing implications about how most people are living. For example, at some point in the past when visiting a favorite restaurant an individual might have compared the Italian cream cake to the Key lime pie and decided that the Key lime pie was preferable. Later the individual would recall the fact that he or she preferred the Key lime pie, but not the original reasons for the preference. If asked to justify the preference the individual would concoct a description based on how the pie tastes in the present and how it matches his or her current tastes. However, tastes and circumstances change, so while continuing to select the Key lime pie because it was preferred in the past, he or she might actually prefer the Italian cream cake if it was given another chance. There might be lots of great tastes and experiences that surpass the ones people stick with just because of past choices.

### References

- Ihssen, N., Linden, D. E. J., & Shapiro, K. L. (2010). Improving visual short-term memory by sequencing the stimulus array. *Psychonomic Bulletin & Review*, *17*(5), 680-686. doi: 10.3758/PBR.17.5.680
- Johansson, P., Hall, L., & Sikstrom, S. (2008). From change blindness to choice blindness. *Psychologia*, *51* (6), 586-155. doi: <http://dx.doi.org/10.2117/psysoc.2008.142>
- Johansson, P., Hall, L., Sikstrom, S., & Olsson, A. (2005). Failure to detect mismatches between intention and outcome in a simple decision task. *Science*, *310*, 116-119. doi: 10.1126/science.1111709
- Johansson, P., Hall, L., Sikstrom, S., Tarning, B., & Lind, A. (2006). How something can be said about telling more than we can know: On choice blindness and introspection. *Consciousness and Cognition*, *15*(4), 673-692. doi: 10.1016/j.concog.2006.09.004
- Phillips, W. A., & Baddeley, A. D. (1971). Reaction time and short-term visual memory. *Psychonomic Science*, *22*(2), 73-74.
- Simons, D. J., & Levin, D. T. (1998). Failure to detect changes to people during a real-world interaction. *Psychonomic Bulletin & Review*, *5*(4), 644-649. doi: 10.3758/BF03208840

Vogel, E. K., Woodman, G. F., & Luck, S. J. (2006).  
The time course of consolidation in visual  
working memory. *Journal of Experimental Psy-  
chology: Human Perception and Performance*,  
32(6), 1436-1451. doi: 10.1037/0096-  
1523.32.6.1436

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## Cognitive Flexibility as a Dominant Predictor of Depression Symptoms Following Stressful Life Events

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**Abstract**—This study was conducted to examine the relationships among event characteristics, cognitive factors, and depression symptoms following stressful life events. Consistent with cognitive theories of depression (e.g., Beck, 1964), we hypothesized cognitive factors would be stronger predictors of depression symptoms than stressful event characteristics. Participants ( $n = 214$ ) completed questionnaires that assessed demographics, trauma, depression, intolerance of uncertainty, and world assumptions. Hierarchical regression analyses revealed cognitions were more strongly related to depression than event characteristics were. We also found greater intolerance of uncertainty and more negative world assumptions (especially self-worth) were significantly associated with greater depression. Fortunately, cognitions, unlike past events, can be changed, and flexible thinking may aid in the prevention and treatment of depression.

*Keywords:* resilience, depression, trauma, Criterion A, cognitive flexibility

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Although most individuals encounter at least one experience they consider traumatic in their lifetime, the majority do not develop psychological disorders, such as depression or posttraumatic stress disorder (PTSD) following the traumatic event. It is estimated that about 80% of people will experience a trauma in their lifetime, but only about 8% of people will develop PTSD and 16% of people will develop depression (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The experience of stressful events, including trauma, is a common risk factor for depression, but many individuals are resilient to its development. As the research demonstrates, the vast majority of trauma victims do not suffer from depression.

Many researchers have attempted to better understand factors influencing resilience to the development of psychological disorders following trauma exposure. Some research has focused on event characteristics that may contribute to increased risk of depression following stressful life events. For example, studies show greater psychopathology following stressful life events that are more interpersonal in nature (e.g., Kramer &

Green, 1991; Schumm, Briggs-Phillips, & Hobfoll, 2006) and involve greater injury (e.g., Blanchard et al., 1995). Studies also show an increased risk of psychopathology following the experience of multiple traumatic life experiences (e.g., Schumm et al., 2006).

Other studies focus on personal factors that may contribute to resilience. Wingo et al. (2010) conducted a study with primarily African Americans who reported exposure to various traumatic events such as childhood abuse, physical abuse, emotional abuse, and sexual assault. Out of 792 trauma survivors, only 30% had experienced moderate or severe depression. Thus, most of the participants were resilient to depression. Using the modified 10-item version of the Connor-Davidson Resilience Scale (CDRISC; Campell-Sills & Stein, 2007), Wingo and colleagues found higher resilience scores resulted in lower depression severity. Resilience was measured using items that demonstrated the ability to persevere through difficult times in life such as change, illness, and failure. Nevertheless, the CDRISC focuses on personality traits of resilience, specifically hardiness and per-

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sistence, and neglects other cognitive characteristics that may influence resilience, such as the ability to tolerate ambiguity and to maintain a positive outlook.

People who have higher resilience may differ in their thinking styles from people who do not. Specifically, individuals with higher resilience may have more flexible thinking patterns, allowing them to avoid or tolerate psychological distress better than those with less flexible thinking patterns. One theory of resilience to chronic negative emotions stems from cognitive models of depression (e.g., Beck, 1964; Ellis, 1962) suggesting that thoughts involving a situation are stronger predictors of an individual's response to the situation than the intensity of the situation itself. Cognitive therapy, which is based on these models, encourages the patient to change his or her way of thinking in order to avoid negative feelings and emotions. An additional component of the cognitive model is Beck's Cognitive Triad. The three factors involved in the cognitive triad are the self, the world, and the future. In other words, individuals who are depressed tend to maintain negative feelings in regards to their selves, the world, and the future (Beck, 1970). Thus, the cognitive triad explains that people are more likely to develop depression if they hold rigid, negative beliefs.

Research studies have demonstrated inflexible thinking patterns may influence the development of depression. According to the "trait-like" hypothesis of depression, individuals who maintain poor cognitive functioning have more severe and consistent depressive episodes (Sarapas, Shankman, Harrow, & Goldberg, 2012). Therefore, individuals who repetitiously cater to negative thinking patterns are more likely to develop and maintain depression. Beck's (1967) cognitive theory of depression also explains the development and maintenance of depression through faulty, rigid thought processes, namely cognitive inflexibility.

Numerous studies have illustrated the role inflexible thinking patterns have in the development and maintenance of depression. Sarapas et al. (2012) found individuals with more severe unipolar depression symptoms had lower abilities to think flexibly, as assessed with the Wisconsin Card Sorting Test (WCST; Grant & Berg, 1948), a test that assesses executive function through abstract

problem-solving ability. Additionally, participants with depression had lower levels of cognitive flexibility than those without any psychological disorders. Similarly, Palm and Follette (2010) conducted a study with 92 female trauma survivors to assess the relationship between psychological distress, cognitive flexibility, and experiential avoidance. Hayes, Wilson, Gifford, Follette, and Strosahl (1996) define experiential avoidance as an attempt to control internal attitudes, such as thoughts and feelings, even when the attempt to control them may be harmful. In Palm and Follette's (2010) study, cognitive flexibility was measured using the Cognitive Flexibility Scale (CFS; Martin & Rubin, 1995), which assesses an individual's ability to consider alternative responses to various situations. Their results suggest cognitive inflexibility could lead to greater experiential avoidance, causing higher susceptibility to the development of depression and PTSD symptoms.

Other studies examine different aspects of cognitive inflexibility, such as rumination, which is the continuous concentration on negative narrow information or ideas (Nolen-Hoeksema, 2000) and intolerance of uncertainty, which is difficulty tolerating ambiguity (Freeston, Rhéaume, Letarte, & Dugas, 1994). The Intolerance of Uncertainty Scale (IUS; de Jong-Meyer, Beck, & Riede, 2009) was developed to assess emotional, cognitive, and behavioral responses to uncertain situations and attempts to take control over future situations. The authors found that higher IUS scores are related to higher depression symptoms in nonclinical samples. Higher inability to tolerate uncertainty suggests higher cognitive inflexibility. Similarly, rumination can result in unproductive thinking patterns that reduce problem-solving abilities. On the contrary, individuals who ruminate less are more likely to be active problem solvers, which possibly increases their tolerance of uncertainty and lessens their chances of developing depression symptoms. Liao and Wei's (2011) sample of 332 college students illustrated a significant link between intolerance of uncertainty, rumination, and depression. The researchers found that 72% of the variance in depression was accounted for by rumination and intolerance of uncertainty.

A consistent theme in theories attempting to explain common thought processes following trau-

ma is that trauma presents a challenge to a person's worldview and way of thinking about themselves and others (Janoff-Bulman, 1989). People who can flexibly think about their experiences in order to maintain a balanced and realistic view of themselves and the world may be more resilient following trauma exposure. Negative worldviews have also been linked to higher susceptibility to psychological disorders such as depression (Maschi & Baer, 2012). The World Assumptions Scale (Janoff-Bulman, 1989) is a measure used to assess multiple aspects of an individual's perception of the world. In a study composed of 667 imprisoned adults, Maschi and Baer (2012) found 19% of the participants maintained negative views of themselves, others, and the world, indicating them as Class 3 in the research study. Class 1 had a mainly positive outlook on all three factors, and Class 2 had a positive view of themselves but negative view of the world and others. Class 3 possessed the most negative outlook and also reported the most psychological-mental health symptoms, including depression. Generally, having an absolute negative outlook (negative self-perception, negative view of others, and negative view of the world) may be linked to poor mental health. However, there is limited research on which areas of negativity are most significant in the development of depression.

The purpose of our study was to further examine the relationship between cognitions and depression symptoms following stressful life events in a nonclinical sample. Although event characteristics may contribute to depression symptoms following stressful life events, we hypothesized cognitive variables would be more strongly related to risks of and resilience to experiencing depression symptoms. Specifically, we investigated the relationships among intolerance of uncertainty, negative world views, and depression symptoms. We examined the relative contribution of event characteristics (e.g., degree of injury, whether the event is interpersonal in nature, severity, number of previous traumas) and cognitive variables (e.g., intolerance of uncertainty and assumptions about one's self and the world) to depression scores. Based on research suggesting a link between cognitive inflexibility and depression (e.g., Palm & Follette, 2010; Sarapas et al. 2012; Wingo et al., 2010),

we hypothesized higher depression scores would be associated with greater intolerance of uncertainty and more negative world assumptions. Further, consistent with cognitive theories of depression, we also hypothesized depression symptoms would be more strongly related to cognitive variables than event characteristics.

## Method

### Participants

The participants in this study were comprised of 215 college students 18 years of age or older. One participant was excluded from the study because he or she did not endorse any past stressful events, so the final sample size was 214. The sample consisted of 170 female and 44 male adults. The participants ranged from 18 to over 60 years of age. However, the majority of the participants were between the ages of 18 to 21 years (86.4%,  $n=185$ ). The sample consisted of 57% Caucasian participants ( $n=122$ ), 34.4% African-American participants ( $n=78$ ), and 5% who indicated another race ( $n=14$ ). Nearly 25% ( $n=52$ ) of the sample reported economic distress in their childhood and family environment. After the study received IRB approval, participants were recruited from psychology classes and offered extra credit for participating in the study.

### Measures

**Traumatic Stress Schedule (TSS).** The TSS (Norris, 1990) assesses exposure to traumatic events by allowing the participant to self-report his or her experience with nine traumatic events within his or her entire lifetime. The events include theft, physical abuse, sexual abuse, unexpected loss of a loved one, injury or loss due to a fire, injury or loss due to natural or human-caused disaster, serious motor vehicle accident, seeing another individual seriously injured or killed, and serious injury from an accident. Also, an open-ended question was provided for participants to write any trauma that had not been addressed in the nine that were listed. More detailed assessments of the trauma were taken through five additional questions that assessed frequency; age when it first happened; and indices of life threat, injury, and distress (1 = *not at all* to 7 = *extremely*). Internal reliability has been found to be acceptable (Cronbach's alpha

= .75; Norris, 1990). In this study, participants who endorsed more than one event were asked to indicate which event was the most upsetting (i.e., the “worst” event). Although there are numerous ways to score this measure (see Norris, 1990), we used the TSS for information about each participant’s worst event and to obtain a frequency count of the number of different categories of events endorsed by each participant.

#### **The Beck Depression Inventory (BDI).**

The BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is used to detect and assess depression symptoms. The items on the BDI are rated from 0 to 3, where 0 indicates *no sign of the symptom* and 3 indicates *more severe signs of the symptom*. Items such as, “I don’t feel like I am being punished” represent no signs of depression and correspond with 0. However, “I feel guilty all of the time” represents 3, indicating endorsement of a depression symptom. Item scores are summed to yield a total score, and higher scores reflect greater endorsement of depression symptoms. Multiple studies have demonstrated the BDI and its revisions have shown good internal consistency, reliability, and validity. Studies show correlations of  $r > .90$  between different versions of the BDI (Beck, Steer, & Brown, 1996; Lightfoot & Oliver, 1985). The BDI has demonstrated correlations with clinical depression ratings as high as 0.62 to 0.66 (Foa, Riggs, Dancu, & Rothbaum, 1993). A study involving women with postpartum depression ( $n = 953$ ) found high internal consistency reliability (Cronbach’s alpha = .91) using a revised version of the BDI (Manian, Schmidt, Bornstein, & Martinez, 2013). In our study, the internal reliability was excellent (Cronbach’s alpha = .90).

#### **Intolerance of Uncertainty Scale (IUS).**

The IUS (Freeston et al., 1994) is a 27-item measure used to assess a person’s comfort with uncertainty. The measure consists of items assessing one’s need for control over the future and one’s emotional and behavioral reactions to uncertainty. Items on the IUS are rated by the participant on a 5-point Likert-type scale, where 1 indicates the item is *not representative of [the participant]* and 5 is *completely representative of [the participant]*. The statements on the IUS, such as “It’s unfair not having any guarantees in life,” are used to determine the degree to which a participant is able to accept

ambiguity. Item scores are summed to yield a total score. Higher scores reflect greater intolerance of uncertainty. The English version of the IUS demonstrates high internal consistency (Cronbach’s alpha = 0.88 - 0.94) and high test-retest reliability over five weeks ( $r = 0.74$ ) (Dugas, Freeston, & Ladoceur, 1997). The reliability of the IUS in our study was excellent (Cronbach’s alpha = .94).

**World Assumptions Scale (WAS).** The WAS (Janoff-Bulman, 1989) contains 32 items to assess the participant’s view of the world and self. The participant rates each item using a 6-point Likert-type scale, where 1 represents that the individual *strongly disagrees* with an item and 6 represents that the individual *strongly agrees*. The WAS is analyzed using an overall score and using three separate subscales: goodness of the world, meaningfulness of the world, and goodness of the self. The WAS assesses the goodness of the world with items such as, “The world is a good place.” Similarly, the meaningfulness of the world is assessed by assuming there is justice and order in the world, using statements such as, “Misfortune is least likely to strike worthy, decent people.” Lastly, self-worth is analyzed with items tailored to determine an individual’s value of oneself such as, “I have reason to be ashamed of my personal character.” Total and subscale scores are summed, and higher scores reflect more positive beliefs. Internal consistency and reliability of the WAS subscale scores have been shown to be acceptable ( $\alpha = .75, .82, .79$  respectively) (Avants, Marcotte, Arnold, & Margolin, 2003). Overall reliability of the total score has also been demonstrated to be acceptable ( $\alpha = .68 - .86$ ) (Janoff-Bulman, 1989). In our study, the total WAS reliability was good (Cronbach’s alpha = .83). The WAS subscales for goodness of the world, meaningfulness of the world, and goodness of the self each demonstrated good reliability as well (Cronbach’s alphas = .81, .75, and .81, respectively).

**Demographics Questionnaire.** The Demographics Questionnaire was created specifically for this study to identify the participant’s sex, age, race, relationship status, economic status, and school status. The participants’ demographics were gathered using 8 individual items. The age item required the individual to write his or her age. The remaining 7 items were provided for the individual to check the appropriate box. For example, the

school status box was followed by corresponding items such as “freshman” and “sophomore.” The race item only contained three items, “White/Caucasian,” “Black/African-American,” and “Other,” to protect the identity of students with ethnicities that were less represented at the university in which the study was conducted.

**Procedure**

The researchers collected data over an extended period of time, approximately 14 months. Participants were recruited in primarily introductory level psychology courses and offered extra credit for their involvement with the study. Before beginning the study, participants were issued in-

formed consent documents, and details of the study were verbally explained. Researchers distributed questionnaire packets and explained the study to small groups of participants (*ns* of 2-12). Each data collection session lasted approximately 40-60 minutes. After the participants completed the questionnaires, they placed their questionnaires in sealed envelopes and received a debriefing form.

Precautions were taken to maintain confidentiality. The lead researcher was the only researcher allowed to view handwritten information about trauma exposure to reduce the chance that any participant could be identified by a research assistant. Also, the database was password protect-

Table 1 *Frequency of Worst Events Reported*

Worst Event	Frequency ( <i>n</i> )	Percent
<b>Criterion A</b>	111	51.87%
Robbery	7	3.27%
Assault	12	5.61%
Sexual assault	22	10.28%
Unexpected death of a loved one	23	10.75%
Fire	1	0.47%
Natural/Human-made disaster	1	0.47%
Motor Vehicle accident	8	3.74%
Other serious accident	10	4.67%
Witnessing physical injury	22	10.28%
Life Threat (from “other” category)	13	6.07%
<b>Non-criterion A</b>	103	48.13%
Romantic relationship problems	20	9.35%
Death of a loved one (not unexpected)	20	9.35%
Illness/injury of loved one	5	2.34%
Family problems	7	3.27%
Minor illness/injury	12	5.61%
Mental health issues	5	2.34%
Conflict with peers	6	2.80%
Stressful work or school environment	10	4.67%
Other	5	2.34%

ed, which prevented anyone other than those in the research team from viewing the data. Additionally, no data were entered until there were a sufficient amount of research sessions to prevent the data from any one group from being identifiable.

## Results

### Trauma Exposure

More than half of the participants ( $n = 118$ , 55.1%) indicated experiencing a “worst” event that satisfies the DSM-5’s (American Psychiatric Association, 2013) description of a traumatic event (Criterion A of the diagnosis of posttraumatic stress disorder). According to the DSM-5, Criterion A of PTSD defines trauma as an event that poses threat to one’s life or physical integrity (or the life of a loved one). The most commonly reported traumas were unexpected death of a loved one ( $n = 23$ ), sexual assault ( $n = 22$ ), and witnessing the death or serious injury of someone ( $n = 22$ ). For events that did not satisfy Criterion A, the death of a grandparent ( $n = 20$ ) and romantic relationship problems ( $n = 19$ ) were the most commonly selected “worst” events. The majority of worst events were interpersonal in nature ( $n = 156$ , 72.9%) and involved a relatively low degree of injury ( $M = 1.95$ ,  $SD = 1.72$ ). Many participants endorsed more than one event category ( $M = 2.14$ ,  $SD = 1.28$ ). See Table 1 for worst event frequencies.

### Cognitive Variables

**Intolerance of Uncertainty.** The participants’ IUS scores ranged from 31 to 114 ( $M = 65.4$ ,  $SD = 21.2$ ). The mean item rating for this measure was a 2.4 on a scale of 1 to 5, corresponding to slight disagreement with the statements that describe cognitive inflexibility. One-third of scores fell between 31 and 53, another third fell between 54 and 72, and the remaining third was between 73 and 114.

**World Assumptions Scale.** The participants’ WAS total scores ranged from 72 to 166. The mean total score was 119.94, and the standard deviation was 17.99. The average item rating was a 3.75 on a scale of 1 to 6, corresponding to slightly more positive beliefs. One-third of the scores fell between 77 and 111, the next third fell between 112 and 127, and the remaining scores were between 128 and 166.

### Depression Symptoms

Participants reported a fairly low level of depression symptoms ( $M = 9.81$ ,  $SD = 8.31$ ). The Center for Cognitive Therapy advises that BDI scores be evaluated under specific guidelines. For example, no depression to minimal depression is less than a score of 10; mild to moderate depression ranges from 10 to 18; moderate to severe depression ranges from 19 to 29; and severe depression falls within 30 to 63. Over half of the sample had none or minimal depression (55.4%,  $n = 118$ ). Only 29.6% of the participants had mild to moderate depression ( $n = 63$ ). There were 12.7% of participants who had moderate to severe depression ( $n = 27$ ), and only 0.02% indicated severe depression ( $n = 5$ ).

### Relationship among Event Characteristics, Cognitive Variables, and Depression

In order to test our hypothesis that cognitive inflexibility would result in higher depression symptoms, we conducted regression analyses. In Block 1, we used variables involving event characteristics, such as whether the event was interpersonal in nature, the total number of event categories endorsed (TSS total score), whether the worst event satisfied Criterion A, and the injury rating for the worst event. In Block 2, we used cognitive variables, such as intolerance of uncertainty (IUS total score) and world assumptions (the WAS total score). In testing the variables in this manner, we were able to determine if the cognitive variables were more predictive of depression than were the situational variables.

In the regression analysis, we found that the event characteristics in Block 1 significantly predicted depression symptoms [ $F(4, 212) = 2.664$ ,  $p < .05$ ] and accounted for 4.9% of variation in depression symptoms ( $R^2 = .049$ ). However, when cognitive variables were added in Block 2, the model that included IUS total score and WAS total score accounted for 41.7% ( $R^2 = .417$ ) of variation in depression symptoms [ $F(6, 212) = 25.544$ ,  $p < .01$ ]. The variables that significantly predicted depression severity were higher injury ( $b = .127$ ,  $p < .05$ ), higher intolerance of uncertainty scores ( $b = .502$ ,  $p < .01$ ), and more negative world assumptions ( $b = -.286$ ,  $p < .01$ ). See Table 2.



Table 2.

Summary of Regression Analysis for Total Scores Predicting Depression

Variable	Block 1			Block 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Criterion A	0.99	1.18	.06	1.10	0.94	.07
Injury	0.78	0.36	.16*	0.62	0.29	.13*
Type (Interpersonal)	-0.06	1.38	-.00	-0.24	1.09	-.01
Event Total	0.61	0.45	.09	0.69	0.36	.11
IUS Total				0.20	0.02	.50**
WAS Total				-0.13	0.03	-.29**
<i>R</i> <sup>2</sup>		.05			.42	
F for change in <i>R</i> <sup>2</sup>		2.66*			65.03**	

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

We also conducted a regression analysis that included WAS subscale scores in place of the total score. This model was significant [*F* (8, 212) = 22.651, *p* < .01] and explained 47% of variation in depression scores. In this model, injury rating and intolerance of uncertainty remained significant, but

the Worthiness of Self scale was the only WAS subscale to significantly predict depression scores (*b* = -.385, *p* < .01). More negative assumptions about one's self were associated with higher depression symptoms. See Table 3.

