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The Journal of Undergraduate Psychological Research

Undergraduate Psychology:

The Importance of Research and Statistical Analysis

COLLEEN MAIR AND **JOCELYN JAILLET**

For undergraduate psychology students, research and statistical methods often present a difficult challenge. Students may be more focused on the counseling aspect of psychology and, thus, lack interest in research methods. Students may be unaware of the scientific rigor within the field of psychology. Nonetheless, the psychology program at Western Connecticut State University requires extensive research training across four semesters. An understanding of systematic inquiry and quantitative analysis is essential for the growth of students of psychology, as well as the field itself.

Research and statistics are important for a number of reasons. These disciplines encourage students to critically analyze information and creatively produce new ways of approaching and testing hypotheses. Investigators thoroughly explore variables that may, or may not, impact a particular outcome. This type of examination does not intend to be correct all of the time. Hypotheses are created in a way that allows the investigator to objectively test their validity. Statistical analyses enhance this process by allowing the researcher to evaluate data systematically. Researchers are then able to make more objective inferences based on their findings.

Overtime, these evidence-based conclusions become the foundation of theories. The use of research and statistics in the field of psychology has led to a broader understanding of areas like human behavior, cognition, biology and more. These findings begin as hypotheses and, if supported, become the framework for explaining different aspects of the world. Theories such as attribution, cognitive dissonance, and unconscious motivation have been developed from this process.

Additionally, research methods go beyond the classroom and have practical application in treatment strategies. Students who hope to aid clients in the future must be able to apply the foundational principles that justify certain treatments for a particular situation. An understanding of the research behind treatment methods, therefore, improves the implementation of treatment. Furthermore, those who inquire about the effectiveness of certain treatment approaches can use these methods of analysis to evaluate them. In this way, data analysis can help ensure that treatment strategies are consistently producing the intended result.

These reasons illustrate the importance of research and statistics training for undergraduate psychology majors. In order to access the important functions of these methods, students must be willing to challenge themselves, and think rationally and creatively. Previous research has led to critical analyses, well-known theories, and effective treatments. For any undergraduate student preparing for graduate work, or even those who are just interested in exploring all the options psychology has to offer, a firm grasp of these methods is important. Without the exploration and knowledge that research provides, there would probably be less advancement in understanding life and the world around us. That is what makes research and statistical methods so important and so valuable to the dynamic field that we call psychology.

OUTSTANDING PAPER

Perceptions of Professional Competence:

A Comparison of Mental Illness Stigma between Nursing and Non-Nursing Students

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Abstract

Past research has identified a negative relationship between internalized stigma towards mental illness and attitudes toward help-seeking behaviors. Those who hold negative views of mental illness are less likely to seek help for their own mental health issues (Tucker, Hammer, Vogel, Bitman, Wade, & Maier, 2013). In particular, healthcare workers have expressed negative attitudes toward help-seeking behaviors. Nurses are at a higher risk for chronic stress and, subsequently, mental illness, yet they are often reluctant to seek help for these problems (Moll, 2014). The current study examined whether nursing students rated the competence of a mentally-ill healthcare professional differently from non-nursing students. The variable studied was profession type. The data revealed no significant differences in competence scores based on profession. However, nursing majors rated the employee as significantly more competent than non-nursing majors. These results suggested that attitudes towards mental illness might be changing in nursing students.

Public stigma against mental illness remains a common experience for the mentally ill today and can create significant barriers toward accessing and utilizing available mental health services (Corrigan, Druss, & Perlick, 2014; Sadow & Ryder, 2008; Stier & Hinshaw, 2007). According to the research literature, this perception has been attributed to low mental health literacy and lack of knowledge (Corrigan et al., 2014; Wig, 1997). Stigma involves labeling a specific group of individuals with undesirable and negative traits that deviate from approved social norms (Anderson, Jeon, Blenner, Wiener, & Hope, 2015). These negative traits may be internalized, leading individuals to develop self-stigma. Self-stigma is characterized by decreased perceptions of self-worth and increased feelings of social isolation (Corrigan et al., 2014; Stromwall & Holley, 2012).

Self-stigma contributes to beliefs that treatment is ineffective and is the major predictor of an individual's help-seeking behaviors (Tucker et al., 2013; Stromwall et al., 2014). Stigma towards mental illness and self-stigma create significant systemic and personal barriers to