Table 3

Summary of Regression Analysis for WAS Subscale Scores Predicting Depression

Variable	Block 1			Block 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Criterion A	0.99	1.18	.06	0.73	0.90	.04
Injury	0.78	0.36	.16*	0.63	0.28	.13*
Type (Interpersonal)	-0.06	1.38	-.00	-0.21	1.04	-.01
Event Total	0.61	0.45	.09	0.58	0.34	.09
IUS Total				0.17	0.02	.42**
WAS Worthiness of Self				-0.33	0.05	-.39**
WAS Benevolence of World				-0.01	0.06	-.01
WAS Meaningfulness of World				0.01	0.05	.01
<i>R</i> <sup>2</sup>		.05			.47	
F for change in <i>R</i> <sup>2</sup>		2.66*			40.61**	

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

### Discussion

Our findings indicated that cognitive variables, specifically cognitive inflexibility and negative worldviews, are significant predictors of depression symptoms; thus, our results supported both of our hypotheses. Higher levels of depression were related to greater intolerance of uncertainty and more negative worldviews. Further, cognitive variables were more strongly related to depression symptoms than situational factors in stressful situations. Consistent with the literature on cognition and depression (Beck, 1964; Ellis, 1962), we found that people with more inflexible, rigid thinking patterns reported greater depression symptoms following trauma. Multiple studies have illustrated the development of depression depends upon more than situational and environmental factors (Palm & Follette, 2010; Sarapas et al., 2012; Wingo et al., 2010). Our study demonstrates that individual perception and cognition are stronger predictors of depression symptoms than the situational elements of the traumatic event. In fact, the only event characteristic associated with depression symptoms in our models was degree of injury of the worst life event. Although higher injury ratings were significantly associated with greater depression symptoms, cognitive variables emerged as stronger predictors of depression.

Individual interpretation of self-worth seems strongly related to depression. Our results indicated the only type of world assumptions to significantly predict depression was the Worthiness of Self subscale. Beliefs about the world (i.e., the Benevolence of the World and Meaningfulness of the World subscales of the WAS) did not relate to depressive symptoms in our sample. The finding that negative thoughts about one's self were related to depression is consistent with other studies that indicate that lower self-esteem is associated with depression (e.g., Valiente et al., 2011). Self-worth is likely to play a significant factor in depression because self-esteem largely determines an individual's perception of herself or himself. Additionally, goals and motivations have been shown to influence an individual's susceptibility to depression in relation to self-worth; people who have goals to avoid feeling worthless are less likely to engage in problem-solving behaviors that demonstrate the ability to think flexibly and more likely to

engage in rigid, inflexible thinking such as rumination (Rothbaum, Morling, & Rusk, 2009).

Nevertheless, this study was limited by its cross-sectional design and inability to discern if inflexible thinking patterns were present before depression symptoms or the result of depressed mood. According to the state effects hypothesis, depression symptoms may contribute to poor cognitive abilities (Sarapas et al., 2012). However, there is evidence from a limited number of longitudinal studies that certain thinking styles are associated with increased depression at later time points (e.g., Rawl, Collishaw, Thapar, & Rice, 2013; Sarapas et al., 2012; Smets, Luycx, Wessel, & Raes, 2012). This study was also limited by reliance on self-report data from a non-clinical sample that reported relatively low depressive symptoms. However, this type of sample is appropriate for examining factors that predict risk and resilience to depression and better generalizes to the overall population because it is a nonclinical sample. As noted by Grant, Thase, and Sweeney (2011), limited research from nonclinical samples is available on individuals who develop depression as young adults. Our sample showed a relatively high prevalence of trauma exposure, despite reporting low depression symptoms, which makes it ideal for examining factors that contribute to resilience. Thus, this study serves as a model to assess major cognitive risk factors for depressive symptoms following trauma.

Future research should examine the relationship between life events, thinking styles, and depression in samples of adults who are over the age of 50 years. Liao and Wei (2011) note that college students have several areas of uncertainty in their lives such as career choice and companionship; however, they are more likely to have stronger social support systems compared to older populations. People with lower social support levels and higher stress levels have been found to have more severe levels of depression than those with stronger social support systems; those with strong social support systems experience similar levels of depression regardless of their stress levels, indicating social support as a significant moderator of depression (Pengilly & Dowd, 2000).

The older population is less likely to have a strong support system during the stressful decline

of their physical and mental conditions. Elderly individuals are likely to experience high total plasma homocysteine (tHcy), a protein that is associated with weakened cognitive ability (Ford, Flicker, Singh, Hirani, & Almeida, 2013). Although Ford and colleagues did not find a significant relationship between high tHcy and depression relative to cognitive impairment, they were unable to thoroughly test executive function. Cognitive impairment in elderly individuals could cause them to maintain poorer executive function, thus, hindering their problem-solving abilities. For example, people with weaker executive function are more likely to have difficulty with shifting mental positions and avoiding perseverative errors (Grant, Thase, & Sweeney, 2011). Individuals who lack the mental capacity to think more broadly face higher risks of cognitive inflexibility and thereby depression symptoms. Further research is necessary in order to properly examine whether the cognitive variables assessed in this study (i.e., negative world assumptions and intolerance of uncertainty) are also associated with depression in elderly individuals, particularly in those with less social support.

Our study presents a building block for the continuation of investigating resilience to depression symptoms following stressful situations. The results illustrate that cognitive variables are more predictive of depression symptoms relative to situational factors. Fortunately, cognitions, unlike past events, can be changed. Flexible, solution-oriented cognition may help individuals cope with the aftermath of a traumatic event. Numerous studies have shown that cognitive therapy is often effective in treating depression (e.g., Beevers & Miller, 2005; Matsunaga et al., 2010), and this study adds to the body of research that suggests flexible thinking may serve as a protective factor against the development of psychopathology following stressful events.

### References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.
- Avants, S. K., Marcotte, D., Arnold, R., & Margolin, A. (2003). Spiritual beliefs, world assumptions, and HIV risk behavior among heroin and cocaine users. *Psychology of Addictive Behaviors*, 7(2), 159-162. doi: 10.1037/0893-164X.17.2.159
- Beck, A. T. (1964). Thinking and depression: Theory and therapy. *Archives of General Psychiatry*, 10(6), 561-571. doi: 10.1001/archpsyc.1964.01720240015003
- Beck, A. T. (1970). *Depression: Causes and Treatment*. Philadelphia, PA: University of Pennsylvania Press.
- Beck, A. T. (1970). The core problem in depression: The cognitive triad. In J.H. Masserman (Ed.), *Depression: Theories and therapies* (47-55). New York, NY: Grune & Stratton.
- Beck, A., Steer, R., & Brown, G. (1996). *The Beck depression inventory* (2nd ed.). San Antonio, TX: The Psychological Corporation.
- Beck, A., Ward, C., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4(6), 561-571. doi: 10.1001/archpsyc.1961.01710120031004
- Beevers, C. G., & Miller, I. M. (2005). Unlinking negative cognition and symptoms of depression: Evidence of a specific treatment effect for cognitive therapy. *Journal of Counseling and Clinical Psychology*, 73(1), 68-77. doi: 10.1037/0022-006X.73.1.68
- Blanchard, E. B., Hickling, E. J., Mitnick, N., Taylor, A. E., Loos, W. R., & Buckley, T. C. (1995). The impact of severity of physical injury and perception of life threat in the development of post-traumatic stress disorder in motor vehicle accident victims. *Behavior Research and Therapy*, 33(5), 529-534. doi: 10.1016/0005-7967(94)00079-Y
- Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress*, 20(6), 1019-1028. doi: 10.1002/jts.20271
- de Jong-Meyer, R., Beck, B., & Riede, K. (2009). Relationships between rumination, worry, intolerance of uncertainty and metacognitive beliefs. *Personality and Individual Differences*, 46(4), 547-551. doi: 10.1016/j.paid.2008.12.010
- Dugas, M. J., Freeston, Mark H., & Ladoceur, R.

- (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research*, 21(6), 593-607. doi: 10.1023/A:1021890322153
- Ellis, A. (1962). *Reason and emotion in psychotherapy*. New York, NY: Stuart.
- Foa, E., Riggs, D., Dancu, C., & Rothbaum, B. (1993). Reliability and validity of a brief assessment for assessing posttraumatic stress disorder. *Journal of Traumatic Stress*, 6(4), 459-573. doi: 10.1002/jts.2490060405
- Ford, A. H., Flicker, L., Singh, U., Hirani, V., & Almeida, O. P. (2013) Homocysteine, depression and cognitive function in older adults. *Journal of Affective Disorders*, 151(2), 646-651. doi: 10.1037/t01528-000
- Freeston, M. H., Rhéaume, J., Letarte, H., & Dugas, M. J. (1994). Why do people worry? *Personality and Individual Difference*, 17(6), 791-802. doi: 10.1016/0191-8869(94)90048-5
- Grant, D. A. & Berg, E. (1948). A behavioral analysis of degree of reinforcement and ease of shifting to new responses in a wegil-type card-sorting problem. *Journal of Experimental Psychology*, 38(4), 404-410. doi: 10.1037/h0059831.
- Grant, M. M., Thase, M. E., & Sweeney, J. A. (2001). Cognitive disturbances in outpatient depressed younger adults: Evidence of modest impairment. *Biological Psychiatry*, 50(1), 35-43. doi: 10.1016/S0006-3223(00)01072-6
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64(6), 1152-1168. doi: 10.1037/0022-006X.64.6.1152
- Janoff-Bulman, R. (1989). Assumptive worlds and the stress of traumatic events: Applications of the schema construct. *Social Cognition*, 7(2), 113-136. doi: 10.1521/soco.1989.7.2.113
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, 52(12), 1048-1060. doi:10.1001/archpsyc.1995.03950240066012
- Kramer, T. L., & Green, B. L. (1991). Posttraumatic stress disorder as an early response to sexual assault. *Journal of Interpersonal Violence*, 6(2), 160-173. doi: 10.1177/088626091006002002
- Liao, K. Y., & Wei, M. (2011). Intolerance of uncertainty, depression, and anxiety: The moderating and mediating roles of rumination. *Journal of Clinical Psychology*, 67(12), 1220-1239. doi: 10.1002/jclp.20846
- Lightfoot, S., & Oliver, J. (1985). The Beck Inventory: Psychometric properties in university students. *Journal of Personality Assessment*, 05(4), 434-436. doi: 10.1207/s15327752jpa4904\_12
- Manian, N., Schimdt, E. B., Marc H., & Martinez, P. (2013). Factor structure and clinical utility of BDI-II factor scores in postpartum women. *Journal of Affective Disorders*, 149(1-3), 259-268. doi: 10.1016/j.jad.2013.01.039
- Martin, M., & Rubin, R. B. (1995). A new measure of cognitive flexibility. *Psychological Reports*, 76(2), 623-626. doi: 10.2466/pr0.1995.76.2.623
- Maschi, T., & Baer, J. (2012). The heterogeneity of the world assumptions of older adults in prison: Do differing worldviews have a mental health effect? *Traumatology*, 19(1), 65-72. doi: 10.1177/1534765612443294
- Matsunaga, M., Okamoto, Y., Suzuki, S., Kinoshita, A., Yoshimura, S., Yoshino, A, ... Yamawaki, S. (2010). Psychosocial functioning in patients with treatment-resistant depression after group cognitive behavioral therapy. *BioMed Central Psychiatry*, 10(22), 1-10. doi: 10.1186/1471-244X-10-22
- Nolen-Hoeksema, S. (2000). The role of rumination in depression disorders and mixed depression/anxiety symptoms. *Journal of Abnormal Psychology*, 109(3), 504-511. doi: 10.1037/0021-843X.109.3.504
- Norris, F. H. (1990). Screening for traumatic stress: A scale for use in the general population. *Journal of Applied Psychology*, 20(20), 1704-18. doi: 10.1111/j.1559-1816.1990.tb01505.x
- Palm, K. M., & Follette, V. M. (2011). The roles of cognitive flexibility and experiential avoidance in explaining psychological distress in survivors of interpersonal victimization. *Journal of*

- Psychopathology & Behavioral Assessment*, 33 (1), 79-86. doi: 10.1007/s10862-010-9201-x
- Pengilly, J. W., & Dowd, E. T. (2000). Hardiness and social support as moderators of stress. *Journal of Clinical Psychology*, 56(6), 813-820. doi: 10.1002/(SICI)1097-4679(200006)56:6<813::AID-JCLP10>3.0.CO;2-Q
- Rawl, A., Collishaw, S., Thapar, A., & Rice, F. (2013). A direct method of assessing underlying cognitive risk for adolescent depression. *Journal of Abnormal Child Psychology*, 41(8), 1279-1288. doi: 10.1007/s10802-013-9760-x
- Rothbaum, F., Morling, B., & Rusk, N. (2009). How goals and beliefs lead people into and out of depression. *Review of General Psychology*, 13(4), 302-314. doi: 10.1037/a0017140
- Sarapas, C., Shankman, S. A., Harrow, M., & Goldberg, J. F. (2012). Parsing trait and state effects of depression severity on neurocognition: Evidence from a 26-year longitudinal study. *Journal of Abnormal Psychology*, 121(4), 830-837. doi: 10.1037/a0028141
- Schumm, J. A., Briggs-Phillips, M., & Hobfoll, S. E. (2006). Cumulative interpersonal traumas and social support as risk and resiliency factors in predicting PTSD and depression among inner-city women. *Journal of Traumatic Stress*, 75(6), 825-836. doi: 10.1002/jts.20159
- Smets, J., Luyckx, K., Wessel, I., & Raes, F. (2012). Depressed mood mediates the relationship between rumination and intrusions. *Australian Journal of Psychology*, 64(4), 209-216. doi: 10.1111/j.1742-9536.2012.0056.x
- Valiente, C., Cantero, D., Vázquez, C., Sanchez, Á., Provencio, M., & Espinosa, R. (2011). Implicit and explicit self-esteem discrepancies in paranoia and depression. *Journal of Abnormal Psychology*, 120(3), 691-699. doi: 10.1037/a0022856
- Wingo, A. P., Wrenn, G., Pelletier, T., Gutman, A. R., Bradley, B., & Ressler, K. J. (2010). Moderating effects of resilience on depression in individuals with a history of childhood abuse or trauma exposure. *Journal of Affective Disorders*, 26(3), 411-414. doi: 10.1016/j.jad.2010.04.009

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## Triple Comorbidity in Adolescence: A Literature Review of the Relations among Attention-Deficit Hyperactivity Disorder, Conduct Disorder, and Substance Abuse

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**Abstract**—This paper aims to explore literature relevant to the relation and interrelated occurrence of the following three disorders: attention-deficit hyperactivity disorder (ADHD), conduct disorder (CD), and substance use disorder (SUD). Research has shown ADHD to be one of the most common childhood psychological conditions. Additional research has shown CD is more prevalent among individuals with ADHD compared to the general population. As a result, CD can play a crucial role in the development of SUD in individuals with ADHD. The relation among these three common co-occurring disorders commands a well-rounded understanding of etiology and possible treatment approaches. This literature review addresses the co-occurrence, possible etiologies, and treatments of ADHD and SUD, CD and SUD, and the triple comorbidity of ADHD, CD, and SUD with the goal of finding common factors among all three disorders that can contribute to clinical and public understanding.

*Keywords:* ADHD, Substance abuse disorder, Conduct disorder, adolescence, comorbidity, treatment

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Attention deficit hyperactivity disorder (ADHD) is characterized by inattention and/or hyperactivity in which the client must exhibit six or more symptoms of either category for six months prior to diagnosis, and most symptoms must be present before 12 years of age (American Psychiatric Association [APA], 2013). This disorder is the most common reason children come to the attention of mental health practitioners, making it one of the most prevalent psychiatric disorders among children and adolescents, occurring in about 5% of children (Barkley, 2006). The prevalence of ADHD in the Western world has prompted researcher interest for the past few decades, leading to an immense body of literature dedicated to etiology, treatment, and outcomes of the disorder among adolescents and adults. Research has shown individuals with ADHD suffer from comorbid disorders including conduct disorder (CD) and substance use disorder (SUD; Hurtig et al., 2007). CD is a disorder in which children or adolescents show a pattern of behavior in which the basic rights of others, or major age-appropriate societal

norms or rules are violated. Examples of CD-related behaviors include aggression toward people, destruction of property, deceitfulness or theft, and serious violation of rules (APA, 2013). According to the APA, not only is CD commonly comorbid with ADHD, but it often predicts worse outcomes for the clients. One of these potential negative outcomes is SUD. Further, the comorbidity among ADHD, CD, and SUD increases risk for short and long-term negative consequences such as elevated engagement in risky sexual behaviors (Sarver, McCart, Sheidow, & Letourneau, 2014) and heightened mental health and substance use disorders in adulthood (Thompson, Riggs, Mikulich, & Crowley, 1996).

This review aims to gather and summarize literature dedicated to the triple comorbidity of ADHD, CD, and SUD due to the frequency, complexity, and potential consequences of the occurrence in adolescent populations. Literature related to the co-occurrence, possible etiologies, and treatment approaches will be highlighted in the paper. The review will examine these areas as they relate to

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ADHD and SUD, CD and SUD, and then the triple comorbidity of ADHD, CD, and SUD. These separate evaluations may aid in understanding and evaluating the complex relations among ADHD, CD, and SUD. This review will focus on the adolescent population because CD is a childhood condition and ADHD is most often first recognized in children. Additionally, adolescent individuals, whether diagnosed with ADHD or CD, are often more susceptible to risk taking involving substances.

### **Attention-Deficit/Hyperactivity Disorder and Substance Use**

#### **Prevalence and Etiology**

The occurrence of comorbid ADHD and SUD is reported in both clinical and community populations. Although not all research has reported significant relations between ADHD and substance use (Ostojic, Charach, Henderson, McAuley, & Crosbie, 2014), other studies have shown a prevalence of 16% within the community, and between 25 and 40% in clinical populations (Tamm, Adinoff, Nakonezny, Winhusen, & Riggs, 2012). The comorbid condition has been related to earlier onset of SUD, longer duration of SUD, and a higher risk for progression from alcohol misuse to drug use disorder (Tamm et al., 2012). To determine which types of ADHD are predictive of SUD, researchers have examined ADHD subtypes, characterized by the classic ADHD symptoms.

One example includes research by Tamm and colleagues (2012). Researchers divided ADHD into three common categorical subtypes as outlined by APA (2013): inattentive, hyperactive, and combined. This study combined data from 303 adolescents recruited from substance abuse programs. For participation, adolescents had to meet diagnosis for ADHD and at least one non-tobacco SUD. The average age of participants was 16.5 years. In this clinical population, the combined subtype was most common (N = 173), including elements of both the inattentive and hyperactive subtypes (Tamm et al., 2012). Overall, results showed the combined subtype had higher rates of alcohol and cocaine dependence. Participants with the combined subtype of ADHD showed a more severe course of ADHD with a greater variety of symptoms and greater risk for comorbidity. Despite this, all

three groups had a similar response to cognitive behavioral therapy (CBT). This shows that seemingly important differences at baseline did not factor in to the treatability of the clients.

Although some studies recruit individuals from substance abuse programs, twin studies have often been used to assess and compare substance use rates among individuals with and without ADHD. In one study, researchers sampled a population of 1,480 twin pairs in Sweden between May 1985 and December 1986, and assessed ADHD and substance use in four different age waves: 8-9, 13-14, 16-17, and 19-21 (Chang, Lichtenstein, & Larsson, 2012). ADHD was assessed with parent reports at waves one and two, whereas substance use was assessed at wave two. In this study, persistent hyperactivity at age wave 13-14 was associated with higher risk for early onset tobacco and alcohol use, which authors hypothesized could be bidirectional. The bidirectional hypothesis suggested early substance use could affect the development of the frontal lobe, which may lead to greater hyperactivity symptoms and a more severe presentation of ADHD. As enlightening as this idea may be, this is one of the few studies in the literature that specifically mentioned frontal lobe development as a factor.

In another twin study, researchers aimed to discover the link between ADHD and substance use by taking a closer look at patterns of attention problems (Palmer et al., 2013). In 2,361 individuals, Palmer and colleagues assessed ADHD, using the Diagnostic Interview Schedule for Children-IV, and substance use by utilizing the Composite International Diagnostic Interview-Substance Abuse Module in two waves. Average age of assessment for the first wave was 14.87, and 19.64 for the second wave. Results showed attention problems at wave one were predictive of risk for both illicit drug dependence and substance dependence at wave two. Authors predicted the relation between risk for dependence and inattention was mediated by substance use itself.

Research cited showed adolescents with ADHD characteristics are at a greater risk for developing substance use difficulties as compared to adolescents without ADHD. Additional research has identified risk factors that may facilitate the development of comorbid ADHD and SUD. One

such risk factor is family environment. Hurtig and colleagues (2007) compared individuals who scored 90% and greater on an ADHD symptom checklist to individuals who scored below 90%, using data from 6,622 adolescents in Finland. Results from this study showed low income families, non-intact families, and parents who felt stressed and had little interest in their children's lives were associated with a higher risk for ADHD comorbid with a range of other disorders, including SUD. Researchers concluded that although the onset of ADHD is partially determined by genetic factors, ADHD and other externalizing disorders such as SUD are mediated by family environment. This conclusion sees family environment as a stressor that can contribute and exacerbate ADHD leading to a comorbid SUD.

It has been suggested that in relation to family environment, parenting styles can play a crucial role in the development of comorbid ADHD and SUD. Walther and colleagues (2012) conducted a study with 142 adolescents with ADHD and 100 without ADHD, looking at four measures of parenting including: parental knowledge, parental consistency, parent-adolescent conflict, and parental support. Results of this study showed that among adolescents with ADHD, more parental knowledge was a significant predictor of lower levels of alcohol consumption. Although the relations between parental knowledge and alcohol consumption were significant in both groups, the relations were stronger among adolescents with ADHD symptomatology. Authors concluded ADHD may put further strain on a parent-child relationship leading to less parental knowledge about the adolescent's activities and result in more problem behaviors such as delinquency and substance use. Limitations of the study include adolescent report of parental behaviors, which may be negatively biased especially in such cases in which there is a significant strain on parent-child relationships.

### **Treatment**

The treatment of comorbid disorders is an intricate process; clinicians must always be aware of the status of the various disorders and sensitive to any worsening conditions among clients. Before deciding on a course of treatment, the proper diagnoses must be made. There are many diagnostic

issues to be aware of when assessing SUD and ADHD. For example, clinicians must be able to distinguish ADHD symptoms from those symptoms that may be the product of substance use such as impulsive behavior. To resolve this issue, many clinicians have required 30 days of sobriety from drugs before making a diagnosis. However, symptoms of withdrawal can continue past the 30 days, making diagnosis difficult (Ivanov, Pearson, Kaplan, & Newcorn, 2010). This sequential approach of first treating SUD, followed by ADHD is commonly found in the comorbid literature (Riggs, 1998). Other researchers have proposed the use of an integrated treatment approach, which treats the SUD and ADHD simultaneously (Schubiner et al., 1995). Regardless of sequential or integrated treatment, ADHD has been effectively treated with stimulant medication (Sibley, Kuriyan, Evans, Waxmonsky, & Smith, 2014; Wigal et al., 1999). However, the research is unclear about the use of stimulants for children or adolescents and the risk for later development of substance abuse. Wilson (2007) highlighted evidence both supporting and refuting the argument for stimulant treatment among adolescents. Some researchers have speculated the use of stimulants in children sensitizes them to the effects of illicit stimulants, leading to a higher risk for addiction. Yet research has shown methylphenidate (commonly used to treat ADHD) does not cause euphoria at high doses, like illicit substances. In a contrasting argument, Wilson mentioned the use of stimulant medication reduces the severity of ADHD symptoms, therefore reducing mediating factors such as impulsivity that may lead to negative peer influences and later SUD. To help manage the debate in the literature, treatment decisions should be made by the clinician on an individual client basis because each client's family, medical, and psychiatric history likely makes a difference in which treatment approach would work best (Schubiner, 2005).

There has been limited research completed on the efficacy of common adult psychological treatments for ADHD in adolescent clients. Yet some research has presented a strong argument for the use of cognitive behavioral therapy (CBT) (van Emmerik-van Ormerssen et al., 2013). CBT has been used in clients with ADHD, but few researchers have examined its effectiveness in indi-



viduals with co-occurring ADHD and SUD. Riggs et al. (2011) conducted a randomized controlled trial of 303 adolescents with comorbid ADHD and SUD. Participants were divided into two groups, CBT plus placebo and CBT plus osmotic-release methylphenidate. Results showed no significant group difference in clinician-rated ADHD symptomology or days using substance. Yet, secondary outcomes showed the CBT plus methylphenidate group experienced lower ADHD symptoms (based on parent reports) and a greater number of negative urine drug screens. Researchers highlighted it might be best for clinicians to begin treatment without any medication, given the non-significant differences in primary outcomes. Tamm et al. (2013) performed further analyses on this data to determine predictors of treatment response. The researchers found participants with "more severe ADHD had a greater reduction in ADHD symptoms and a greater likelihood of achieving 50% reduction in substance use, regardless of medication status" (p. 228). Those participants with more severe substance use experienced less of a reduction in ADHD symptoms. The researchers suggested the treatment plan of CBT plus osmotic-release methylphenidate may best for those participants who experience ADHD as their primary difficulty.

### **Attention-Deficit/Hyperactivity Disorder and Substance Use: Summary**

ADHD and SUD commonly co-occur, and the research linking specific subtypes to substance use outcomes is mixed. Yet research has supported that when ADHD and SUD co-occur, the course of both conditions can be more severe and more complicated to treat than either course alone. Research has shown family environment and parenting play a role in the progression of ADHD and co-occurring psychological disorders. Future research should focus on the development of ADHD and substance use in at-risk families and potential treatments involving family therapy. If certain parenting and family factors negatively influence ADHD and substance use, then involving family members in therapy may work to reduce the negative influence. Additionally, research is somewhat mixed on the risk of stimulant medications by adolescents for ADHD. There are concerns such medications will increase the likelihood for later development of

SUD. More solid evidence needs to be provided in this debate. For example, additional longitudinal studies may help determine if stimulant medication in childhood increases risk for SUDs in late-adolescence or early adulthood. If the risk is minimal, then stimulant medication for ADHD and substance use may be an effective treatment option. However, if the risk for later SUDs is elevated, then additional treatment options such as CBT should be emphasized.

## **Conduct Disorder and Substance Use Disorder**

### **Prevalence and Etiology**

Earlier onset of substance use creates a greater risk for developing substance use issues in adolescence and adulthood. Research has shown that increased alcohol use is three times more likely with adolescent or early onset conduct problems versus low conduct problems (Heron et al., 2013). Over 40% of individuals with early or adolescent conduct problems were drinking hazardously by age 16. CD severity has been linked to substance use severity in adolescents in residential mental health programs (Young et al., 1995). CD is more common in males than females (APA, 2013). Yet some research has shown CD is only predictive of subsequent SUD in females (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). This research is inconclusive, as other reports have shown CD to be related to SUD in males and not females (Whitmore et al., 1997). Among boys who participated in the study conducted by Whitmore and colleagues, all met criteria for CD, 93% were dependent on one or more drugs, and 67% used more than five drug categories at least monthly. Further, researchers have found CD coexists in as many as 44% of individuals with SUD (Chong, Chan, & Cheng, 1999). Although the results on gender effects are mixed, it is apparent the occurrence of SUD among people with CD is pervasive and in need of investigation into factors that may better our understanding of the co-occurrence.

Genetic factors are often distinct vulnerabilities for a number of conditions; these vulnerabilities may not lead to psychiatric conditions, but with the presence of stress can become active disorders within the client (Ingram & Luxton, 2005). In a study of 645 monozygotic twin pairs and 702

dizygotic twin pairs, classic twin analyses were used to estimate genetic effects by comparing monozygotic versus dizygotic twin pairs (Button et al., 2007). Results showed that in relation to CD and alcohol and drug dependence, monozygotic twins were more similar compared to dizygotic twins, which demonstrates a genetic vulnerability connecting CD and symptoms of alcohol and illicit drug dependence in adolescents. In other words, researchers suggested this shows a common influence on phenotypes leading to CD, alcohol dependence, and drug dependence. This research recognized genetic vulnerability is one factor that can lead to SUD in a population with and without CD. Another vulnerability factor which may be coupled with genetic vulnerability is behavioral disinhibition.

A significant amount of research has explored the effects of behavioral disinhibition on child and adolescent behavior. This behavioral disinhibition includes the diminished capacity to inhibit socially undesirable or restricted actions, which is the defining trait of CD. Researchers have shown that the characteristic of behavioral disinhibition represents a specific phenotype present within externalizing disorders such as CD throughout the lifespan (Iacono, Malone, & McGue, 2008). This general disinhibition may lead to adolescents and sometimes adults who are more likely to engage in substance abuse and other externalizing behaviors. For example, research has determined a correlation between CD and later substance abuse through behavioral disinhibition. Behavior disinhibition also often includes aggression. Aggression is one of the primary characteristics of CD; this characteristic can be seen as a risk factor for later development of deviant behavior, including SUD (Connor & Lochman, 2010).

### **Treatment**

Little evidence for explicit research on treatment of CD and comorbid substance abuse is available. Rather, the research in the area tends to focus on juvenile offenders. Multisystemic therapy (MST) is often implemented with substance abuse juvenile offenders, and individuals with CD often run into issues with the law. MST aims to have a therapeutic influence on systemic and intrapersonal factors associated with delinquent behavior

(Borduin et al., 1995). MST has led to decreased aggression and better family relations in comparison to individual therapy. It was unclear if the participants in the study conducted by Borduin and colleagues could be clinically diagnosed with CD according to DSM criteria. It is also unclear whether this treatment directly affected substance use. However, researchers reported a decrease in behavioral problems and delinquent behaviors, which may or may not include substance use.

Whitmore, Mikulich, Ehlers, and Crowley (2000) specifically examined the treatment of females with comorbid SUD and CD. The sample included 60 females with a mean age of 15.5 years. In this study, treatment included weekly individual and group therapy sessions addressing criminality and drug use, as well as family therapy and random urine screenings. Follow-up was examined 6 to 21 months post discharge from treatment. Outcomes showed no significant improvement in participants substance use over time, but significant improvements in criminality and CD symptoms from intake and at follow-up. Authors stated, "adolescent SUD may be more chronic than adolescent psychiatric disorders and may require continuing treatment and support" (p. 138). These researchers also found that among ADHD, performance IQ, and age of first CD symptom, performance IQ was predictive of substance use in female adolescents. This research explored many factors that may affect the comorbidity, but showed that multiple forms of treatment may combine to effectively treat multiple psychiatric disorders.

Treatment can also be examined from a prevention standpoint. Connor and Lochman (2010) explained results and advantages of the program "Coping Power." This treatment approach is used with individuals who have oppositional defiant disorder or CD. "Coping Power" is intended to improve behavioral dysregulation and disinhibition, and seeks to reduce the aggression risk factor. Follow-ups of children who have participated in these programs have shown a decrease in drug use and overt aggression. It is noteworthy that studies on the treatment of the comorbidity of CD and substance abuse often include participants who are triply diagnosed with ADHD. Findings suggested CD is a moderator of the relations between ADHD and adolescent substance use, such that only ado-

lescents high in CD symptoms will experience substance use following ADHD symptom development (Marshal & Molina, 2006). This research by Marshal and Molina pertains more to triple comorbidity. These research findings along with treatments that address all three diagnoses will be discussed in the next section. Treatments for the triple comorbidity may generalize well to individuals diagnosed with comorbid CD and SUD.

### **Conduct Disorder and Substance Use Disorder: Summary**

Within the literature, individuals with CD are often also diagnosed with ADHD. However, individuals with ADHD are not commonly diagnosed with CD. This pattern provided insight into further avenues for research especially for individuals with CD and SUD. For example, genetic factors are often highlighted. Research exploring genetics and phenotypes related to externalizing behaviors may play an important role in the link between CD and SUD. If there is genetic vulnerability, then exploring early intervention techniques in this population may help combat genetics with positive environmental influences. Whitmore et al. (2000) suggested performance IQ may be another vulnerability that affects this population, increasing risk for substance use in adolescents with CD. Exploring factors affecting performance IQ, or potentially intervention possibilities on performance IQ, may work to decrease risk for substance use. Many of the treatments found during the literature search were of juvenile delinquents who may or may not have had clinically diagnosed CD. Future research on juvenile delinquents may benefit from more clearly assessing or specifying CD diagnoses to provide a firmer description of the study sample and improve study generalizability.

### **Triple Comorbidity Prevalence and Etiology**

Among those adolescents with ADHD, CD has been shown to be comorbid in 30 to 50% of cases (Biederman, Newcorn, & Sprich, 1991). Further, adolescents with ADHD and CD reported the highest levels of substance use and SUD compared to individuals with ADHD only (Molina & Pelham, 2003). In a study with 395 adolescents with alcohol use disorder, 30% of participants had ADHD

and 70% had CD (Molina, Bukstein, & Lynch, 2002). In the same study, the researchers found most participants with CD also had ADHD; only 3% of adolescents had ADHD without CD. Adolescents with SUD, ADHD, and CD showed more severe symptomatology than adolescents with CD and SUD. However, the researchers could not determine that triple comorbidity leads to more severe substance use because adolescents with CD problems had the most severe substance use histories. Additionally, there was no interaction between ADHD and CD in relation to substance use. These researchers hypothesized an interaction did not result due to the pervasiveness of the conduct problems in the sample.

Many researchers have attempted to examine the interactive elements of ADHD and CD that create a greater vulnerability to using substances. Molina, Smith, and Pelham (1999) used teacher and student reports of 202 high risk 6th, 7th, and 8th grade students to effectively diagnosis ADHD and CD based on DSM-IV criteria. These researchers compared interactions between four groups on use of substances: CD only, ADHD only, CD+ADHD, and no diagnosis. Results showed the comorbid group consistently showed higher rates of substance use than the CD group or ADHD group. These results also showed when ADHD was broken down into symptom categories, substance use was strongly related to hyperactive/impulsivity subtypes more than inattention subtypes. Thus, ADHD may start children and adolescents on a pathway for early onset CD. This becomes apparent when ADHD is disaggregated into its individual parts, which show that impulsivity can lead to escalation in substance abuse. Although the results were insightful, limitations of this study include reliance on self-report measures.

Molina and colleagues (1999) suggested comorbid ADHD and CD puts adolescents on a different developmental trajectory versus when an adolescent has one disorder. Wilson (2007) appeared to agree, and argued comorbid ADHD and CD can be seen as a distinct type of disruptive behavior disorder due to the distinct symptom patterns present as the conditions are working in tandem. As a result, the risk for SUD may be increased. Wilson's main focus was the epidemiology of ADHD. Yet due to this idea of ADHD and CD exist-

ing as a distinct disorder, he tried to determine the relevant similarities between ADHD and other behavioral disorders including CD. One of these similarities between CD and ADHD was behavioral impulsivity, which can be placed in the category of behavioral disinhibition discussed earlier. Behavioral impulsivity may be tied to maladaptive learning by the user, where his or her drug use is a product of behavioral impulsivity that ignores long-term consequences of drug use in an attempt to reach immediate gratification. These explanations, which rely on a behavioral model, may explain a part of the relation among ADHD, CD, and SUD.

This explanation provided by Wilson (2007) follows closely the maturation theory presented by Tarter and colleagues (1999), which explored the cause of early onset substance use. The maturation theory described how adolescents with dysregulation within their environment (emotional or behavioral) are placed on a path toward later SUD. Tarter and colleagues suggested differing biological maturation predisposes individuals to dysregulation which is externalized into disorders in later childhood such as ADHD, CD, or both. Dysregulation is first shown as difficult temperament in early life, but can change into conduct problems and impulsivity. It is possible this dysregulation will impact social functioning, leading adolescents to seek out deviant peer groups, where the use of substances may be practiced.

ADHD is often associated with impairment in social functioning, such as peer rejection, neglect, or affiliation with deviant peer groups (APA, 2013). Marshal, Molina, and Pelham (2003) hypothesized deviant peer groups mediated substance abuse and conduct problems in adolescence. The researchers operationalized deviant peer association as perceived peer substance use, perceived peer tolerance of substance use, and mother approval of the participant's peers. These results indicated 60% of participants had at least one friend who used substances on a regular basis. Compared to controls, participants with ADHD were more likely to report affiliation with deviant peers, and this affiliation mediated the effects of childhood ADHD on adolescent substance use and conduct problems.

Later research by Marshal and Molina (2006) speculated about the role CD plays in the environment of those individuals with comorbid

ADHD and CD. Specifically, the role of CD was examined in the relations among peer group affiliation, ADHD, and SUD among adolescents. Marshal and Molina (2006) hypothesized the relation between peer group affiliation and substance use, as well as the relations between ADHD symptoms and deviant peer affiliation, would be stronger for children with CD symptoms. To test this hypothesis, researchers examined 142 children clinically diagnosed with ADHD, according to DSM-III or DSM-IV criteria, and treated for services at the Western Psychiatric Institute and Clinical ADD Program. Children were interviewed between the ages of 13 and 17 to assess CD symptoms, deviant peer affiliation, substance use, and substance use disorders. Results showed CD symptoms in adolescence moderated the relations between deviant peer groups and substance use problems. Individuals with CD deviate from society at large and tend to select peers who do the same. With these deviant peer groups, individuals with concurrent ADHD and CD are more likely to use and abuse substances due to peer influence, behavior dysregulation, impulsivity and a number of other factors intrinsic to the comorbidity.

Flory, Milich, Lynam, Leukefeld, and Clayton (2003) studied the effects of hyperactivity-impulsivity-inattention (HIA) symptoms and conduct problems on substance use, and hypothesized participants with coexisting disorders would have greater substance dependence problems than participants with either disorder alone. Participants in this study included 481 individuals who were part of a 10 to 12 year longitudinal study examining the etiological pathways leading to substance use and psychopathology. In this case, adolescents were assessed by written questionnaires before they started sixth grade and follow-up was collected over five years, from 6th to 10th grade. Later information was collected using a mail survey when participants were between 19 and 21 years of age. Results confirmed individuals with both hyperactivity-impulsivity and conduct problems were at risk for the most severe substance problems in adolescence. Analyses showed that among participants with an average level of HIA, conduct problems influenced the degree of substance use and dependence. Additionally, high HIA and low conduct problems related to lower substance use

problems. This suggests HIA may serve as a protective factor in the development of SUD in the absence of conduct problems; however, further research is needed to explore this possibility. A limitation of this study is its reliance on recall evidence to support HIA and conduct problems. This retrospective self-report evidence may be biased and unreliable.

Whitmore et al. (1997) studied the effects of gender, CD, and ADHD on adolescents' substance abuse, a unique perspective as most articles do not take gender into account. Average ages of participants were 15.3 years for females, and 16.0 years for males. Substance abuse among this particular population was severe. Participants with substance use diagnoses had them for three to four substances, on average. In this sample, prevalence of ADHD diagnoses did not differ by gender, although males reported more CD behaviors than females. It seemed CD severity associated with substance dependence severity only in males. Similarly, among clients diagnosed with major depressive disorder, ADHD, and CD, only major depressive disorder was significantly associated with substance dependence symptoms in females. In males, the joint severity of all diagnoses was linked to the substance dependence symptoms. This may be linked to the severity of CD reported by males, and the findings that CD is normally evident at a younger age in males.

### **Treatment**

Little research has been done on effective treatments for the triple comorbid population presented in this review. Research to date has shown ADHD with comorbid CD is related to more severe substance use and mental health disorders in adulthood (Thompson et al., 1996). The combination of substance use and mental health disorders (rather than substance use alone or mental health alone) makes treatment more difficult. In such cases, Riggs (1998) researched the efficacy of a sequential treatment model, focused on treating SUD, then mental illness. Riggs suggested addressing this specific triple comorbidity by reducing severity of SUD symptoms, via CBT and family therapy, then the use of stimulant treatments with low abuse potential to treat ADHD. In accordance with this model, after substance use has been greatly

diminished, treating mental illness will involve a pharmacological agent with a low abuse potential.

One of the pharmacological agents suggested by Riggs includes bupropion (Riggs, Leon, Mikulich, & Pottle, 1998). Bupropion has a low abuse potential and has been shown to create reductions in aggression and conduct problems. This treatment was administered to clients after a one-month period of abstinence from substances. It was tested on 13 males between the ages of 14 and 17 years, most of whom had failed previous treatment interventions. Diagnoses of CD and ADHD were made by using the Diagnostic Interview Schedule for Children (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The treatment was implemented for five weeks, during which time most clients decreased in severity from being markedly ill to only mildly ill. Most striking in this study was the clients' desire to continue treatment; 85% of clients voiced desire to continue the treatment they were on. This desire to continue treatment is worth consideration due to the low retention rates common among comorbid populations, yet Riggs admits to the need for further research due to a small sample size. Additionally, the treatment focused on ADHD and conduct problems with a sample that was abstinent from substance use, once again showing a sequential treatment approach.

Among individuals diagnosed with ADHD, CD, and SUD, differences in severity can change among community and clinical samples, impacting the treatment effectiveness. More research must be done on the effects of gender, prevalence, and onset in order to determine the best course of action. As is common in clinical practice, it is necessary to consider client history when picking a treatment model.

### **ADHD, CD, and SUD: Summary**

This area of research would benefit from more studies using clinical diagnostic techniques; many of the studies presented use self-report measures of participants and their families. One avenue for further research in this area is developing temporality between ADHD and CD. Both childhood disorders often precede the development of SUD, yet little is known about whether ADHD or CD commonly occurs first. Research also shows vary-

ing results about the unique contributions of ADHD and CD on substance use. In certain cases, hyperactivity may be a protective factor (Flory et al., 2003). Yet in other studies, it was ADHD alone that contributed to severity of certain substances. Conduct disorder was also shown to play a role in the development of substance use alone, but sometimes only affected one gender (Whitmore, 1997). These nuances may show important insights into the possibility of multiple developmental trajectories leading to the experience of compounded ADHD, CD, and SUD. The exploration of deviant peer group affiliation and behavior dysregulation would be a valuable avenue for more research, especially among school age children and adolescents. With adolescents, peers have a significant influence on behavior. If deviant peer group affiliation is validated as an important risk factor, schools may work toward prevention therapies. Due to the more severe psychopathology presented by individuals with this triple comorbidity, it would be expected there would be extensive research on plausible treatment options. However, there is no strong evidence for whether sequential or integrated treatment is best, and in fact, may depend on the individual.

### Conclusion

The comorbid diagnosis of ADHD and CD is associated with greater severity of symptoms and a poorer psychiatric prognosis. One of the potential outcomes for this poorer prognosis is substance use and SUD. This triple comorbidity of ADHD, CD, and SUD has been found to be prevalent in adolescents from both clinical and community settings. Researchers have found a genetic correlation between ADHD and many externalizing disorders, such as conduct disorder and substance abuse. Although genetics may explain a piece of this puzzle, many studies have shown that psychological and environmental variables including family environment, deviant peer groups, impulsivity, and behavior disinhibition play a role. Even with the knowledge that exists, it is apparent additional research is needed to further understand the etiology and treatment of such disorders in adolescents. The limited amount of research demonstrating effective treatments may be due to the complexity of triple comorbidity. Regardless, this complexity

### ADHD, CD, AND SUBSTANCE ABUSE IN ADOLESCENCE

speaks to the importance of treatment development. Although this review covered literature that focused on the adolescent population, it is pertinent to note the display of these disorders in adolescence can affect their trajectory into adulthood. Increasing knowledge about this population can lead to important clinical applications as well as awareness among the general population. Because ADHD is one of the most diagnosed childhood disorders, there has been an influx in research. Within that research, the prevalence of these comorbid disorders should not be ignored.

### References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Association.
- Barkley, R. A. (2006). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment*. New York, NY: Guilford Press.
- Biederman, J., Newcorn, J., & Sprich, S. (1991). Comorbidity of attention deficit hyperactivity disorder with conduct, depressive, anxiety, and other disorders. *American Journal of Psychiatry, 148*(5), 564-577.
- Borduin, C. M., Mann, B. J., Cone, L. T., Henggeler, S. W., Fucci, B. R., Blaske, D. M., & Williams, R. A. (1995). Multisystemic treatment of serious juvenile offenders: Long-term prevention of criminality and violence. *Journal of Consulting and Clinical Psychology, 63*(4), 569-578. doi:10.1037/0022-006X.63.4.569
- Button, T. M. M., Rhee, S. H., Hewitt, J. K., Young, S. E., Corley, R. P., & Stallings, M. C. (2007). The role of conduct disorder in explaining the comorbidity between alcohol and illicit drug dependence in adolescence. *Drug and Alcohol Dependence, 87*(1), 46-53. doi: 10.1016/j.drugalcdep.2006.07.012
- Chang, Z., Lichtenstein, P., & Larsson, H. (2012). The effects of childhood ADHD symptoms on early-onset substance use: A Swedish twin study. *Journal of Abnormal Child Psychology, 40*(3), 425-435. doi:10.1007/s10802-011-9575-6
- Chong, M., Chan, K., & Cheng, A. T. A. (1999). Substance use disorders among adolescents in Taiwan: Prevalence, sociodemographic corre-

- lates and psychiatric comorbidity. *Psychological Medicine*, 29(6), 1387-1396. doi:10.1017/S0033291799001257
- Conner, B. T., & Lochman, J. E. (2010). Comorbid conduct disorder and substance use disorders. *Clinical Psychology: Science and Practice*, 17(4), 337-349. doi:10.1111/j.1468-2850.2010.01225.x
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*, 60(8), 837-844. doi:10.1001/archpsyc.60.8.837
- Flory, K., Milich, R., Lynam, D. R., Leukefeld, C., & Clayton, R. (2003). Relation between childhood disruptive behavior disorders and substance use and dependence symptoms in young adulthood: Individuals with symptoms of attention-deficit/hyperactivity disorder are uniquely at risk. *Psychology of Addictive Behaviors*, 17(2), 151-158. doi:10.1037/0893-164X.17.2.151
- Heron, J., Maughan, B., Dick, D. M., Kendler, K. S., Lewis, G., Macleod, J., ... Hickman, M. (2013). Conduct problem trajectories and alcohol use and misuse in mid to late adolescence. *Drug and Alcohol Dependence*, 133(1), 100-107. doi: 10.1016/j.drugalcdep.2013.05.025
- Hurtig, T., Ebeling, H., Taanila, A., Miettunen, J., Smalley, S., McGough, J., ... Moilanen, I. (2007). ADHD and comorbid disorders in relation to family environment and symptom severity. *European Child & Adolescent Psychiatry*, 16(6), 362-369. doi:10.1007/s00787-007-0607-2
- Iacono, W. G., Malone, S. M., & McGue, M. (2008). Behavioral disinhibition and the development of early-onset addiction: Common and specific influences. *Annual Review of Clinical Psychology*, 4, 325-348. doi:10.1146/annurev.clinpsy.4.022007.141157
- Ingram, R. E., & Luxton, D. D. (2005). Vulnerability-stress models. In B. L. Hankin & J. Abela (Eds.), *Development of psychopathology: A vulnerability-stress perspective* (pp. 32-46). Thousand Oaks, CA: Sage Publications.
- Ivanov, I., Pearson, A., Kaplan, G., & Newcorn, J. (2010). Treatment of adolescent ADHD and comorbid substance abuse. *International Journal of Child and Adolescent Health*, 3(2), 163-177.
- Marshal, M. P., & Molina, B. S. G. (2006). Antisocial behaviors moderate the deviant peer pathway to substance use in children with ADHD. *Journal of Clinical Child and Adolescent Psychology*, 35(2), 216-226. doi:10.1207/s15374424jccp3502\_5
- Marshal, M. P., Molina, B. S. G., & Pelham, W. E. J. (2003). Childhood ADHD and adolescent substance use: An examination of deviant peer group affiliation as a risk factor. *Psychology of Addictive Behaviors*, 17(4), 293-302. doi:10.1037/0893-164X.17.4.293
- Molina, B. S., Bukstein O. G., & Lynch, K. G. (2002). Attention-deficit/hyperactivity disorder and conduct disorder symptomatology in adolescents with alcohol use disorder. *Psychology of Addictive Behaviors*, 16(2), 161-164. doi: 10.1037/0893-164X.16.2.161
- Molina, B. G., & Pelham, W. R. (2003). Childhood predictors of adolescent substance use in a longitudinal study of children with ADHD. *Journal of Abnormal Psychology*, 112, 497-507. doi:10.1037/0021-843X.112.3.497
- Molina, B. S. G., Smith, B. H., & Pelham, W. E. (1999). Interactive effects of attention deficit hyperactivity disorder and conduct disorder on early adolescent substance use. *Psychology of Addictive Behaviors*, 13(4), 348-358. doi:10.1037/0893-164X.13.4.348
- Ostojic, D., Charach, A., Henderson, J., McAuley, T., & Crosbie, J. (2014). Childhood ADHD and addictive behaviours in adolescence: A Canadian sample. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 23(2), 128-135.
- Palmer, R. C., Knopik, V. S., Rhee, S., Hopfer, C. J., Corley, R. C., Young, S. E., ... Hewitt, J. K. (2013). Prospective effects of adolescent indicators of behavioral disinhibition on DSM-IV alcohol, tobacco, and illicit drug dependence in young adulthood. *Addictive Behaviors*, 38(9), 2415-2421. doi:10.1016/j.addbeh.2013.03.021
- Riggs, P. D. (1998). Clinical approach to treatment of ADHD in adolescents with substance use disorders and conduct disorder. *Journal of the American Academy of Child & Adolescent Psy-*

- chiatry*, 37(3), 331-332. doi: 10.1097/00004583-199803000-00019
- Riggs, P. D., Leon, S. L., Mikulich, S. K., & Pottle, L. C. (1998). An open trial of bupropion for ADHD in adolescents with substance abuse disorders and conduct disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, 37(12), 1271-1278. doi: 10.1097/00004583-199812000-00010
- Riggs, P. D., Winhusen, T., Davies, R. D., Leimberger, J. D., Mikulich-Gilbertson, S., Klein, C., ... Liu, D. (2011). Randomized controlled trial of osmotic-release methylphenidate with cognitive-behavioral therapy in adolescents with Attention-Deficit/Hyperactivity Disorder and substance use disorders. *Journal of the American Academy of Child & Adolescent Psychiatry*, 50(9), 903-914. doi:10.1016/j.jaac.2011.06.010
- Sarver, D. E., McCart, M. R., Sheidow, A. J., & Letourneau, E. J. (2014). ADHD and risky sexual behavior in adolescents: Conduct problems and substance use as mediators of risk. *Journal of Child Psychology and Psychiatry*, 55(12), 1345-1353. doi: 10.1111/jcpp.12249
- Schubiner, H. (2005). Substance abuse in patients with attention-deficit hyperactivity disorder: Therapeutic implications. *CNS Drugs*, 19(8), 643-655. doi: 10.2165/00023210-200519080-00001
- Schubiner H., Tzelepis A., Isaacson J. H., Warbasse, L. H., Zacharek, M., & Musial, J. (1995). The dual diagnosis for attention deficit/hyperactivity disorder and substance abuse: Case reports and literature review. *Journal of Clinical Psychiatry*, 56(4), 146-50.
- Shaffer, D., Fisher P., Lucas, C. P., Dulcan, M. K., & Schwab-Stone, M. E. (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): Description, differences from previous versions, and reliability of some common diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39(1), 28-39. doi: 10.1097/00004583-200001000-00014
- Sibley, M. H., Kuriyan, A. B., Evans, S. W., Waxmonsky, J. G., & Smith, B. H. (2014). Pharmacological and psychosocial treatments for adolescents with ADHD: An updated systematic review of the literature. *Clinical Psychology Review*, 34(3), 218-232. doi: 10.1016/j.cpr.2014.02.001
- Tamm, L., Adinoff, B., Nakonezny, P. A., Winhusen, T., & Riggs, P. (2012). Attention-deficit/hyperactivity disorder subtypes in adolescents with comorbid substance-use disorder. *American Journal of Drug and Alcohol Abuse*, 38(1), 93-100. doi:10.3109/00952990.2011.600395
- Tamm, L., Trello-Rishel, K., Riggs, P., Nakonezny, P. A., Acosta, M., Bailey, G., & Winhusen, T. (2013). Predictors of treatment response in adolescents with comorbid substance use disorder and attention-deficit/hyperactivity disorder. *Journal of Substance Abuse Treatment*, 44(2), 224-230. doi: 10.1016/j.jsat.2012.07.001
- Tarter, R. E., Vanyukov, M., Giancola, P., Dawes, M., Blackson, T., Mezzich, A., & Clark, D.B. (1999). Etiology of early age onset substance use disorder: A maturational perspective. *Development and Psychopathology*, 11(4), 657-683. doi: 10.1017/S0954579499002266
- Thompson, L. L., Riggs, P. D., Mikulich, S. K., & Crowley, T. J. (1996). Contribution of ADHD symptoms to substance problems and delinquency in conduct-disordered adolescents. *Journal of Abnormal Child Psychology*, 24(3), 325-347. doi: 10.1007/BF01441634
- van Emmerik-van Oortmerssen, K., Vedel, E., Koeter, M. W., de Bruijn, K., Dekker, J., van den Brink, W., & Schoevers, R. A. (2013). Investigating the efficacy of integrated cognitive behavioral therapy for adult treatment seeking substance use disorder patients with comorbid ADHD: Study protocol of a randomized controlled trial. *BMC Psychiatry*, 13, 132. doi: 10.1186/1471-244X-13-132
- Walther, C. A. P., Cheong, J., Molina, B. S. G., Pelham, W. E. J., Wymbs, B. T., Belendiuk, K. A., ... Pedersen, S. L. (2012). Substance use and delinquency among adolescents with childhood ADHD: The protective role of parenting. *Psychology of Addictive Behaviors*, 26(3), 585-598. doi:10.1037/a0026818
- Whitmore, E. A., Mikulich, S. K., Ehlers, K. M., & Crowley, T. J. (2000). One-year outcome of adolescent females referred for conduct disorder and substance abuse/dependence. *Drug*



- and Alcohol Dependence*, 59(2), 131-141.  
doi:10.1016/S0376-8716(99)00112-X
- Whitmore, E. A., Mikulich, S. K., Thompson, L. L., Riggs, P. D., Aarons, G. A., & Crowley, T. J. (1997). Influences on adolescent substance dependence: Conduct disorder, depression, attention deficit hyperactivity disorder, and gender. *Drug and Alcohol Dependence*, 47(2), 87-97. doi: 10.1016/S0376-8716(97)00074-4
- Wigal, T., Swanson, J. M., Regino, R., Lerner, M. A., Soliman, I., Steinhoff, K., ... Wigal, S. B. (1999). Stimulant medications for the treatment of ADHD: Efficacy and limitations. *Mental Retardation and Developmental Disabilities Research Reviews*, 5(3), 215-224. doi: 10.1002/(SICI)1098-2779(1999)5:3<215::AID-MRDD8>3.0.CO;2-K
- Wilson, J. J. (2007). ADHD and substance use disorders: Developmental aspects and the impact of stimulant treatment. *The American Journal on Addictions*, 16(s1), 5-13.  
doi:10.1080/10550490601082734
- Young, S. E., Mikulich, S.K., Goodwin, M. B., Hardy, J., Martin, C. L., Zoccolillo, M. S., & Crowley, T. J. (1995). Treated delinquent boys' substance use: Onset, pattern, relationship to conduct and mood disorders. *Drug and Alcohol Dependence*, 37(2), 149-161. doi: 10.1016/0376-8716(94)01069-W

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## Do You See What I Mean? Text Message Dependency, Multitasking, and Social Cue Recognition

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**Abstract**—The current study investigated the relationship among self-perceived text message dependency, multitasking while text messaging, and social cue recognition. The study was conducted in two groups. The first group was the multitasking group. In this group, participants completed two tasks: watching a video vignette for social cue recognition and sending a text message concurrently. The second, a control group, completed the same tasks separately. Next, both groups completed a scale that measured self-perceived text message dependency. A significant difference was found between the multitasking group and the control group for scores on a social cue recognition test. There was no relationship between self-perceived text message dependency and social cue recognition. Implications for the findings of this study and directions for future research are discussed.

*Keywords:* text message dependency, multitasking, social cue recognition

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There is a growing interest in the psychological impact of technology on human relationships. One particular area of interest includes the use of text messaging for communication. Text messaging may actually be replacing a great deal of face-to-face communication and can become addictive (Igarashi, Motoyoshi, Taki, & Yoshida, 2005). Furthermore, text messaging frequently occurs when individuals are participating in different activities while in the presence of others, thus raising questions about the effect multitasking has on social relationships (Jeong & Fishbein, 2007). More specifically, distraction while multitasking has an effect on sustained attention and cognitive learning (Wei, Wang, & Klausner, 2012). Multitasking with media may also limit time spent engaging in face-to-face communication and has been related to decreased feelings of well-being in relationships (Pea et al., 2012). On the premise that individuals who are addicted to text messaging may spend less time engaging in face-to-face communication, this study was designed to examine how text message dependency may affect individuals ability to recognize social cues, and to examine the relationship between multitasking and social cue recognition.

To our knowledge, there are no current studies investigating the relationship among text message dependency, multitasking, and social cue recognition.

According to a statistical analysis of smart phone subscribers, 75% of people who own a smart phone use text messaging to communicate (Com.score, 2012). Cell phone use is particularly prominent among individuals aged 17-21 (Faulkner & Culwin, 2005). The frequent use of text messaging may be due to the convenience it allows to maintain connections to friends and associates who are not in close proximity. Being available by text messaging may create the expectation and a disproportionate dependence to offset face-to-face conversations in social networks (Igarashi, Motoyoshi, Taki, & Yoshida, 2008). The expectations of perpetual availability can be related to feelings of guilt and feeling pressured to respond to text messages and phone calls that imparts dissatisfaction in friendships (Hall & Baym, 2011). Furthermore, there is an increased interest in individuals who may be dependent on text messaging for relaying all types of communication.

Text message dependency may interfere

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with daily life and result in negative psychological and behavioral symptoms similar to alcohol and gambling addictions. Igarashi et al. (2008) have operationally defined text message dependency as, “text messaging related compulsive behavior that causes psychological/behavioral symptoms resulting in negative social outcomes” (p. 2313). In a study of internet and text message dependency in Japanese adults, depression was positively correlated with both dependency on internet use and text messaging (Lu et al., 2011). Another study of psychological predictors of mobile phone use reported that people who are prone to exhibit other maladaptive behavioral or technological addictions seem to be more vulnerable to high and problematic use of texting (Bianchi & Phillips, 2005). The concern for the negative effects of texting has led to the creation of two measurement scales for text message dependency, including the Self-Perception of Text Message Dependency Scale (Igarashi et al., 2008), and the Short Message Service (SMS) Problem Use Questionnaire (Rutland, Sheets, & Young, 2007).

Beyond text message dependency, another factor that may be related to a variety of negative social and psychological outcomes is the distraction of multitasking while texting. For example, the frequency of text message usage while performing other tasks may contribute to distraction while multitasking (Pea et al., 2012). Texting while driving is perhaps the most highly publicized and well-known example of the consequences of multitasking and distraction. Many states have passed laws forbidding texting while driving, and have created educational programs to prevent accidents related to being distracted by texting while driving. Numerous studies have demonstrated that using cell phones while driving leads to a plethora of cognitive and driving deficits; including higher collision rates, slower brake reaction time, and less time obeying posted speed limits (Cooper & Strayer, 2008; Strayer & Drews, 2004; Strayer, Drews, & Crouch, 2006). One study found that sending and receiving text messages while driving produced a higher mental demand, more frequent and longer glances away from the road, and diminished performance on steering measures (Owens, McLaughlin, & Sudweeks, 2011). Multitasking has been found to cause distraction which affects individu-

als’ attentional focus.

Because multitasking impacts attention, cell phones are prohibited in many classrooms due to the distraction they cause students. In a survey study on self-regulation and text message use during class time, results showed students who could not self-regulate their texting behaviors were distracted, and a negative correlation was found between classroom text messaging and self-reported learning ability (Wei et al., 2012). The majority of students who multitask while sending and receiving text messages reported that multitasking was detrimental to their school work, but beneficial to maintaining social relationships (Junco & Cotton, 2011). It appears when students choose to focus their attention on texting, there are negative consequences for school performance. Considering the number of individuals who are using texting for communication, many areas of life may be impacted by the attentional shift that occurs while sending and receiving text messages.

In a study of 14-22 year olds keeping a diary of activities with media use, researchers reported 76% of the time participants were using technology while engaging in one or more additional activities, indicating that for this demographic, multitasking is common (Jeong & Fishbein, 2007). Given the prevalence of individuals who use technology for communication and who appear to be multitasking while texting, it is important to consider the effects distraction and less face-to-face communication may have on the ability to correctly interpret conversational meaning by being able to recognize nonverbal social cues.

Social cue recognition refers to the ability to decode and understand meaning shown in nonverbal behavior (Archer & Akert, 1977). In fact, communication theory posits that social cue recognition is the key factor of language and emotional expression that may account for a larger percentage of accurate understanding of communication than the verbal word spoken alone (Merhabian, 2008). The ability to correctly interpret the social cues others are using to communicate emotional content is a vitally important facet of face-to-face communication. Accurate social cue recognition and a clear understanding of the emotional meaning being communicated may be hindered if individuals are staring at their phone and missing visu-

al cues because eye contact is not being utilized.

In a study of performance on the Social Interpretations Task (SIT), researchers reported words alone were not enough for the correct discernment of conversational social meaning. Participants completed the SIT in one of two conditions. One group was presented with a written version, and the other was presented with a video version containing the verbal and non-verbal messages. Accurate social interpretation was found to occur only when both non-verbal and verbal conditions were presented at the same time. Participants taking the test in the written version actually performed worse than would have been expected by chance (Archer & Akert, 1977). Also, in a study of college students that examined the relationship between nonverbal decoding skills and relationship well-being, poorer relationship well-being was associated with problems decoding emotional meanings in facial expressions and tones of voice (Carton, Kessler, & Pape, 1999).

The research described in the previous paragraph suggests the recognition of social cues appears to be necessary for accurate interpretation of communication between individuals. Text message dependency may be associated with a decreased amount of time spent engaging in face-to-face conversation. The infrequent face-to-face communication associated with text message dependency may influence the ability to accurately read social cues in communication and be related to the quality of understanding meaning in conversation.

To date, no current studies have addressed the issue of how self-perceived text message dependency may affect the ability to recognize social cues nor have any studies examined the effect of multitasking while texting and the ability to recognize social cues. The purpose of the present study was to investigate the relationships among self-perception of text message dependency, multitasking, and social cue recognition. Furthermore, this study was designed to examine the relationship between self-perceived text message dependency, multitasking, and social cue recognition in two groups; one participating in a multitasking assignment and a control group performing the same two tasks separately. Both groups reported their self-perceived text message dependency and completed a task for social cue recognition. Based on the liter-

ature about text message dependency, multitasking, and social cue recognition, we hypothesized (H1) self-perceived text message dependency would be negatively correlated with social cue recognition, and (H2) participants assigned to a multitasking condition would score lower on a test for social cue recognition than participants assigned to a control condition.

## Methods

### Participants

Participants (N=75) were undergraduate students attending a small Midwestern public university and received course credit in an introductory psychology class for taking part in the study. Each participant was required to bring a cell phone with text messaging features as a requirement for participation. The majority of participants were between 18-22 years of age ( $M = 20$ ,  $SD = 2$ ) with a range of 18-44 years old (70% female and 30% male). The participants self-identified as Caucasian/White (79.7%), Black/African American (9.5%), Other (5.4%), Hispanic (4.1%), and Asian (1.4%). The study was approved by the institutional review board at the university where the research was conducted.

### Measures

**Demographic Information.** Participants provided demographic information including their age, gender, and ethnicity. Participants were not asked to estimate how many text messages they received per day due to concern that many of the estimates would be inaccurate and prone to error.

**Self-Perception of Text Message Dependency Scale** (Appendix A). The short version of the Self-Perception of Text Message Dependency Scale (Igarashi et al., 2005) measures how participants perceive the way they use text messages and the urgency to use text messages for communication within interpersonal relationships. The questionnaire is structured into two parts; self-perception of dependency on texting and psychological/behavioral symptoms. Self-perception of text message dependency is determined by reports on five questions for each of three factors: perception of emotional reaction, excessive use, and relationship maintenance. The emotional reaction subscale assesses feelings about receiving responses

to text messages (e.g., "I feel disappointed if I don't receive any text messages"). The perception of excessive use subscale involves the way controlling the use of excessive text messaging is self-perceived (e.g., "I sometimes send text messages while engaging in a conversation with another person"). The relationship maintenance subscale relates to anxiety about separation of relationships without text messages (e.g., "I think my relationships would fall apart without text messages"). Responses are measured with a five point Likert format ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). The scores on the self-perception of dependency subscale have a possible range of 15-75.

The second part of the questionnaire measures psychological/ behavioral symptoms, operationally defined as participants' attitudes toward the compulsive use of text messages in the context of interpersonal relationships. These measures were developed to quantify psychological and behavioral symptoms by comparing symptoms of text message dependency to those criteria listed in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000) for alcohol and drug dependencies. Participants rate statements about their use of text messaging (e.g., "I have tried to cut down on the amount of text messages I use" and "I sometimes worry that life would be boring and empty without text-messages") using a five point Likert scale ranging from 1 (*not true at all*) to 5 (*extremely true*). The Cronbach's alpha for the five questions was .78 (Igarashi et al., 2008). The scores on the psychological/behavioral symptoms subscale have a possible range of 5-25.

The short version of the Self-Perception of Text Message Dependency scale has a good internal consistency when compared to the original 40 item scale with relatively high Cronbach's alpha coefficients for perception of emotional reaction ( $\alpha = .81$ ), perception of excessive use ( $\alpha = .85$ ), and relationship maintenance ( $\alpha = .78$ ) (Igarashi et al., 2008).

**Social Cue Recognition Test** (Appendix B). A modified version of the Social Cue Recognition Test (SCRT; Corrigan, Buican, & Toomey, 1996) assesses participants' competence in recognizing and understanding social roles, rules, and context. One of the original 30-second DVD vignettes of two

people engaging in a social situation is viewed by participants. A high emotion vignette (HE 2) is shown depicting a man and woman arguing over who gets to choose what to watch on television. The high emotion vignette shown was believed to be more sensitive than the lower emotional vignette, increasing the likelihood that differences between the two conditions would be observable. Furthermore, the vignette represented a scenario the researchers believed to be familiar to participants and replicated (albeit on a video) a real world occurrence in the controlled experimental environment. After watching the scene, participants answer 36 true or false questions. Half of these questions measure recognition of concrete cues about what the actor/actress said or did that could be seen or heard by participants (e.g., "After Doris changes the channel, Harry goes to the kitchen for a snack"). The other half of the questions measure abstract cues regarding moods, social rules, and underlying motivations being role played (e.g., "At the end of the scene, Harry felt disgusted because he had to tell Doris to sit down and shut up once again"). Three scores are generated for each participant; concrete social cues (range 0-18), abstract social cues (range 0-18), and an overall total score (range 0-36).

The internal consistency for the SCRT was calculated and the Cronbach's alpha for the high emotion vignettes were reported as  $\alpha = .54$  for concrete cues and  $\alpha = .73$  for abstract cues (Beaupre et al., 2002). Reliability was measured by computing Pearson product moment correlations between the High Emotion vignette shown to participants in this study and the other vignettes in the SCRT. All were significant for concrete cues ( $r = .71$ ) and for abstract cues ( $r = .91$ ) (Corrigan & Green, 1993). Concurrent validity was reported after measuring correlations between the SCRT and the SCRT Canadian version. The tests were found to be moderately correlated for concrete social cues ( $r = .38$ ) and abstract social cues ( $r = .59$ ) using the high emotion vignettes (Beaupre et al., 2002).

**Text messaging assignment** (Appendix C). A photocopy of a passage (Boethius, 1962, p. 54-55, Prose 8) was given to participants who typed the written content of the page into their phones as if they were sending a text message. Five true or false questions were written by the two experimenters

as fillers for the text messaging assignment (see Appendix D). The purpose of the text messaging assignment was to standardize what the participants were texting, while helping to obscure the purpose of the study.

### Materials

Each participant provided their own mobile telephone which was equipped with text messaging features. The SCRT was shown on a laptop and projected on a screen in the classroom where the experiment was performed. A stopwatch was used to monitor time for the control group.

### Procedure

After signing the consent form, participants confirmed possession of an operational cell phone with text messaging ability. Each participant was informed in writing of the tasks required for participation, including reporting their use of text messaging, watching a video, and sending a text message. They were also informed they would be tested on both the content of the video and on content of the text messaging assignment. Participants were assigned to one of two conditions: multitasking or control. Participants were tested in groups of no more than 15 students during 15-20 minute sessions. Due to time and logistical constraints, neither random assignment nor counterbalancing was used. Therefore, participants voluntarily signed up for a time slot which determined their assignment to the multitasking or control group.

Participants in the multitasking group completed the Self-Perception of Text Message Dependency Scale and placed it in an envelope. Participants completed the task of copying text from the Botheius selection at the same time the SCRT vignette was shown. At the end of the video, participants circled the last word they had texted on the sheet containing the Botheius selection. They were informed that they could delete the text message. Participants completed the SCRT measure and placed it in the envelope. Next, each participant answered questions over the texting assignment and placed it in the envelope. Finally, participants provided demographic information and answered the question, "What do you think we are predicting in this study? That is, what do you think it is that we are hoping to find?"

The control group completed the Self-Perception of Text Message Dependency scale and placed it in an envelope. Participants watched the SCRT vignette, completed the SCRT measure when the video was finished, and placed the survey in the envelope. Participants then performed the texting task for thirty seconds. The experimenters used a stopwatch to indicate that the 30 seconds had passed and asked participants to stop texting. Participants circled the last word that they had texted from the Botheius selection, placed it in the envelope and were informed that they could delete the text message. Next, each participant answered questions over the texting assignment and placed it in the envelope. Finally, participants provided demographic information and answered the question, "What do you think we are predicting in this study? That is, what do you think it is that we are hoping to find?"

Participants in both the multitasking and control groups were informed that the results would not be examined for at least two days to ensure anonymity. Each participant took part in a debriefing session with the experimenters and was given the opportunity to provide an e-mail address if they would like to receive a copy of the study's results.

### Results

All data were checked for outliers. A t-test was conducted to examine the differences in social cue test recognition scores between the control condition ( $M = 27.15$ ,  $SD = 2.05$ ) and the multitasking condition ( $M = 24.29$ ,  $SD = 2.92$ ), mean difference (2.86). Equal variance was not assumed due to the violation of Levine's Test for equality of variance  $F(71) = 7.73$ ,  $p < .01$ . The difference was significant,  $t(71) = 4.94$ ,  $p < .001$ ;  $d = 1.14$ , indicating that individuals in the multitasking group performed significantly lower on the social cue recognition task than individuals in the control group. The effect size for this analysis ( $d = 1.14$ ) was found to exceed Cohen's convention for a large effect ( $d = .80$ ).

In order to determine whether social cue recognition test scores could be predicted as a function of self-perceived text message dependency and task condition, two hierarchical regressions were conducted. In the first hierarchical regres-

Table 1

Summary of Hierarchical Regression Analysis for Variables Predicting Abstract Social Cue Recognition Test Scores

	<i>b</i>	<i>SE B</i>	$\beta$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> $\Delta$	<i>p</i>
Step 1					.04	.04	.23
SPTMD- subscale 1	-.04	.03	-.22	.11			
SPTMD	.09	.06	.19	.17			
Subscale 2							
Step 2					.13	.09	.011*
Multitasking condition	.87	.33	-.30	.011*			

Note. SPTMD Subscale 1 = self-perception of dependency on texting. SPTMD Subscale 2 = psychology/behavioral symptoms of dependency on texting.

\* $p < .05$ .

sion, abstract social cue recognition test scores were entered as the criterion variable. In the second hierarchical regression, concrete social cue recognition was entered as the criterion variable. In both hierarchical regressions, task assignment condition and the two major subscales of the text message dependency scale were entered as predictors. A Durbin-Watson test was conducted to assess the assumption of independent errors ( $h = 2.04$ ) and did not indicate cause for concern. All correlations were examined between the two subscales of the Self-Perceived Text Message Dependency measure, a) emotional reaction, relationship maintenance and perception of excessive use ( $M = 45.00$ ,  $SD = 7.98$ ) and b) psychological/behavioral symptoms ( $M = 9.95$ ,  $SD = 3.19$ ) and the two subsections of the SCRT, a) abstract social cue recogni-

tion ( $M = 12.05$ ,  $SD = 1.47$ ) and b) concrete social cue recognition ( $M = 13.54$ ,  $SD = 1.47$ ). A positive relationship was found between the two subscales of the Self-Perceived Text Message Dependency Measure ( $r = .51$ ,  $p < .01$ ). Additionally, a positive relationship was found between the two subscales of the SCRT ( $r = .31$ ,  $p < .01$ ). Bivariate correlations revealed that neither of the two subscales of the Self-Perceived Text Message Dependency subscales was related to any of the SCRT criterion variables.

The first hierarchical regression was conducted with abstract social cue recognition test scores as the criterion variable. The two subscales of the Self-Perceived Text Message Dependency measure were entered at stage one and the multitasking condition was added at stage two. Regression statistics are reported in Table 1. The hierar-

Table 2

Summary of Hierarchical Regression Analysis for Variables Predicting Concrete Social Cue Recognition Test Scores

	<i>b</i>	<i>SE B</i>	$\beta$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> $\Delta$	<i>p</i>
Step 1					.01	.01	.76
SPTMD- subscale 1	-.017	.037	-.064	.647			
SPTMD	-.024	.093	-.036	.799			
Subscale 2							
Step 2					.23	.22	<.001***
Multitasking condition	-2.04	.453	-.479	<.001***			

Note. SPTMD Subscale 5 = self-perception of dependency on texting. SPTMD Subscale 2 = psychology/behavioral symptoms of dependency on texting.

\*\*\*  $p < .001$ .

chical regression analysis revealed that in step one, the two subscales of the Self-Perceived Text Message Dependency measure failed to predict abstract social cue recognition test scores,  $F(2,71) = 1.49, p = .23, R^2 = .04^1$ . However, in step two, the task condition to which participants were assigned was a significant predictor of abstract social cue recognition test scores,  $F(3,70) = 3.36, p < .01, R^2 = .13, R^2\Delta = .09$ . Participants in the multitasking condition tended to have lower abstract social cue recognition test scores than participants in the single task condition.

The second hierarchical regression was conducted with concrete social cue recognition test scores as the criterion variable. The two subscales of Self-Perceived Text Message Dependency were entered at stage one and the multitasking condition was added at stage two. Regression statistics are reported in Table 2. The hierarchical regression analysis revealed that the two subscales of the self-perceived text message dependency failed to predict concrete Social cue recognition test scores,  $F(2,71) = .28, p = .76, R^2 = .01, p = .76^2$ . However, in step two, the task condition to which participants were assigned was a significant predictor of concrete social cue recognition test scores,  $F(3,70) = 6.97, p < .001, R^2 = .23, R^2\Delta = .22$ . Participants in the multitasking condition tended to have lower concrete social cue recognition test scores than participants in the single task condition.

### Discussion

The purpose of this study was to assess the relationship among self-perceived text message dependency, multitasking, and social cue recognition. Participants were separated into two groups: one multitasking group, who completed two tasks at once, and another control group who completed the same tasks separately. The key findings are discussed below as well as the limitations and implications of what has been found in this study.

The most important contribution of this study is the support for the second hypothesis (H2). As predicted, participants assigned to a multitasking condition scored lower on a test for social cue recognition than participants assigned to a control condition. Based on previous research suggesting texting may place limitations on time spent using face-to-face communication (Pea et al.,

2012), we believed multitasking would contribute to distraction, and this would be reflected in lower scores on the SCRT. The significant result found is supportive of the previous literature reporting similar results in regard to distraction while texting and driving (Owens et al., 2011) and lower self-reported learning ability while texting (Wei et al., 2012). Doing more than one thing at a time while texting appears to limit the ability to fully focus on a variety of given tasks.

Furthermore, multitasking while texting may impose limitations on social cue recognition. Our findings appear to support the literature regarding the importance of recognizing social cues in that when individuals are distracted, they are not paying attention and miss the true context of conversational meaning. Words may not be enough for a full understanding of conversation (Archer & Akert, 1977). Individuals distracted by texting may miss out on important cues necessary for interpreting meaning in conversation. That being said, we do not wish to imply that individuals who text while performing other tasks such as observing or engaging in conversation are completely incapable of recognizing social cues. Although the SCRT scores were significantly lower for the multitasking group than the control group in the current research, the mean SCRT score for the multitasking group was well above the mid-point of the range for possible scores. Hence, we conclude that text messaging while performing other tasks impairs, but does not eliminate, the ability to recognize social cues.

Although this study contributes to the growing knowledge about multitasking while texting, it is limited in some respects. For example, due to the brief time period in which we needed to collect data, participants were tested in a group setting so that multiple participants could participate simultaneously. To maximize internal validity in future research, participants should be tested individually in a tightly controlled laboratory environment.

Furthermore, it should be kept in mind that watching one short vignette from the SCRT may not be representative of true social cue recognition abilities. As we did not see a significant relationship between self-reported text message dependency and social cue recognition, it would be interesting to see in future research if similar re-



sults would emerge when different tests of social cue recognition were utilized. Another possibility would be to assess the relationship between task condition and scores on the SCRT by utilizing a within-subjects, repeated measures design. In addition, it would be interesting to see if the results would be similar for other vignettes from the SCRT, including low emotion scenes.

Another useful direction for future research would be to compare groups who are multitasking while texting with another group who was multitasking with a different activity, such as drawing a picture while watching the vignette. Using a different experimental task may help to clarify that the texting task may be more or less related to lower SCRT scores, rather than the multitasking condition assignment itself. Moreover, it would be worthy to find additional ways to more specifically link the reduced social cue recognition scores to distraction resulting from texting.

Furthermore, watching a video and sending a text message by copying a page from a philosophy book is not representative, and may not be generalized to a real life situation where texting and multitasking is taking place while engaging in conversation with other(s). Perhaps further research may be conducted that will focus on more realistic scenarios, that represent actual multitasking while texting, and social cue recognition in real life situations or with the use of confederates. Another point to consider is that the SCRT is a bit dated. However, the vignette chosen for this story, a couple fighting over what to watch on television, is representative of a situation that could easily occur today. Future researchers may consider the use of confederates to recreate a real life scenario that would aid in the ability to generalize results beyond the experimental environment.

In conclusion, this study did find that participants who were distracted by texting fared worse on a test for social cue recognition than those who performed the same tasks one at a time. Subsequently, those who use text messages while performing other tasks simultaneously may be less focused and miss out on important social cues. The results suggest that individuals' attention may function best while performing one task at a time and consideration should be taken while choosing to send text messages while performing other

tasks. Perhaps it would be wise to put down the phone and devote more attention to the accurate detection of social cues.

### References

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders: 4th ed. Text Revision*. Washington, DC: American Psychiatric Association.
- Archer, D., & Akert, R. (1977). Words and everything else: Verbal and nonverbal cues in social interpretation. *Journal of Personality and Social Psychology, 35*(6), 443-449. doi: 10.1037/0022-3514.35.6.443
- Beaupre, M., & King, S., Bauer, I., Hess, U., Debrulle, J., & Corrigan, P. (2002). Validation of the French and English-Canadian versions of the Social Cue Recognition Test. *Canadian Journal of Psychiatry, 47*(1), 81-86.
- Bianchi, A., & Phillips, J. (2005). Psychological predictors of problem mobile phone use. *Cyber Psychology & Behavior, 8*(1), 39-51. doi: 10.1089/cpb.2005.8.39
- Boethius, (1962). *The consolation of philosophy, translated with an introduction and notes by Richard Green*. New York, NY: Macmillan/ Library of Liberal Arts.
- Carton, J. S., Kessler, E. A., & Pape, C. L., (1999). Nonverbal decoding skills and relationship well-being in adults. *Journal of Nonverbal Behavior, 23*(1), 91-100. doi: 10.1023/A:1021339410262
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159. doi: 10.1037/0033-2909.112.1.155
- ComScore (2012, July). Retrieved from 2012 US Mobile Subscriber Market Share [http://www.comscore.com/Insights/Press\\_Releases/2012/9/com-score\\_Reports\\_July\\_2012\\_US\\_Mobile\\_Subscriber\\_Market\\_Share](http://www.comscore.com/Insights/Press_Releases/2012/9/com-score_Reports_July_2012_US_Mobile_Subscriber_Market_Share).
- Cooper, J. M., & Strayer, D. L. (2008). Effects of simulator practice and real-world experience on cell-phone-related driver distraction. *Human Factors, 50*(6), 893-902. doi: 10.1518/001872008X374983
- Corrigan, P., Buican, B., & Toomey, R. (1996). Construct validity of two tests of social cognition

- in schizophrenia. *Psychiatry Research*, 63(1), 77-82. doi: 10.1016/0165-1781(96)02897-1
- Corrigan, P. W., & Green, M. F. (1993). The Situational Feature Recognition Test: A measure of schema comprehension for schizophrenia. *International Journal of Methods in Psychiatric Research*, 3(1), 29-35.
- Faulkner, X., & Culwin, F. (2005). When fingers do the talking: A study of text messaging. *Interacting with Computers*, 17(2), 167-185. doi: 10.1016/j.intcom.2004.11.002
- Hall, J., & Baym, N. (2011). Calling and texting (too much): Mobile maintenance expectations, (over)dependence, entrapment, and friendship satisfaction. *New Media & Society*, 14(2), 316-331. doi: 10.117/146144811415047
- Igarashi, T., Motoyoshi, T., Takai, J., & Yoshida, T. (2005, April). *The Text Messaging Addiction Scale: Factor structure, reliability and validity*. Sixth biennial conference of the Asian Association of Social Psychology, Wellington, New Zealand.
- Igarashi, T., Motoyoshi, T., Takai, J., & Yoshida, T. (2008). No mobile, no life: Self-perception and text-message dependency among Japanese high school students. *Computers in Human Behavior*, 24(9), 6755-2324. doi: 10.1016/j.chb.2007.12.001
- Jeong, S., & Fishbein, M. (2007). Predictors of multitasking with media: Media factors and audience factors. *Media Psychology*, 10(3), 364-384. doi: 10.1080/15213260701532948
- Junco, R., & Cotton, S.R., (2011). Perceived academic effects of instant messaging use. *Computers & Education*, 56(2), 370-378. doi: 10.1016/j.compedu.2010.08.020
- Lu, X., Watanabe, J., Liu, Q., Liji, M., Shono, M., & Kitamura, T. (2011). Internet and mobile phone text-messaging dependency: Factor structure and correlation with dysphoric mood among Japanese adults. *Computers in Human Behavior*, 27(5), 1702-1709. doi: 10.1016/j.chb.2011.02.009
- Mehrabian, A. (2008). Language within language. In C. Mortensen (Ed.), *Communication theory* (2nd ed.) (pp. 182-192). Piscataway, NJ: Transaction Publishers.
- Owens, J., McLaughlin, S., & Sudweeks, J. (2011). Driver performance while text messaging using handheld and in-vehicle systems. *Accident Analysis and Prevention*, 43(3), 939-947. doi: 10.1016/j.aap.2010.11.019
- Pea, R., Nass, C., Meheula, L., Rance, M., Kumar, A., Bamford, H., .... Zhou, M. (2012). Media use, face-to-face communication, media multitasking, and social well-being among 8-to 12-year-old girls. *Developmental Psychology*, 48(2), 327. doi: 10.1037/a0027030
- Rutland, J., Sheets, T., & Young, T. (2007). Development of a scale to measure problem use of short message service: The SMS Problem Use Diagnostic Questionnaire. *CyberPsychology & Behavior*, 10(6), 841-843. doi: 10.1089/cpb.2007.9943
- Strayer, D. L., & Drews, F. A. (2004). Profiles in driver distraction: Effects of cell phone conversations on younger and older drivers. *Human Factors*, 46(4), 640-649. doi: 10.1518/hfes.46.4.640.56806
- Strayer, D. L., Drews, F. A., & Crouch, D. J. (2006). A comparison of the cell phone driver and the drunk driver. *Human Factors*, 48(2), 381-391. doi: 10.1518/001872006777724471
- Wei, F. Y. W., Wang, Y. K., & Klausner, M. (2012). Rethinking college students' self-regulation and sustained attention: Does text messaging during class influence cognitive learning? *Communication Education*, 61(3), 185-204. doi: 10.1080/03634523.2012.672755

### Footnotes

<sup>1</sup>Given the significant correlation between the two text message dependency subscales, it was important to examine the possibility that these factors predicted abstract social cue recognition test scores but "washed each other out" as unique influences. Hence, a semi-partial correlation was computed between scores on the Self-Perception of Dependency on Texting subscale and abstract social cue recognition test scores. The relationship was not significant,  $sr = -.19$ ,  $p = .11$ . Likewise, the semi-partial correlation between scores on the psychological/behavioral symptoms subscale and abstract social cue recognition test scores was not significant,  $sr = .16$ ,  $p = .17$ .

<sup>2</sup>The semi-partial correlation between the Self-Perception of Dependency on Texting Subscale and

concrete social cue recognition test scores was not significant,  $sr = -.05$ ,  $p = .65$ . Likewise, the semi-partial correlation between scores on the psychological/behavioral symptoms subscale and concrete social cue recognition test scores was not significant,  $sr = -.03$ ,  $p = .80$ .

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## APPENDIX A. SELF-PERCEIVED TEXT MESSAGE DEPENDENCY SCALE

Rate the degree to which you agree with each statement by circling one number only.

After sending a text message, I check my mailbox repeatedly to see if I had received a response.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I feel disappointed if I don't get a reply to my message immediately.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I feel anxious when people don't immediately reply to my text message.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I often check my mailbox to see if I had a text message.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I feel disappointed if I don't receive any text messages.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I sometimes send text-messages while engaging in a conversation with another person.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I sometimes spend many hours on text messages.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I often exchange many text messages in a short period of time.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I use text messages even while I am talking with friends.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I consider myself a quick typist on cell phones.

<b>Strongly disa- gree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I cannot maintain new friendships without text messages.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I can't form any new relationships without using text messages.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I think my relationships would fall apart without text messages.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

Without text messages, I would not be able to contact friends whom I cannot meet on a daily basis.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

Without text messages , I can't say what is on my mind.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I have tried to cut down on the amount of text messages I use.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I sometimes worry that life would be boring and empty without text messages.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I use text messages to escape from my personal problems/issues or from feeling down.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

Using text messages breaks up my daily schedule.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

I use text messages even if I had something else I must do.

<b>Strongly disagree</b>	<b>Moderately disagree</b>	<b>Neither disagree nor agree</b>	<b>Moderately agree</b>	<b>Strongly agree</b>
1	2	3	4	5

## APPENDIX B. SOCIAL CUE RECOGNITION TEST

**Video Task Questionnaire-Please circle one answer ( T= true or F= false) for each question.**

**If you are unsure, make the choice you think is best.**

Harry said the detective show was a good show.	T	F
After Doris changes the channel, Harry goes to the kitchen for a snack.	T	F
After she said it was her turn to watch TV, Doris changed the channel.	T	F
Harry is wearing a robe.	T	F
Harry shook his fist at Doris because he didn't like her hairstyle.	T	F
Harry said he would rather watch Doris' show.	T	F
Doris says they should change the channel because it's time for Harry to go to bed.	T	F
Harry is wearing a suit.	T	F
Harry is wearing a bright red undershirt.	T	F
In the beginning of the situation, Harry is happy because he is enjoying his show.	T	F
One of Harry's goals in this situation is to get Doris to sit down and be quiet.	T	F
Doris changed the channel because it was her turn to watch TV.	T	F
Doris' goal in this situation is to get to sit in Harry's chair.	T	F
Harry shakes a fist at Doris.	T	F
At the end of the scene, Harry felt sad because he was sitting so close to the TV.	T	F
Harry said he would rather watch a baseball game.	T	F
After she said it was her turn to watch TV, Doris read a book.	T	F
Doris' goal in this situation is to change the channel to her TV show.	T	F
Harry shook his fist at Doris because she interrupted his show.	T	F
Doris is wearing eyeglasses.	T	F
Harry shook his fist at Doris because he was trying to get her attention.	T	F
Doris changed the channel because she thought Harry's show was obscene.	T	F
Doris went next door and watched TV.	T	F
At the end of this scene, Doris felt happy that she had a meaningful talk with Harry.	T	F



Doris says they should change the channel because it's her turn to watch a program she likes.	T	F
At the end of the scene, Harry felt disgusted because he had to tell Doris to sit down and shut up once again.	T	F
Doris said 6:30 was the time for her to watch her show.	T	F
Doris' goal in this scene was to get Harry to admit he was wrong.	T	F
At the end of the scene, Harry was worried about what Doris might do.	T	F
Doris looked at her watch to see what time it was.	T	F
Doris changed the channel back to Harry's station because he bullied her.	T	F
Harry smiled broadly when Doris did as she was told.	T	F
Doris said, "I get to watch the TV shows I want tomorrow."	T	F
Harry's goal in this scene was to have a meaningful conversation with his wife.	T	F
Harry did not stand up because Doris came into the room late.	T	F
When asking to change the channel at the beginning of the scene, Doris felt a little nervous.	T	F

**APPENDIX C. BOETHIUS SELECTION**

Philosophy concludes that these limited goods are transitory and cannot bring happiness. On the contrary, they are often positively harmful.

There is no doubt, therefore, that these are the wrong roads to happiness; they cannot take anyone to the destination which they promise. Let me briefly show you the evils within them. If you try to accumulate money, you must deprive someone else of it. If you want to cover yourself with honors, you will become indebted to those who can bestow them; and, by wishing to outdo others in honor, you will humiliate yourself by begging.

**APPENDIX D. BOETHIUS TEST**

## Boethius Questionnaire

- |   |   |   |
|---|---|---|
| T | F | 1. Limited goods bring happiness.                                       |
| T | F | 2. If you try to accumulate money, you must deprive someone else of it. |
| T | F | 3. Power brings the risk of treachery.                                  |
| T | F | 4. To cover yourself in honors, you will become indebted to others.     |
| T | F | 5. Fame seekers humiliate themselves by begging.                        |

## Body Modification: An Attempt at Mood Regulation for Some People?

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**Abstract**—The current study examined the relationships between self-harm, tattooing, piercing, and emotion regulation among individuals who engage in body modification. Positive and negative motives behind tattooing and piercing were explored, as well as motives behind self-injury for individuals who had tattoos and/or piercings. As predicted, relative to people without a history of self-harm, people with a history of self-harm endorsed more negative emotion regulation reasons for piercing and tattooing. In addition, individuals with a history of self-harm were significantly younger at the time of their first tattoo compared to individuals without a history of self-harm. These results are discussed in terms of possible reasons for body modification, including emotion regulation.

*Keywords:* body modification, non-suicidal self-injury, emotion regulation, self-harm, self-care

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Body modification involves the deliberate alteration of the human body for non-medical reasons. Body modification includes behaviors such as tattooing, branding, scarification, transdermal implants, silicon injections, and flesh suspensions and pulling (Hicinbothem, Gonsalves, & Lester, 2006). The two most common forms of body modification are piercings and tattoos. Mayers and Chiffreller (2008) surveyed 661 university students and found 51% were pierced and 22% were tattooed. These numbers included lower ear lobe piercings for men but not women.

Tattooing and piercing are practices seen across almost every subsection of Western culture and arguably worldwide (Carmen, Guitar, & Dillon, 2012). People engage in tattooing and piercing for a variety of reasons, including individualizing themselves; beautifying themselves; and identifying themselves with religious groups, cults, gangs, or other groups (Greif, Hewitt, & Armstrong, 1999). Antoszewski, Sitek, Fijalkowsha, Kasielska, and Kruk-Jeromin (2010) found the most common reasons for tattooing or piercing were to heighten individuality, peer pressure, and aesthetic value.

Although some forms of body modification are becoming more socially acceptable, other

forms are classified as self-injury. Non-suicidal self-injury (NSSI) is the deliberate infliction of damage, pain, or both to one's own body without suicidal intent (Jefferies, 2000; Selby, Bender, Gordon, Nock, & Joiner, 2012). NSSI includes: scratching, cutting, burning, carving, bruising, and bone breaking. Klonsky (2011) surveyed 439 participants who were selected through a random dial survey in 48 states and found that the lifetime prevalence of NSSI was 5.9%, including 2.7% who had self-injured five or more times, and the 12-month prevalence was 0.9%. Additional research on NSSI has found the average age of onset to be 12.3 years old (Ferrara, Terrinoni, & Williams, 2012) and rates of NSSI were found to increase over time in a large sample of 7th grade girls followed for three years (Marshall, Tilton-Weaver, & Stattin, 2013).

Some people engage in NSSI for mood regulation (e.g., Marshall et al. 2013; Slee, Arensman, Garnefski, & Spinhoven, 2007). In this case, people who self-injure experience overwhelming emotions in response to stressful events and engage in NSSI to reduce arousal (Nock & Mendes, 2008). Fewer people who self-injure report doing so to punish themselves, communicate with others/get attention, or escape a situation or responsibility

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\*Faculty Sponsor.

(Klonsky, 2011).

Claes, Vandereycken, and Vertommen (2005) suggested there may be connections among NSSI, body modification (i.e., tattooing and piercing), and emotion regulation. Specifically, they suggest piercing and tattooing may serve as socially accepted forms of self-harming. Favazza (2011) noted severe psychopathology is minimal for many who engage in body modification. However, for some individuals, tattooing and piercing may serve as a replacement for self-inflicted harming behaviors.

Individuals with a history of self-harm seem to develop increased pain tolerance (Bohus et al., 2000; Hamza, Willoughby, & Armiento, 2014; Kemperman et al., 1997; Russ et al., 1992; Russ et al., 1996; Russ et al., 1999). Consequently, individuals who engage in self-harm behaviors early in life may more readily “graduate” to regulating their emotions with socially acceptable painful experiences such as tattooing and piercing. Given the early onset of NSSI, increased pain tolerance, and the tendency to regulate painful internal emotional experiences with external pain, these individuals may seek out tattooing and piercing sooner than individuals without a history of NSSI.

Claes et al. (2005) examined NSSI, body modification (i.e., tattooing and piercing), and emotion regulation among 101 female inpatients diagnosed with an eating disorder. Among these patients, 11.9% had tattoos, 25.7% had piercings, and 64.9% engaged in one or more types of self-injuring behavior. Of the tattooed participants, 33.6% identified significant stressors (e.g., sexual abuse, divorce) at the time of their first tattoo. Of the pierced participants, 23.1% reported significant stressors at the time of their first piercing. Self-injury had a small negative correlation with the presence/absence of piercings and tattoos; that is, tattooed and pierced individuals were slightly less likely to engage in self-injury. These data suggest that, for some individuals, tattooing and piercing could be related to regulating emotions during times of stress and perhaps even serve a protective function, reducing the likelihood of self-injury. This study did not, however, directly ask participants whether they ever engaged in tattooing and piercing for emotion regulation reasons. It is also unclear whether some individuals from the general

population also engage in tattooing and piercing for emotion regulation reasons.

The purpose of the current study was to better understand the relationship between self-harm, tattooing and piercing, and emotion regulation among those members of the population who engage in body modification. Thus, the following hypotheses were formed: a) relative to people without a history of self-harm, people with a history of self-harm will have more piercings and tattoos; b) relative to people without a history of self-harm, people with a history of self-harm will endorse more reasons for piercing and tattooing relating to regulating emotions; c) individuals with and without a history of self-harm are also likely to tattoo and pierce for many of the same positive reasons (e.g., aesthetic purposes), because tattooing and piercing can serve multiple functions within the same individual; and d) relative to people without a history of self-harm, people with a history of self-harm will begin tattooing and piercing at a younger age.

## Method

### Participants

Data was gathered from 244 participants (47.1% male; 52.5% female) who reported engaging in tattooing, piercing, or both. Ages ranged from 18 to 70 years old ( $M = 31.38$ ,  $SD = 11.97$ ). In terms of race, 79.1% reported Caucasian, 7% reported mixed heritage ethnicity, 6.1% reported Latino/Hispanic, and 7.4% reported their ethnicity as “other.” Regarding body modification, 158 (64.8%) participants reported having both tattoos and piercings, 63 (25.8%) reported only having tattoos, and 23 (9.4%) reported only having piercings. When asked about self-harm, 147 (60.2%) reported no history of self-harm, whereas 97 (39.8%) reported a history of self-harm.

### Measures

A demographics questionnaire was administered, which consisted of questions regarding gender, age, and ethnicity. Next, participants completed the Body Modification and Self-injury Questionnaire (BMSQ), a modified version of the Self-Injury Questionnaire (Claes et al., 2005; see also Vanderlinden & Vandereycken, 1997). This measure consists of questions regarding behaviors including

getting tattoos, getting piercings, and/or engaging in various forms of self-harm (e.g., cutting). Participants were also asked about when they last engaged in each activity. Participants rated their reasons for tattooing, piercing, or engaging in self-harm behaviors in terms of their importance on a 5-point scale (1 = *not at all important*; 5 = *extremely important*).

The BMSQ has two subscales. The negative emotion regulation subscale includes the following ten items: to get in a trance-like state, to avoid/diminish suicidal thoughts, to make myself unattractive, to escape from a trance-like state, to avoid/diminish negative feelings, to punish myself, to get attention from others, to show myself I'm strong, to show others I'm strong, and to cope with a stressful event. The positive reasons subscale includes the following four items: to enjoy, to express my independence, because I like the look of it, and because I wanted one. Means were calculated for each subscale. For each subscale, scores could range from 1 (*not at all important*) to 5 (*extremely important*). Participants completed the negative emotion regulation items and positive items after responding "yes" to having tattoos, having piercings (not including lower earlobes), and/or engaging in self-harm behavior. For example, a participant who had tattoos, who had piercings, and who engaged in self-harm would rate their reasons for engaging each behavior separately.

### Procedure

The study was approved by the Institutional Review Board. Participants were recruited through Facebook advertisements, introductory psychology classes, and flyers on campus. All questions were administered via Survey Monkey. Participants read and agreed to the informed consent form. Next, participants completed the demographics questionnaire. Participants then completed the BMSQ. At the end of the study, participants were given information for mental health resources to facilitate assistance if they were experiencing distress.

## Results

### Frequency of Tattooing and Piercing

It was hypothesized that, relative to people without a history of self-harm, people with a history of self-harm would have more piercings and tat-

toos. People with a history of self-harm ( $M = 6.65$ ,  $SD = 8.54$ ) and people without a history of self-harm ( $M = 6.42$ ,  $SD = 8.42$ ) reported similar frequency of tattooing,  $t(228) = -.20$ ,  $p = .84$ . The number of tattoos reported by people with a history of self-harm ranged from 0 to 46; the number of tattoos reported by people without a history of self-harm ranged from 0 to 50. Similarly, people with a history of self-harm ( $M = 2.51$ ,  $SD = 3.57$ ) and people without a history of self-harm ( $M = 2.15$ ,  $SD = 3.21$ ) reported similar frequency of piercing,  $t(232) = 0.81$ ,  $p = .42$ . The number of piercings reported by people with a history of self-harm ranged from 0 to 19; the number of piercings reported by people without a history of self-harm ranged from 0 to 20.

### Reasons for Tattooing and Piercing

It was hypothesized that, relative to people without a history of self-harm, people with a history of self-harm would endorse more reasons for piercing and tattooing relating to regulating emotions. Levene's test for equality of variances was found to be violated for the comparison of individuals with and without a history of self-harm for endorsement of negative emotion regulation reasons for tattooing,  $F(1, 206) = 5.36$ ,  $p = .02$ . Given this violated assumption, a  $t$  statistic not assuming homogeneity of variance was utilized. Consistent with hypotheses, people with a history of self-harm ( $M = 1.49$ ,  $SD = 0.48$ ) endorsed more negative emotion regulation reasons for tattooing than people without a history of self-harm ( $M = 1.28$ ,  $SD = 0.38$ ),  $t(149.85) = 3.24$ ,  $p = .001$ .

Levene's test for equality of variances was found to be violated for the comparison of individuals with and without a history of self-harm for endorsement of negative emotion regulation reasons for piercing,  $F(1, 157) = 14.18$ ,  $p = .001$ . Given this violated assumption, a  $t$  statistic not assuming homogeneity of variance was utilized. Compared to people without a history of self-harm ( $M = 1.13$ ,  $SD = 0.24$ ), people with a history of self-harm ( $M = 1.27$ ,  $SD = 0.36$ ) endorsed more negative emotion regulation reasons for piercing,  $t(104.54) = 2.59$ ,  $p = .01$ .

It was hypothesized that individuals with and without a history of self-harm would tattoo and pierce for many of the same positive reasons

(e.g., aesthetic purposes), because tattooing and piercing can serve multiple functions within the same individual. There were no differences between people with ( $M = 4.15, SD = 0.70$ ) and without a history of self-harm ( $M = 4.00, SD = 0.73$ ) with regard to positive reasons for tattooing,  $t(213) = 1.47, p = .14$ . However, contrary to predictions, people with a history of self-harm ( $M = 4.07, SD = 0.82$ ) endorsed more positive reasons for piercing than people without a history of self-harm ( $M = 3.79, SD = 0.83$ ),  $t(162) = 2.17, p = .03$ .

### Age at Time of First Tattoos and Piercings

It was hypothesized that, relative to people without a history of self-harm, people with a history of self-harm would report tattooing and piercing at a younger age. Levene's test for equality of variances was found to be violated for the comparison of individuals with and without a history of self-harm for age of first tattoo,  $F(1, 216) = 6.61, p = .01$ . Given this violated assumption, a  $t$  statistic not assuming homogeneity of variance was utilized. Individuals with a history of self-harm ( $M = 20.92, SD = 8.55$ .) were significantly younger at the time of their first tattoo compared to individuals without a history of self-harm ( $M = 23.94, SD = 12.33$ ),  $t(215.58) = -2.16, p = .034$ . However, no differences were found between individuals with ( $M = 20.19, SD = 10.33$ .) and without ( $M = 20.22, SD = 10.21$ .) a history of self-harm regarding the age at which they got their first piercing,  $t(165) = -0.019, p = .99$ .

### Discussion

The number of individuals who reported a history of self-harm was surprisingly high at 39.8%. As previously stated, in the general population, there is a life-time prevalence of 5.9% for self-injury (Klonsky, 2011). In a study conducted by Stirn and Hinz (2008), 27% of their participants reported a history of self-cutting and 13% ceased this behavior when they began tattooing and/or body piercing. The participants of the Stirn and Hinz study were gathered through a questionnaire published in a 2002 copy of a German tattooing and piercing magazine, *Taetowiermagazin*. Stirn and Hinz's data, combined with our data, suggest higher lifetime prevalence rates of self-harm may be present in the population of individuals who

engage in body modification; however, more research is needed to better understand this issue. It is unclear to what extent these elevations are due to factors relating to different methods of assessing self-harm across studies versus factors specific to the subgroup of individuals who engage in body modification. From the perspective of this study, greater problems with emotion dysregulation among some individuals who engage in body modification may contribute to more self-harm within this population, but other factors may play a role as well (e.g., models who engage in self-injury may be more readily available within the subculture of individuals who engage in tattooing and piercing).

The first hypothesis proposed that, relative to people without a history of self-harm, people with a history of self-harm will have more piercings and tattoos. Inconsistent with this hypothesis, relative to people without a history of self-harm, people with a history of self-harm did not have more piercings and tattoos. Both groups reported having about 6 or 7 tattoos and 2 or 3 piercings. Future research is needed to determine whether these groups might be differentiated by other factors about their piercing and tattooing such as size, content, and location on the body. Research could also examine the amount of tattoo work and piercings individuals from each group can handle in one sitting; that is, if individuals with a history of NSSI have higher pain tolerance, they may engage in more body modification per session.

The second hypothesis proposed that, relative to people without a history of self-harm, people with a history of self-harm will endorse more reasons for piercing and tattooing relating to regulating negative emotions. This hypothesis was supported by the data. For some individuals, piercing and tattooing may serve an emotion regulation function similar to self-injury. Some individuals may even "graduate" from self-injury to piercing and tattooing as they seek to regulate their negative emotions.

The third hypothesis predicted that individuals with and without a history of self-harm will endorse many of the same positive reasons (e.g., aesthetic purposes) for tattooing and piercing. As expected, the groups did not differ in terms of positive reasons for tattooing. Tattooing can be motivated by a variety of positive reasons, even among

individuals who are also motivated by negative reasons. Individuals with a history of self-harm reported more positive reasons for piercing than individuals without a history of self-harm. This unexpected finding could be due to chance and needs replication.

Importantly, irrespective of history of self-harm, participants much more strongly endorsed the positive reasons for tattooing and piercing (rated, on average, as “very important”) relative to the negative emotion regulation reasons (rated, on average, as “not at all important”). For most people, tattooing and piercing are not activities primarily motivated by attempts at emotion regulation. Although some people may tattoo and pierce during times in which they are feeling distressed, many tattoo in times of happiness or for other reasons not tied to distress (e.g., expressing individuality).

The final hypothesis proposed that, relative to people without a history of self-harm, people with a history of self-harm will begin tattooing and piercing at a younger age. Consistent with this hypothesis, people with a history of self-harm began tattooing almost three years earlier than people without a history of self-harm. Attempts to regulate emotions earlier in life through self-injury (e.g., Ferrara et al., 2012; Marshall et al., 2013) may facilitate engaging in tattooing and piercing at a younger age.

Importantly, at least 18% of participants with a history of self-harm (17 out of 97 participants) reported continued engagement in self-harming behaviors at the time of completing the survey; this number is likely to be an underestimation, given that 31% of the individuals with a history of self-harm (30 out of 97) did not provide this information. Said differently, of the 67 participants with a history of self-harm who answered the question about current self-harm, 25% (17 out of 67) endorsed the continuance of this behavior. Moreover, it appears that a meaningful number of individuals who have tattoos and piercings continue to self-harm.

The current study has a number of limitations. Unfortunately, like most studies in this area, this study is a cross-sectional, retrospective self-report study. Longitudinal methodologies would be a more desirable approach for understanding the

factors involved in the decisions to tattoo and pierce and how these behaviors related to any self-injurious behaviors over time. Additionally, the self-injury group and the group without self-injury are likely to differ in a number of ways beyond these behaviors and their reasons for piercing and tattooing; we cannot make conclusions about causation based upon our research design. Finally, as this was a correlational design, we were unable to determine direction of causality. Additional research is needed to better understand this issue.

The vast majority of our sample engaged in tattooing; relatively few individuals engaged in piercing only. Future research may wish to explore whether important differences exist between individuals who pierce but never tattoo. Additionally, only four positive reasons for tattooing and piercing were included, consistent with Claes et al. (2001). Future research should include more positive reasons for tattooing (e.g., group identification, remembrance, religious, increased feelings of self-esteem and attractiveness) consistent with the broader literature (Aizeman & Conover Jensen, 2011; Albin, 2006; Schulz, Karshin, & Woodiel, 2006; Stirn & Hinz, 2008.)

In summary, people with a history of self-harm endorsed more negative emotion regulation reasons for piercing and tattooing than their counterparts without a history of self-harm. Thus, some individuals with a history of self-harm may regulate painful emotions by engaging in some form of body modification. Nevertheless, individuals with a history of self-harm reported predominantly positive reasons for engaging in body modification. Rates of NSSI were high in this population, suggesting that additional research examining the links among NSSI, emotion regulation, and body modification is warranted.

## References

- Aizenman, M., & Conover Jensen, M. A. (2011). Speaking through the body: The incidence of self-injury, piercing, and tattooing among college students. *Journal of College Counseling, 10* (1), 27- 43. doi: 10.1002/j.2161-1882.2007.tb00004.x
- Albin, D. (2006). Making the body (w)hole: A semiotic exploration of body modifications. *Psycho-*

- dynamic Practice*, 12(1), 19-35. doi: 10.1080/14753630500471960
- Antoszewski, B., Sitek, A., Fijalkowska, M., Kasielska, A., & Kruk- Jeromin, J. (2010). Tattooing and body piercing- What motivates you to do it? *International Journal of Social Psychology*, 56(5), 471- 479. doi:10.1002/erv.612
- Bohus, M., Limberger, M., Ebner, U., Glocker, F. X., Schwarz, B., Wernz, M., & Lieb, K. (2000). Pain perception during self-reported distress and calmness in patients with borderline personality disorder and self-mutilating behavior. *Psychiatry Research*, 95(3), 251-260. doi:10.1016/S0165-1781 (00)00179-7
- Carmen, R., Guitar, A., & Dillon, H. (2012). Ultimate answers to proximate questions: The evolutionary motivations behind tattoos and body piercings in popular cultures. *Review of General Psychology*, 16(2), 134- 143. doi:10.1037/a0027908
- Claes, L., Vandereycken, W., & Vertommen, H. (2005). Self-care versus self-harm: Piercing, tattooing, and self-injuring in eating disorders. *European Eating Disorders Review*, 13 (1), 11-18. doi:10.1002/erv.612
- Favazza, A. (2011). *Bodies under siege: Self-mutilation, nonsuicidal self-injury, and body modification in culture and psychiatry* (4th ed.). Baltimore, MD: Johns Hopkins University Press.
- Ferrara, M., Terrinoni, A., & Williams, R. (2012). Non-suicidal self-injury (NSSI) in adolescent inpatients: Assessing personality features and attitude toward death. *Adolescent Psychiatry and Mental Health*, 6(12), 1- 8. doi:10.1186/1753-2000-6-12
- Greif, J., Hewitt, W., & Armstrong, M. (1999). Tattooing and body piercing: Body art practices among college students. *Clinical Nursing Research*, 8(4), 368- 385. doi: 10.1177/10547739922158368
- Hamza, C., Willoughby, T., & Armiento, J. (2014). A laboratory examination of pain threshold and tolerance among nonsuicidal self-injurers with and without self-punishing motivations. *Archives of Scientific Psychology*, 2(1), 23- 42. doi: 10.1037/arc0000008
- Hicinbothem, J., Gonsalves, S., & Lester, D. (2006). Body modification and suicidal behavior. *Death Studies*, 30(4), 351- 363. doi:10.1080/07481180600553419
- Jefferies, S. (2000). 'Body Art' and social status: Cutting, tattooing and piercing from a feminist perspective. *Feminism and Psychology*, 10(4), 409- 429. doi: 10.1177/0959353500010004002
- Kemperman, I., Russ, M. J., Crawford Clark, W., Kakuma, T., Zanine, E., & Harrison, K. (1997). Pain assessment in self-injurious patients with borderline personality disorder using signal detection theory. *Psychiatry Research*, 70(3), 175-183. doi:10.1016/S0165-1781(97)00034-6
- Klonsky, E. D. (2011). Non-suicidal self-injury in United States adults: Prevalence, socio-demographics, topography and functions. *Psychological Medicine*, 41(9), 1981-1986. doi:10.1017/S0033291710002497
- Marshall, S., Tilton-Weaver, L., & Stattin, H. (2013). Non-suicidal self-injury and depression symptoms during middle adolescence: A longitudinal analysis. *Journal of Youth and Adolescence*, 42(8), 1234- 1242. doi:10.1007/s10964-013-9919-3
- Mayers, L., & Chiffriller, S. (2008). Body art (body piercing and tattooing) among undergraduate university students: "Then and now." *Journal of Adolescent Health*, 42(2), 201- 203. doi:10.1016/j.jadohealth.2007.09.014
- Nock, M., & Mendes, W. (2008). Physiological arousal, distress tolerance, and social problem - solving deficits among adolescent self-injurers. *Journal of Consulting and Clinical Psychology*, 76 (1), 28-38. doi:10.1037/0022-006X.76.1.28
- Russ, M. J., Campbell, S. S., Kakuma, T., Harrison, K., & Zanine, E. (1999). EEG theta activity and pain insensitivity in self-injurious borderline patients. *Psychiatry Research*, 89(3), 201-214. doi:10.1016/S0165-1781(99)00113-4
- Russ, M. J., Clark, W. C., Cross, L. W., Kemperman, I., Kakuma, T., & Harrison, K. (1996). Pain and self-injury in borderline patients: Sensory decision theory, coping strategies, and locus of control. *Psychiatry Research*, 63(1), 57-65. doi:10.1016/0165-1781(96)02808-9
- Russ, M. J., Roth, S. D., Lerman, A., Kakuma, T., Harrison, K., Shindedecker, R. D., . . . Mattis, S.



- (1992). Pain perception in self-injurious patients with borderline personality disorder. *Biological Psychiatry*, 32(6), 501–511. doi:10.1016/0006-3223(92)90218-0
- Schulz, J., Karshin, C., & Woodiel, D. K. (2006). Body art: The decision making process among college students. *American Journal of Health Studies*, 21, 123- 127. doi: 10.1177/10547739922158368
- Selby, E., Bender, T., Gordon, K., Nock, M., & Joiner, T. (2012). Non-suicidal self-injury (NSSI) disorder: A preliminary study. *Personality Disorders: Theory, Research, and Treatment*, 3(2), 167- 175. doi:10.1037/a0024405
- Slee, N., Arensman, E., Garnefski, N., & Spinhoven, P. (2007). Cognitive-behavioral therapy for deliberate self-harm. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 28(4), 175- 182. doi:10.1027/0227-5910.28.4.175
- Stirn, A., & Hinz, A. (2008). Tattoos, body piercing, and self-injury: Is there a connection? Investigations on a core group of participants practicing body modification. *Psychotherapy Research*, 18(3), 326- 333. doi:10.1080/10503300701506938
- Vanderlinden, J., & Vandereycken, W. (1997). *Trauma, dissociation, and impulse dyscontrol in eating disorders*. Philadelphia, PA: Brunner/Mazel.

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## Psychosocial Correlates of Muscle Dysmorphia among Collegiate Males

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**Abstract**—Muscle dysmorphia (MD) is a form of body dysmorphic disorder for which an individual becomes extremely preoccupied with muscularity and, in an effort to achieve a desired body physique, one engages in exercise and dietary behaviors negatively impacting functioning or causing significant distress. This study examined the psychosocial correlates of MD symptomatology in a collegiate male population. One hundred and twenty collegiate males (mean age = 23.24 years; mean body mass index = 24.86 kg/m<sup>2</sup>) completed assessments of the following: MD, eating disorder symptomatology, teasing history, physique anxiety, and quality of life related to general health. Pearson correlations illustrated statistically significant associations between symptoms of MD and eating disorder symptoms, general and weight-related teasing, and quality of life. Males who frequently exercised, compared to those who infrequently exercised, reported greater exercise dependence and size/symmetry concerns on the MD assessment. These findings support previous literature demonstrating similarities between MD symptoms and eating disorder symptoms, and extend the literature by suggesting a history of underweight-related and general teasing might be related to later symptoms of MD. Future longitudinal research is necessary to determine causal relationships, if any, among MD, eating disordered behaviors and attitudes, and teasing.

*Keywords:* males, college, muscle dysmorphia, body image, exercise, teasing, eating disorders

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Much of the body image literature focuses on females. Male representation and internalization of body image norms, however, are equally important because males suffer from eating and weight-related disorders at alarming rates (Weltzin et al., 2005). One extreme form of body dissatisfaction impacting males is muscle dysmorphia (MD). MD is a specifier of body dysmorphic disorder (BDD), in which an individual becomes unusually preoccupied with his or her muscularity (American Psychiatric Association [APA], 2013; Pope, Gruber, Choi, Olivardia, & Phillips, 1997). As described by Pope and colleagues, individuals with MD engage in excessive weight training, are overly concerned with their diet, and often use performance enhancing substances to achieve their desired body shape. Additionally, they often forgo social or occupational activities to maintain their workout schedule and experience significant dis-

stress/anxiety about being too small or not muscular enough. In order for a MD diagnosis to be made, these behaviors must cause significant distress or impair social or occupational functioning. Health risks such as steroid use and overtraining injuries are common among persons diagnosed with MD (Parent, 2013).

Progress toward better understanding the causes and correlates of MD has been made since it was first described in the early-mid 1990s. Much of the research has focused on characterizing the similarities and differences between MD and eating disorders (EDs). For example, Olivardia, Pope, and Hudson (2000) found that men (ages 18-30 years) with MD had a significantly greater lifetime history of EDs including anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). Researchers have also attempted to better understand the relationship between MD and EDs using

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\*Faculty Sponsor.

the transdiagnostic model of EDs (Murray et al., 2012). The transdiagnostic model of EDs assumes a common factor across all symptom presentations of EDs is an underlying over-evaluation of body shape, weight, and eating (Fairburn, Cooper, & Shafran, 2003). Among undergraduate male college students, Murray and colleagues (2012) found several transdiagnostic ED constructs, including perfectionism, low self-esteem, and mood intolerance all predicted symptoms of MD. This research shows the importance of continuing to study the functional relationship between MD and EDs, particularly among young adult males. Despite the strong relationship between eating disordered behavior/attitudes and symptoms of MD, however, it remains a type of body dysmorphia, not an ED per se (APA, 2013).

The causal risk factors for MD are relatively unknown. In contrast, within the general eating disorder literature, research has shown eating disordered behaviors in women are related to experiencing a history of weight-related teasing (Neumark-Sztainer et al., 2010; Olvera, Dempsey, Gonzales, & Abrahamson, 2013; Suisman, Slane, Burt, & Klump, 2008). For example, Quick, McWilliams, and Byrd-Bredbenner (2013) found eating disordered behaviors assessed with the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008) were significantly higher in women who had previously experienced weight-related teasing as assessed with the Perception of

Teasing Scale (POTS; Thompson, Cattarin, Fowler, & Fisher, 1995). Similar findings have been found among men. Schuster, Negy, and Tantleff-Dunn (2011) found that prior negative weight and shape commentary was significantly correlated with eating pathology, body dissatisfaction, and dietary behaviors in undergraduate males. It is to the authors' knowledge that no studies have examined the relationship between having a teasing history, particularly experiencing teasing for being underweight (versus overweight), and later MD symptomatology among young adult males.

The reviewed literature demonstrates that, although some correlates of MD among young adult males are known (e.g., general ED symptomatology), other correlates remain understudied (i.e., teasing history). The purpose of this study, therefore, was to replicate and extend existing research on the psychosocial correlates of MD among young adult males. Specifically, four hypotheses were formed: a) symptoms of MD will be positively correlated with ED symptomatology among collegiate males; b) underweight-related teasing history and fear about appearance evaluation will be significantly positively associated with MD symptoms; c) greater endorsement of MD symptoms will be associated with lower aspects of quality of life; and d) collegiate males who participate in any level of sport and/or those who regularly exercise, compared to non-exercise/sport participants, will experience greater MD symptomatology.

Table 1.  
*Participant Demographics*

<b>Variable</b>	<b>Mean (SD)</b>
Age (years)	23.24 (7.22)
BMI (kg/m <sup>2</sup> )	24.86 (3.94)
<u>Ethnicity (%)</u>	
Caucasian	60.0%
African American	20.0%
Hispanic	8.3%
Native Hawaiian	1.7%
Asian	3.3%
Multi-ethnic	8.3%
Unknown/Did not answer	6.7%
Gym attendance days/week	3.42 days (1.76)
Gym attendance minutes/day	67 minutes (35.87)
Weight training days/week	3.22 days (1.58)
Weight training minutes/day	48.19 minutes (32.6)

## Method

### Participants

Participants included 120 males recruited through undergraduate psychology courses and a university recreation center. Participant demographic characteristics are presented in Table 1. There were no statistically significant differences on demographic characteristics (all  $ps > 0.05$ ) between participants recruited through either method; therefore, the samples were combined for all analyses.

### Materials and Procedure

Upon providing informed consent, participants were asked to complete an online, anonymous, self-report survey including assessments of MD symptomatology, disordered eating behaviors and attitudes, weight-related and general teasing history, fear of appearance evaluation, sports participation, exercise habits, and health-related quality of life. Participants recruited through psychology courses received extra course credit for their participation. Those participants recruited through the university recreation center completed paper and pencil versions of the self-report assessments and received \$10 for participation. All study procedures were reviewed and approved by the university Institutional Review Board. The assessments used are described below.

**Demographic Questionnaire.** Participant demographics were assessed with a self-report measure of age, ethnicity, height (feet, inches), and weight (pounds). Body mass index (BMI; kilograms/meters<sup>2</sup>) was computed from self-reported height and weight values.

**Exercise Frequency Assessment.** Participants were asked a series of questions about exercise in order to assess the type and frequency of physical activity. First, participants were asked, "Do you currently participate in an organized sport?" Participants endorsed one or more of the following response options: no, recreational sport league, intramural sport league, or collegiate sports. Next, participants were asked, "How many days per week do you attend the gym?" and responded by indicating a number between 0 and 7 days. Participants were also asked the following questions: a) "On average, how many minutes do

you attend the gym per session?"; b) "How many days per week do you weight train?"; c) "On average, how many minutes do you weight train per session?"; and d) "For how many years have you weight trained?." Males who participated in any organized sport and/or who trained three or more days per week were operationalized as "high frequency exercisers." Men who did not participate in organized sports or trained zero, one, or two times per week were classified as "low frequency exercisers."

**Muscle Dysmorphia Inventory.** The Muscle Dysmorphia Inventory (MDI; Rhea, Lantz, & Cornelius, 2004) is a 27-item self-report questionnaire that assesses MD symptoms such as body image and eating concerns. There are six subscales: size/symmetry, physique protection, exercise dependence, supplemental use, dietary behavior, and pharmacological use. When completing the survey, participants were asked to rank themselves on several questions for each subscale, with questions measured on a six-point Likert scale ranging from 1 (*never*) through 6 (*always*). Higher MDI scores indicate greater severity of MD symptoms. The authors recommend retaining each subscale rather than computing a composite score for the measure.

**Eating Disorder Examination Questionnaire.** The EDE-Q (Fairburn & Beglin, 2008), is a 36-item, adapted self-report version of the Eating Disorder Examination. This measure assesses the frequency and occurrences of disordered eating behaviors and attitudes across four subscales (dietary restraint, shape concerns, weight concerns, and eating concerns) and a global score over the previous 28-day period. Participants' answers were ranked on a seven-point Likert scale ranging from 0 (*not one day*) through 6 (*everyday*); thus, higher EDE-Q scores indicate a greater severity of eating disordered behaviors and attitudes.

**Perception of Teasing Scale-Underweight.** Participants were asked to complete the Perception of Teasing Scale-Underweight (POTS-U; Lundgren, Anderson, Thompson, Shapiro, & Paulosky, 2004), which assesses one's experience and perception of teasing related to being underweight, as well as general competency-based teasing. For endorsed items, participants were asked to rate the impact of the teasing on a six-point Likert scale ranging from 1 (*never/not upset*) through 6 (*very*

often/very upset). The scale yields four subscales: underweight-related teasing events, underweight-related teasing impact, competency-related teasing events, and competency-related teasing impact. Higher scores indicate either greater frequency of teasing events experienced or greater impact of those teasing events on the individual.

**Fear of Negative Appearance Evaluation.**

The Fear of Negative Appearance Evaluation (FNAES; Lundgren, Anderson, & Thompson, 2004) is an 8-item measure, which examines apprehension about appearance evaluation. Participants were asked to rank their answers on a five-point Likert scale ranging from 1 (*not at all*) through 5 (*extremely*), with higher scores indicative of more

distress related to the evaluation of one's appearance by others.

**Short Form-36 Health Survey.** General health-related quality of life was assessed with the Short Form-36 Health Survey (SF-36; Ware, Snow, Kosinski, & Gandek, 1993). This assessment is divided into eight subscales, which include physical functioning, role limitations due to physical problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health.

The online survey was designed so assessments were administered in the following order: exercise frequency assessment, demographic questionnaire, MDI, EDE-Q, FNEAS, POTS-U, and the SF-

Table 2.  
Association between Muscle Dysmorphia and Eating Disorder Symptoms

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Dietary Behavior <sup>a</sup>	1.00										
2. Supplemental Use <sup>a</sup>	<i>r</i> = .26 <i>p</i> = .009	1.00									
3. Physique Protection <sup>a</sup>	<i>r</i> = .13 <i>ns</i>	<i>r</i> = .17 <i>ns</i>	1.00								
4. Exercise Dependence <sup>a</sup>	<i>r</i> = .43 <i>p</i> < .001	<i>r</i> = .49 <i>p</i> < .001	<i>r</i> = .16 <i>ns</i>	1.00							
5. Size/Symmetry <sup>a</sup>	<i>r</i> = .38 <i>p</i> < .001	<i>r</i> = .63 <i>p</i> < .001	<i>r</i> = .18 <i>ns</i>	<i>r</i> = .58 <i>p</i> < .001	1.00						
6. Pharmacological Use <sup>a</sup>	<i>r</i> = .21 <i>p</i> = .046	<i>r</i> = .35 <i>p</i> < .001	<i>r</i> = .32 <i>p</i> = .002	<i>r</i> = .17 <i>ns</i>	<i>r</i> = .29 <i>p</i> = .004	1.00					
7. Restraint <sup>b</sup>	<i>r</i> = .27 <i>p</i> = .008	<i>r</i> = .09 <i>ns</i>	<i>r</i> = .27 <i>p</i> = .010	<i>r</i> = .20 <i>p</i> = .052	<i>r</i> = .22 <i>p</i> = .036	<i>r</i> = .11 <i>ns</i>	1.00				
8. Shape Concern <sup>b</sup>	<i>r</i> = -.04 <i>ns</i>	<i>r</i> = -.11 <i>ns</i>	<i>r</i> = .37 <i>p</i> < .001	<i>r</i> = -.04 <i>ns</i>	<i>r</i> = .04 <i>ns</i>	<i>r</i> = -.02 <i>ns</i>	<i>r</i> = .53 <i>p</i> < .001	1.00			
9. Weight Concern <sup>b</sup>	<i>r</i> = -.04 <i>ns</i>	<i>r</i> = -.09 <i>ns</i>	<i>r</i> = .43 <i>p</i> < .001	<i>r</i> = -.04 <i>ns</i>	<i>r</i> = .01 <i>ns</i>	<i>r</i> = .12 <i>ns</i>	<i>r</i> = .48 <i>p</i> < .001	<i>r</i> = .88 <i>p</i> < .001	1.00		
10. Eating Concern <sup>b</sup>	<i>r</i> = .05 <i>ns</i>	<i>p</i> = -.03 <i>ns</i>	<i>r</i> = .47 <i>p</i> < .001	<i>r</i> = .03 <i>ns</i>	<i>r</i> = .05 <i>ns</i>	<i>r</i> = .22 <i>p</i> = .036	<i>r</i> = .45 <i>p</i> < .001	<i>r</i> = .61 <i>p</i> < .001	<i>r</i> = .72 <i>p</i> < .001	1.00	
11. Global <sup>b</sup>	<i>r</i> = .06 <i>ns</i>	<i>r</i> = -.05 <i>ns</i>	<i>r</i> = .44 <i>p</i> < .001	<i>r</i> = .04 <i>ns</i>	<i>r</i> = .09 <i>ns</i>	<i>r</i> = .12 <i>ns</i>	<i>r</i> = .73 <i>p</i> < .001	<i>r</i> = .92 <i>p</i> < .001	<i>r</i> = .92 <i>p</i> < .001	<i>r</i> = .80 <i>p</i> < .001	1.00

Note. *ns* = not significant, *p* < .05. All significance values are for two-tailed tests.

<sup>a</sup> Subscales of the Muscle Dysmorphia Inventory.

<sup>b</sup> Subscales of the Eating Disorder Examination Questionnaire.

36 Health Survey. In order to keep the order presentation the same between participant subgroups, surveys were not counterbalanced when presented to the participants who were recruited from the recreation center.

## Results

### Statistical Analyses

To test hypotheses one, two, and three, bivariate Pearson correlations were run between the MDI subscale scores and the EDE-Q subscales, POTS-U subscales, FNAES, and SF-36 subscales. Resampling was conducted with each correlation analysis to account for multiple comparisons and inflated Type I error rate. T-tests with manual adjustment of alpha level of significance for multiple comparisons were run to test hypothesis four. Males participating in any level sport and/or males who endorsed exercising three or more times per week were compared to males who exercised less than three times per week.

### Association between Muscle Dysmorphia and Eating Disorder Symptoms

As illustrated in Table 2, the MDI dietary behavior subscale was significantly positively correlated with the EDE-Q restraint subscale. The MDI physique protection subscale was significantly positively correlated with the EDE-Q restraint, shape concern, weight concern, and eating concern subscales, as well as the global score. The MDI exercise dependence subscale was significantly positively correlated with the EDE-Q restraint subscale. The MDI size/symmetry subscale was significantly positively correlated with the EDE-Q restraint subscale. The MDI pharmacological use subscale was significantly positively correlated with the EDE-Q eating concern subscale. The MDI supplemental use subscale was not significantly correlated with any EDE-Q subscales.

### Associations between Muscle Dysmorphia Symptoms and Teasing History and Appearance Anxiety

Correlations between MD symptoms, teasing history, and appearance anxiety are presented in Table 3. The MDI supplemental use subscale was significantly positively correlated with the POTS-U frequency of underweight-related teasing events,

## MUSCLE DYSMORPHIA AND COLLEGIATE MALES

impact of underweight-related teasing, and impact of competency-related teasing subscales. The MDI exercise dependence subscale was significantly positively correlated with underweight-related teasing events. The MDI size/symmetry subscale was significantly positively correlated with underweight-related teasing events, underweight-related teasing impact, and competency-related teasing impact. The MDI pharmacological use subscale was significantly positively correlated with the underweight-related teasing impact. The MDI physique protection subscale was not significantly correlated with any teasing subscale. Physique protection was the only MDI subscale to significantly correlate with appearance anxiety as measured by the FNEAS.

### Association between Muscle Dysmorphia and Quality of Life

Three statistically significant correlations emerged between MD symptoms and quality of life. The MDI physique protection subscale was negatively associated with general health ( $r = -.31, p = .003$ ), the supplemental use subscale was negatively associated with bodily pain ( $r = -.22, p = .037$ ), and the pharmacological use subscale was negatively associated with physical functioning ( $r = -.27, p = .011$ ). The dietary behavior, exercise dependence, and size/symmetry subscales were not significantly correlated with any SF-36 subscales.

### Comparison of Males Engaged in High Sport/Exercise Participation to Low Sport/Exercise Participation on Muscle Dysmorphia Symptoms

Frequent exercisers and sports participants ( $n = 88$ ) were compared to infrequent exercisers ( $n = 31$ ) on the MDI subscale scores. To correct for multiple comparisons, the level of significance was considered  $p = .008 (.05/6)$ . The MDI exercise dependence and size/symmetry subscales remained significantly different between groups after correcting for multiple comparisons. Specifically, frequent exercisers scored significantly higher than infrequent exercisers on the MDI exercise dependence subscale,  $t(114) = 5.01, p < 0.001$ . As well, frequent exercisers scored significantly higher than less frequent exercisers on the MDI size/symmetry subscale,  $t(117) = 3.40, p < 0.01$ .

Table 3.  
Associations between Muscle Dysmorphia Symptoms, Teasing History, and Appearance Anxiety

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Dietary Behavior <sup>a</sup>	1.00										
2. Supplemental Use <sup>a</sup>	$r = .48$ $p < .001$	1.00									
3. Physique Protection <sup>a</sup>	$r = .18$ <i>ns</i>	$r = .12$ <i>ns</i>	1.00								
4. Exercise Dependence <sup>a</sup>	$r = .57$ $p < .001$	$r = .52$ $p < .001$	$r = .06$ <i>ns</i>	1.00							
5. Size/Symmetry <sup>a</sup>	$r = .46$ $p < .001$	$r = .68$ $p < .001$	$r = .07$ <i>ns</i>	$r = .56$ $p < .001$	1.00						
6. Pharmacological Use <sup>a</sup>	$r = .23$ $p = .014$	$r = .36$ $p = .001$	$r = .39$ $p < .001$	$r = .18$ <i>ns</i>	$r = .30$ $p = .009$	1.00					
7. Weight Frequency <sup>b</sup>	$r = .13$ <i>ns</i>	$r = .34$ $p = .002$	$r = -.03$ <i>ns</i>	$r = .27$ $p = .017$	$r = .34$ $p = .002$	$r = .17$ <i>ns</i>	1.00				
8. Weight Effect <sup>b</sup>	$r = .13$ <i>ns</i>	$r = .36$ $p = .011$	$r = .02$ <i>ns</i>	$r = .21$ <i>ns</i>	$r = .35$ $p = .002$	$r = .30$ $p = .007$	$r = .49$ $p < .001$	1.00			
9. Competency Frequency <sup>b</sup>	$r = -.03$ <i>ns</i>	$r = .01$ <i>ns</i>	$r = .14$ <i>ns</i>	$r = .13$ <i>ns</i>	$r = .14$ <i>ns</i>	$r = .20$ <i>ns</i>	$r = .34$ $p = .002$	$r = .24$ $p = .031$	1.00		
10. Competency Effect <sup>b</sup>	$r = .20$ <i>ns</i>	$r = .28$ $p = .013$	$r = .13$ <i>ns</i>	$r = .21$ <i>ns</i>	$r = .26$ $p = .020$	$r = .20$ <i>ns</i>	$r = .10$ <i>ns</i>	$r = .01$ <i>ns</i>	$r = -.31$ $p = .006$	1.00	
11. Appearance Anxiety <sup>c</sup>	$r = .14$ <i>ns</i>	$r = .09$ <i>ns</i>	$r = .37$ $p = .001$	$r = .01$ <i>ns</i>	$r = .12$ <i>ns</i>	$r = .19$ <i>ns</i>	--	--	--	--	1.00

Note. *ns* = not significant,  $p < .05$ . All significance values are for two-tailed tests.

<sup>a</sup> Subscales of the Muscle Dysmorphia Inventory,

<sup>b</sup> Subscales of the Perception of Teasing Scale—Underweight.

<sup>c</sup> Total score of the Fear of Negative Appearance Evaluation Scale.

### Discussion

This study aimed to examine the relationship among symptoms of muscle dysmorphia and eating disorders, teasing history, physical appearance anxiety, and physical and mental quality of life in a collegiate male population. Additionally, it sought to compare collegiate males who frequently engage in exercise and sport behaviors to those who infrequently engage in exercise on symptoms of muscle dysmorphia.

Similar to previous literature demonstrating a relationship between muscle dysmorphia and eating disorder pathology (e.g., Murray et al., 2012), we found significant associations between several muscle dysmorphia and eating disorder

symptoms as measured by the MDI and the EDE-Q. Importantly, we found physique protection, a construct assessing efforts to hide perceived physical defects or muscularity of one's body from others, was significantly positively correlated with all of the EDE-Q subscales. This means the more one seeks to hide one's body from others, the more he or she reports broad eating disorder symptomatology, including efforts to restrict food intake and body image concerns. Additionally, exercise dependence, size/symmetry, and dietary behaviors of the MDI were all significantly positively correlated with the restraint subscale of the EDE-Q, which measures attempts to control dietary intake. Pharmacological use (MDI) and eating concerns (EDE-

Q) were also significantly positively correlated. These findings, consistent with previous literature finding an association between MD and a history of disordered eating behavior (e.g., Olivardia et al., 2000), suggest there is an association between MD and eating disorder symptoms in collegiate males, particularly related to the need to hide or disguise one's physical appearance.

To the authors' knowledge, the relationship between teasing history, particularly underweight-related teasing, and current symptoms of MD has not been examined. Results from the current study showed the frequency of underweight-related teasing and the emotional impact of such teasing were strongly associated with symptoms of MD. Of note, the emotional impact of weight-related teasing was associated with pharmacological use, which has particularly adverse outcomes associated with abuse of anabolic steroids (Pope et al., 2005). The emotional impact of teasing as a result of competency (not related to weight) was associated with supplemental use and size/symmetry. Frequency of competency teasing was not associated with any symptoms of MD. This is important because it suggests a history of teasing, particularly frequency and impact of teasing about being underweight, might put males at risk for developing symptoms of MD later in life. Surprisingly, there was no association between teasing history (underweight or competency-based) and physique protection, despite the strong relationship between physique protection and eating disordered symptomatology and fear of negative appearance evaluation. It is possible, however, that higher scores on physique protection are associated with trait anxiety, which is often high among individuals with disordered eating behavior (Brown, Haedt-Matt, & Keel, 2011; Lulé et al., 2014) and would be expected to correlate with fear of negative appearance evaluation, but not necessarily a history of being teased. The current study was not designed to evaluate a cause/effect relationship between teasing and MD, but indicates that future longitudinal research should include underweight-related teasing histories as a risk factor for MD.

Not surprisingly, three subscales of the MDI (physique protection, supplemental use, and pharmacological use) were negatively associated with aspects of physical and/or mental quality of life. In

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particular, physique protection was negatively associated with general health, supplemental use was negatively associated with bodily pain, and pharmacological use was negatively associated with physical functioning. These findings highlight the importance of further studying the impact of MD on quality of life, particularly physical aspects of quality of life, of those who suffer from it.

Finally, as expected, males who engaged in frequent sport/exercise behaviors reported significantly higher scores on exercise dependence and size/symmetry subscales of the MDI compared to infrequent exercisers. Exercise dependence items assess maintenance of strict workout schedule, feelings about missing a workout or taking a day off from working out, and working out to maximize development of muscle mass. Size/symmetry items assess preoccupation with muscular appearance and beliefs about having more or less muscle mass. Notably, these groups did not differ on the subscales of diet, supplemental use, physique protection, or pharmacological use. It seems MD behaviors of "dependence" on exercise and preoccupation with muscular appearance and muscle mass do not spill over to the domains of diet and supplement and pharmacological use for this group of weight trainers.

Taken together, these findings suggest symptoms and behaviors characteristic of MD assessed in a non-clinical sample have negative implications for aspects of quality of life and negative associations with disordered eating behaviors and attitudes. College campuses are in a unique position to promote healthy body image among males, similar to programs that are already in place for females (e.g., The Body Project [Stice, Shaw, Burton, & Wade, 2006]). Despite the important associations found in the study, the results should be interpreted with caution. In particular, the order of assessment presentation was not counterbalanced and questions about physical activity were asked first. It is possible questions about physical activity could influence subsequent responses, particularly for those males with higher symptoms of muscle dysmorphia. Additionally, this study is limited by a convenience sample of males not suffering from clinical MD and by a cross-sectional design. Nonetheless, the results remain important because they replicate and extend the previous literature. Future



studies should investigate these psychosocial correlates of MD in a longitudinal study design, identify protective factors against symptoms of MD, and develop prevention or intervention programs targeting males at risk for developing or suffering from MD.

### References

- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (9th ed.). Washington, DC: American Psychiatric Publishing.
- Brown, T. A., Haedt-Matt, A. A., & Keel, P. K. (2011). Personality pathology in purging disorder and bulimia nervosa. *International Journal of Eating Disorders, 44*(8), 735-740. doi:10.1002/eat.20904
- Fairburn, C. G., & Beglin, S. (2008). Eating disorder examination questionnaire (EDE-Q 6.0). In C. G. Fairburn (Ed.), *Cognitive behavior therapy and eating disorders*. New York, NY: Guilford Press.
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy, 41*(5), 509-528. doi: 10.1016/S0005-7967(02)00088-8
- Lulé, D., Schulze, U. M., Bauer, K., Schöll, F., Müller, S., Fladung, A. K., & Uttner, I. (2014). Anorexia nervosa and its relation to depression, anxiety, alexithymia and emotional processing deficits. *Eating and Weight Disorders: Studies on Anorexia, Bulimia, and Obesity, 19*(2), 209-216. doi: 10.1007/s40519-014-0101-z.
- Lundgren, J. D., Anderson, D. A., & Thompson, J. K. (2004). Fear of negative appearance evaluation: Development and evaluation of a new construct for risk factor work in the field of eating disorders. *Eating Behaviors, 5*(1), 75-84. doi: 10.1016/S1471-0153(03)00055-2
- Lundgren, J. D., Anderson, D. A., Thompson, J. K., Shapiro J. R., & Paulosky, C. A. (2004). Perception of teasing in underweight persons: A modification of the perception of teasing scale. *Eating and Weight Disorders, 9*(2), 139-146. doi:10.1007/BF03325058
- Murray, S., Rieger, E., Hildebrandt, T., Karlov, L., Russell, J., Boon, E., ... & Touyz, S. W. (2012). A comparison of eating, exercise, shape, and weight related symptomatology in males with muscle dysmorphia and anorexia nervosa. *Body Image, 9*(2), 193-200. doi: 10.1016/j.bodyim.2012.01.008
- Neumark-Sztainer, D., Bauer, K. W., Friend, S., Hannan, P. J., Story, M., & Berge, J. M. (2010). Family weight talk and dieting: How much do they matter for body dissatisfaction and disordered eating behaviors in adolescent girls? *Journal of Adolescent Health, 47*(3), 270-276. doi:10.1016/j.jadohealth.2010.02.001
- Olivardia, R., Pope, H., & Hudson, J. I. (2000). Muscle dysmorphia in male weightlifters: A case-control study. *The American Journal of Psychiatry, 157*(8), 1291-1296. doi:10.1176/appi.ajp.157.8.1291
- Olvera, N., Dempsey, A., Gonzales, E., & Abrahamson, C. (2013). Weight-related teasing, emotional eating, and weight control behaviors in Hispanic and African American girls. *Eating Behaviors, 14*(4), 513-517. doi: 10.1016/j.eatbeh.2013.06.012
- Parent, M. C. (2013). Clinical considerations in etiology, assessment, and treatment of men's muscularity-focused body image disturbance. *Psychology of Men & Masculinity, 14*(1), 88-100. doi:10.1037/a0025644
- Pope, C. G., Pope, H. G., Menard, W., Fay, C., Olivardia, R., & Phillips, K. A. (2005). Clinical features of muscle dysmorphia among males with body dysmorphic disorder. *Body Image, 2*(4), 395-400. doi:10.1016/j.bodyim.2005.09.001
- Pope, H. G., Gruber, A. J., Choi, P., Olivardia, R., & Phillips K. A. (1997). Muscle dysmorphia: An under recognized form of body dysmorphic disorder. *Psychosomatics, 38*(6), 548-557. doi: 10.1016/S0033-3182(97)71400-2
- Quick, V. M., McWilliams, R., & Byrd-Bredbenner, C. (2013). Fatty, fatty, two-by-four: Weight-teasing history and disturbed eating in young adult women. *American Journal of Public Health, 103*(3), 508-515. doi:10.2105/AJPH.2012.300898
- Rhea, D. J., Lantz, C. D., & Cornelius, A. E. (2004). Development of the Muscle Dysmorphia Inventory (MDI). *Journal of Sports Medicine and Physical Fitness, 44*(4), 428-435

- Schuster, E., Negy, C., & Tantleff-Dunn, S. (2013). The effects of appearance-related commentary on body dissatisfaction, eating pathology, and body change behaviors in men. *Psychology of Men & Masculinity, 14*(1), 76-87. doi:10.1037/a0025625
- Stice, E., Shaw, H., Burton, E., & Wade, E. (2006). Dissonance and healthy weight eating disorder prevention programs: A randomized efficacy trial. *Journal of Consulting and Clinical Psychology, 74*(2), 263. doi:10.1037/0022-006X.74.2.263
- Suisman, J. L., Slane, J. D., Burt, S., & Klump, K. L. (2008). Negative affect as a mediator of the relationship between weight-based teasing and binge eating in adolescent girls. *Eating Behaviors, 9*(4), 493-496. doi: 10.1016/j.eatbeh.2018.04.001
- Thompson, J. K., Cattarin, J., Fowler, B., & Fisher, E. (1995). The Perception of Teasing Scale (POTS): A revision and extension of the Physical Appearance Related Teasing Scale (PARTS). *Journal of Personality Assessment, 65*(1), 146. doi:10.1207/s15327752jpa6501\_11
- Ware, J. E., Snow, K. K., Kosinski, M., & Gandek, B. (1993). *SF-36 health survey: Manual and interpretation guide*. Boston, MA: The Health Institute, New England Medical Center.
- Weltzin, T. E., Weisensel, N., Franczyk, D., Burnett, K., Klitz, C., & Bean, P. (2005). Eating disorders in men: Update. *Journal of Men's Health & Gender, 2*(6), 5<sup>20</sup>-193. doi:10.1016/j.jmhg.2005.04.008

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## ***Psychologically Speaking***

### **Exploring the Architecture of Memory: An Interview with Daniel Schacter**

**Britaini Delbo<sup>1</sup>, Megan Krueger<sup>2</sup>, Sasha Bacca<sup>3</sup>, & Richard L. Miller<sup>4</sup> \***

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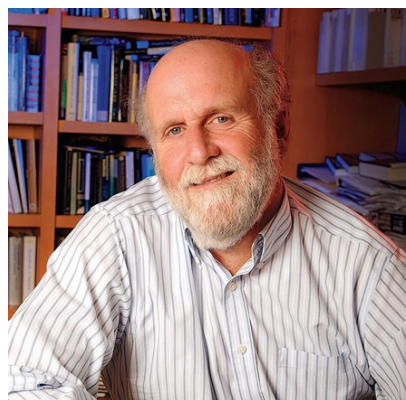
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**Background**—Daniel Schacter is the William R. Kenan, Jr. Professor of Psychology at Harvard University. He received his B.A. from the University of North Carolina at Chapel Hill and an M.A. and Ph.D. from the University of Toronto. Before coming to Harvard, he taught at the University of Toronto and the University of Arizona. His research uses both cognitive testing and brain imaging techniques to explore the relationship between conscious and unconscious forms of memory and the nature of distortions and errors in remembering, as well as the effects of aging on memory. Many of Schacter's studies are summarized in his books, especially *Searching for Memory: The Brain, The Mind, and The Past*, and *The Seven Sins of Memory: How the Mind Forgets and Remembers*, both winners of the APA's William James Book Award. In addition to his books, Schacter publishes regularly in scientific journals on such topics as Alzheimer's disease, the neuroscience of memory, false memories, and implicit memory. Dr. Schacter is a Fellow of the American Academy of Arts and Sciences and has received many awards, including the National Academy of Sciences Award for Scientific Reviewing and the Howard Crosby Warren Medal from the Society of Experimental Psychologists.

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**Miller:**

The Journal of Psychological Inquiry publishes undergraduate student research. In addition, there is a Special Features section that provides a forum for student essays on topical issues and also features, from time-to-time, interviews with distinguished psychologists. We have asked you for this interview in order to explore your experiences and thoughts on the role of undergraduate research in teaching. The interview is primarily designed for students, and secondarily for faculty. The three students who will be conducting this interview are Britaini Delbo, Megan Krueger, and Sasha Bacca. Britaini graduated last spring with a double major; psychology and criminal justice. She served as Vice President of the Weber State University chapter of Psi Chi and was a member of



Golden Key Honor Society as well as Phi Kappa Phi. She is taking this year off after graduation for family and will then pursue a Master's degree in psychology. Megan graduated last spring from the University of Nebraska at Kearney where she majored in

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psychology and minored in music. She played violin with the Thornton string quartet and was a member of Psi Chi. She is also taking this year off and then plans on attending graduate school to pursue a doctorate in clinical psychology. Sasha is a senior psychology major and nutrition minor and plans to pursue a Ph.D. in social psychology. At Metropolitan State University, she has served as President of the Research Club; Historian for Psi Chi; and worked as a T.A., Lab Manager, and Supplemental Instructor. So without further ado, I will leave you in the capable hands of these students, who have prepared a series of questions.

**Delbo:**

The first question we have is a background question, and it is whether or not there is a specific person who influenced you to become a psychologist, and were there significant teachers who played a role in your decision to become a psychologist?

**Schacter:**

Yes, there are several I'd have to mention. I first became interested in psychology in high school when I took a health course that had a very strong psychology component. That really got me interested mainly in the clinical side of psychology. I was a psychology major at University of North Carolina, Chapel Hill as an undergraduate. I was very influenced there by Bernadette Gray-Little, a clinical psychologist who is now the president of the University of Kansas. I was able to work with her a lot and she really further inspired my interest in psychology. I was headed on a clinical track until I became involved in some research of a more experimental nature that sparked my interest in experimental psychology. Then through one person knowing another, it was brought to my attention that a research assistant job was opening up over at Duke University and the Durham VA hospital in the lab of a researcher named Herb Crovitz, who studied perception and memory. He ended up hiring me as his research assistant and further inspired my interest in psychology. Herb, who sadly passed away recently, was a great guy to

work for. It was in his lab that I received my initial exposure to amnesic patients because he was starting to test amnesic patients and, as his research assistant, I actually carried out the testing. I was very intrigued by these amnesic patients. They would seem like normal people; you'd have a normal conversation with them. But then you would go out of the room for a minute and come back and they would have no idea who you were or that you'd just been talking and testing them for an hour. That got me interested in memory and Crovitz encouraged me to pursue that interest further. I ended up going to the University of Toronto, which was a mecca for memory research. It was 1976 when I went there to start graduate school and I worked with Endel Tulving, one of the great memory researchers, who was very inspiring to me. I benefited enormously from his mentorship and learned a lot from him.

**Bacca:**

How did your friends and family react when you chose psychology as a career?

**Schacter:**

I think that they were all very supportive. I didn't really have any psychologists in the family but my mother was a reading teacher, so there's a little bit of a link there and I think that many people I knew saw it as an interesting, growing field.

**Delbo:**

These next questions are going to be about research. It seems that you use the fMRI frequently in your research. So, how do you think that being able to use that kind of technology has changed the field of psychology and your ability to study it?

**Schacter:**

That's a very good question. Well, I can only answer from my perspective. I was someone who became interested in memory and its link to the brain initially by working with amnesic patients. Working with those patients who had damage to particular parts of the brain raised all kinds of interesting questions about what role those brain regions play in memory. But we were limited in the questions we could ask because those of us

who were interested in the link between human memory and the brain were mainly restricted to studying amnesic patients and there just weren't that many available. When neuroimaging techniques like PET and functional MRI came along that allowed a very precise localization of activity in the brain, those new tools made it possible for people like me, who already had interests in the relationship between brain and memory, to pose our questions in studies of the normal healthy brain instead of just relying on the lesion patients. So I think for me, and by extension for many others who've had interests in the link between the brain and human cognition or the brain and human emotion, it gave us a new window into the healthy, normally functioning brain. Obviously, neuroimaging has opened up a lot of new questions and provided a lot of new information.

**Bacca:**

Where do you see memory research going in the future?

**Schacter:**

Well, I think that there are a number of directions. I think there's going to be an ever-increasing integration across levels of analysis. We've seen some of that already. People who are interested in human memory tend to focus on the link between large-scale brain systems and cognitive aspects of memory because that's the most accessible level of analysis. But, research is starting to emerge that uses recordings from much smaller populations of cells in surgical patients. As technology improves and we start learning more about small populations of neurons, I think that will allow us to span across more levels of analysis than we've been able to do in the past. I also think that linking up questions about the function of memory with neural substrates is a very important direction for the future. We've started on that in my lab to some extent, but I think there has generally been a bias in memory research for a focus on mechanisms and there has been less emphasis on functions.

**Delbo:**

I know you've done some research with Alzheimer's patients. Based on that research, do you think that a cure would be feasible within the next few decades?

**Schacter:**

That one is hard for me to say because the work that I've been involved with in Alzheimer's patients has been primarily at a behavioral level of trying to characterize more precisely the nature of the memory deficits. I haven't been working at the molecular level or taking a pharmaceutical approach that would possibly provide a cure. It has been frustrating so far—though we understand a lot more now than we did previously about the neuropathology of Alzheimer's, and yet it seems that we're really not much closer to a cure. So the kind of work I do doesn't give me a really good handle on how close we are to a cure or when there will be one.

**Bacca:**

So considering all of the work you have done with memory, what's the best thing somebody could do to preserve his or her memory?

**Schacter:**

That's an interesting question. I would hark back to one of the main ideas from the book I wrote, *The Seven Sins of Memory*. There is a variety of ways that memory can go wrong. So, to answer the question concerning the best way to preserve your memory, I would first think about the different kinds of memory errors and foibles to which we are subjected. Within the context of the seven sins, I talked about three basic kinds of forgetting: transience (loss of information over time), absent-mindedness (a break down at the interface of attention and memory), and blocking (the inability to retrieve information that's available in memory). I think that what you would do to preserve your memory would be different in each of those cases. So, to preserve your ability to remember information over time, you would probably want to invoke encoding strategies, such as elaborative processing of information or visual imagery mnemonics. You would also

want to take advantage of the power of retrieving information. Nowadays, in the guise of the testing effect, we know that testing memory can be very effective in promoting memory for that information. So, to deal with things like transience, to have a better memory for specific information that holds up better over time, I would say focus on encoding strategies, retrieval practice, exploiting test effects, things of that sort. If we're talking about preserving our memory with respect to everyday absent-minded memory slips like, "Where did I put my keys?" or "Where did I put my glasses?" that's a completely different problem. Making more effective use of external memory aids and trying to organize your environment would be the best way to preserve your memory in that domain. And then blocking, that's more like tip-of-the-tongue states, retrieval failures, and so forth, that's a trickier one. But, avoiding blocking incidents, at least to some degree, can be accomplished by anticipating situations in which you're likely to be subject to blocking. We know, for example, that names of people that we haven't retrieved recently or frequently are especially prone to blocking. So, if you know that you're going to meet people who you're vaguely familiar with and you don't want to block on their names, you can be proactive and adopt a strategy of trying to review people who are going to be in a meeting before the meeting begins. So, from where I sit, what to do to improve memory would all depend on the particular memory "sin."

**Delbo:**

Of all the aspects of memory that you have studied, is there one in particular that you found to be the most interesting? Was there one that you found the most difficult to implement into a study or research design?

**Schacter:**

Well, I think the answer to both those questions might be the same, and that's the role of memory in future imagining. Going all the way back to the early 1980s I was in a testing room with Endel Tulving with a severely

amnesic patient 'KC' when Tulving asked KC, who couldn't remember a specific episode from his past, "Try to imagine something that might occur tomorrow." It was very dramatic then when KC couldn't come up with a specific future episode. That really impacted me, way back in 1983, 1984, sometime around then, and planted the seed in my mind that it would be very interesting to try to study in a systematic way how we use memory to think about the future, because that dramatic observation suggested a link between the two. But it was hard to think of how one could study future imagination and future simulation because they are very open-ended. We had good paradigms for studying memory through recall tests, recognition tests, paired associate tasks, and others. But, it was a real methodological challenge to try to come up with tasks to capture in some systematic way future imagining. I thought about it off and on over the years and in the mid-90s one of my post doctoral fellows at my lab at the time, Wilma Koutstaal, and I got excited about the possibility of doing some studies on future imagining but we were doing other studies that were working out well and took precedence. It wasn't until about 2005, 2006 when reading some of the literature that I began to have some ideas about how it might be possible to do systematic studies of future imagining. A post-doc came to my lab, Donna Rose Addis, who had done some very highly related work with autobiographical memory and we plotted out some studies to get going in that area.

**Krueger:**

How has your teaching style evolved over the years?

**Schacter:**

That's a good question. I'm not sure that it has evolved that much. I've always prized clarity over everything else and tried to make sure that information is presented in a very clear, logical, and consistent way. I think that's been my overarching goal in teaching. One thing that I do more with today involves visual aids. When I started out

teaching, we were lecturing off of crumpled paper yellow pads and using the chalkboard. Of course PowerPoint and related technology make it possible to do more on the visual side. And I think I'm more aware, probably than I was earlier on, of the importance of not overwhelming students with too much information that they're not yet ready to handle.

**Bacca:**

Is that hard to do considering how much research you've done over the years?

**Schacter:**

It is hard to do. It's always hard to do and it's easy to take for granted, if you're running a seminar where students aren't psychology majors and haven't taken many psychology courses or you want to assign some journal articles and students haven't had statistics. You really have to guide them away from worrying, "don't worry if you don't know what an ANOVA is," for example. I think it is always a constant battle. You want to communicate what you know, you want to communicate in some depth and meaningful way, but you have to keep in mind that a lot of things that seem obvious to you and familiar to you are completely obscure to the students.

**Bacca:**

How, if at all, have you involved undergraduate students in your research?

**Schacter:**

I've had undergraduates involved in my lab pretty much every year. For the twenty three years I've been at Harvard, we've always had undergraduates involved, and that has ranged from assisting with scoring or just running subjects, in a helping out mode, all the way to students who have written undergraduate theses with me and have had first-author publications in good journals. It runs the whole gamut and really depends a lot on the student and if they're really engaged with the subject matter and want to find out something about memory. They can join my lab and be part of a paper or possibly have their own paper, particularly if they go all the way to writing a thesis. So, I think

in almost every case it just really depends on the student.

**Delbo:**

Technology has clearly changed a lot of things in academia. How do you feel technology has aided or hindered your capabilities as a professor as well as that of your students?

**Schacter:**

I think for both students and professors one of the biggest advantages of technology is the ability to do, in a very easy way, literature searches and have much of what is known about a particular topic on your desk through the use of e-resources like Google Scholar, Web of Science, and e-journals within a matter of hours in a way that was not imaginable when I was a student. Then everything started with a trek to the library and looking through it to try to find what was there, laborious Xeroxing of articles, and then hauling them back for review. It seems laughable now when I think of just the amount of sheer physical labor that used to be involved in collecting articles and getting to know what a field or a topic was about as opposed to now. In a couple of hours, you can have access to everything. To me, that has been the most beneficial single thing in technology affecting scholarship and teaching for both students and professors. On the downside, it can be discouraging when you're lecturing in class and you see a wall of computers and you know on the other side of that, students are not always engaged in on-task note-taking. Facebook, YouTube, you name it - the potential for distraction is high and it's produced by the same technology that makes some of these other things easy. That's why one of the recent directions in our lab has been to look at how we can combat mind wandering during lectures.

**Krueger:**

If you could pick any psychologist, dead or living, to have an in-depth conversation with, who would you choose?

**Schacter:**

Probably Sir Fredrick Bartlett because of the strong link to my interests in constructive

memory. Bartlett was the single individual that really put the view of memory as a construction on the map for psychologists and I would have loved to be able to sit down and talk with Bartlett.

**Bacca:**

If you could give one piece of advice to an undergraduate student, what would it be?

**Schacter:**

As an undergraduate, seek exposure to different areas of the field and really be attuned to what you become excited and passionate about. If you really care about a topic and you are really deeply interested; if you become passionate and identify that topic, then basically everything else falls out from that, in my opinion. Give yourself a chance to be exposed to enough things to find out what excites that passion and curiosity to drive you.

**Delbo:**

What do you view as your greatest professional accomplishment and why?

**Schacter:**

That's a hard one to answer. In terms of any one thing that I have personally done, I think the first book I wrote, which most people don't even know about, is probably my personal single most ambitious accomplishment. It was a historical book about a scientist named Richard Semon, who was an unknown memory theorist that I found out about in graduate school. I ended up completing a side project in graduate school writing a book on Semon's life and ideas, how he impacted understanding of memory, and the implications of his case for understanding not only memory and psychology, but also the history of science. His ideas were ignored for 50 or 60 years and I talked a lot about what that might teach us about why ideas that are "ahead of their time" are ignored in science. Of any particular thing I've done in my career, I would say this book is the single accomplishment that I have the most pride in. More generally, running a lab that's turned out a lot of really good students and researchers who are out there in the field having an impact on psychology would

be the other thing that gives me a lot of satisfaction.

**Krueger:**

What do you enjoy the most about being a psychologist?

**Schacter:**

The chance to pursue the questions that really interest me and the chance to answer questions that I really care about.

**Bacca:**

So you spoke a little about the sins [of memory] before, but which do you think of the seven is the hardest to overcome?

**Schacter:**

I think persistence, intrusive memory, is a very difficult one. That is something that can be very psychologically disabling. Although there are various therapeutic regimes that people have tried to develop to help with intrusive memories of trauma (modify or dampen down those memories), they can be very disabling. Also, in a funny way, absent-mindedness is quite difficult to overcome because absent minded errors tend, by definition, to occur when we are focused on something other than the task that we end up being absent minded about. So even if we know that we are prone to those kinds of errors, there's kind of a Catch-22, that they are going to happen at the moment that you are not aware. Therefore, it is difficult to always maintain awareness in a way that would avoid those errors.

**Delbo:**

Other than psychology, what are some of your additional passions in life?

**Schacter:**

I like music a lot. I have been a lifelong music fan. Really all kinds of music, but probably contemporary jazz more than anything else. I grew up just outside of New York City, so I got to go to a lot of great jazz clubs in the 60's and early 70's, and I am still as interested in that as I always have been. I also grew up in a great era of rock music, and I don't like to be an old guy who just listens to Led Zeppelin. I like to keep up with music that is being created now, so I do keep up with certain kinds of rock music. I love classical mu-



music as well; particularly I'm a Mozart fan. Music is big for me and then another thing that's big for me is golf. It was important for me in high school because I was captain of our school's golf team, and that led me to UNC Chapel Hill, where unfortunately I wasn't good enough to make the golf team. I gave up the game for many years because of psychology and family taking up time, but I have gotten back into it over the past 15 years or so.

**Krueger:**

Do you play any instruments yourself?

**Schacter:**

I played piano when I was a kid, but then I stopped. I also learned flute when I was in college, but I don't really play much now.

# Journal of Psychological Inquiry

## Call for Papers

The *Journal of Psychological Inquiry* (JPI) encourages undergraduate students to submit manuscripts for consideration. Manuscripts may include:

- *Empirical studies*
- *Literature reviews*
- *Historical articles*
- *Special Features I: Evaluating controversial issues*. Two students work together on different facets of the same issue.
  - Select a controversial issue relevant to an area of psychology (e.g., Does violence on television have harmful effects on children?—developmental psychology; Is homosexuality incompatible with the military?—human sexuality; Are repressed memories real?—cognitive psychology). Each student addresses the current empirical research and makes a persuasive case for one side of the argument.
- *Special Features II: Conducting psychological analyses- Dramatic*. This manuscript is a psychological analysis of a television program or movie.
  - Television program: select an episode from a popular, 30-60 min television program, describe the salient behaviors, activities, and/or interactions, and interpret that scene using psychological concepts and principles. The presentation should identify the title of the program and the name of the television network. Describe the episode and paraphrase the dialogue. Finally, interpret behavior using appropriate concepts and/or principles that refer to the research literature.
  - Analyze a feature film for psychological content. Discuss the major themes but try to concentrate on applying some of the more obscure psychological terms, theories, or concepts. Briefly describe the plot and then select key scenes that illustrate one or more psychological principles. Describe how the principle is illustrated in the movie and provide a critical analysis of the illustration that refers to the research literature.
- *Special Features III: Conducting psychological analyses- Current events*. By using the perspective of any content area in psychology, this manuscript analyzes a current event.
  - Example 1: Several psychological theories could be used to describe people's reactions to the destruction of the World Trade Center on September 11, 2001. Terror management research has often shown that after reminders of mortality people show greater investment in and support for groups to which they belong and tend to derogate groups that threaten their worldview (Harmon-Hones, Greenberg, Solomon, & Simon, 1996). Several studies have shown the link between mortality salience and nationalistic bias (see Greenberg, Simon, Pyszczynski, & Solomon, 1992). Consistent with these findings, the news reported that prejudice towards African Americans decreased noticeably after 9/11 as citizens began to see all Americans as more similar than different.

- Example 2: A psychological concept that could be applied to the events of September 11 would be that of bounded rationality, which is the tendency to think unclearly about environmental hazards prior to their occurrence (Slovic, Kunreuther, & White, 1974). Work in environmental psychology would help explain why we were so surprised by his terrorist act.
- *Special Features IV: Teaching techniques*- Student and faculty mentor collaborate on this manuscript regarding a teaching technique the faculty member uses that the student found particularly helpful.
  - Some examples of teaching techniques are interteaching, the use of clickers, podcasting, team-based learning, and reflective journaling. The description should contain enough information so that another teacher could use the technique and should provide reasons why you think the technique worked well. The second half of the paper should be written by the faculty member who can explain why he or she chose the technique you found to be effective, and what they hoped to accomplish in terms of learning outcomes by using the technique.

Manuscripts may cover any topical area in the psychological science. Further details for the special features submission can be found at the end of volume 18 (1), available at: <http://www.fhsu.edu/psych/jpi/>

#### Submission Details:

1. Manuscripts must have an undergraduate as the primary author. Manuscripts by graduates will be accepted if the work was completed as an undergraduate. Graduate students or faculty may be co-authors, if their role was one of teacher or mentor versus equal collaborator.
2. Manuscripts must come from students who meet the following conditions: (a) from students at institutions who are current on their financial annual support of JPI (see list on JPI website), (b) from students at institutions who are willing to pay an \$80 annual processing fee for unlimited submissions, or (c) from students who pay a one-time \$30 processing fee to have a single submission processed.
3. Submit original manuscripts only. Do not submit manuscripts that have been accepted for publication or that have been published elsewhere.
4. All manuscripts should be formatted in accordance with the APA manual (latest edition).
5. Submissions are made online at <http://www.edmgr.com/jpi>.
6. Ordinarily, the review process will be completed in 30 to 60 days.
7. If a manuscript requires revisions, the author(s) is (are) responsible for making the necessary changes and resubmitting the manuscript to the Journal. Sometimes you may have to revise manuscripts more than once.
8. For further submission guidelines, see the JPI website at <http://www.fhsu.edu/psych/jpi/> or contact Dr. Jenn Bonds-Raacke ([jmbondsraacke@fhsu.edu](mailto:jmbondsraacke@fhsu.edu)) or Dr. John Raacke ([jdraacke@fhsu.edu](mailto:jdraacke@fhsu.edu)).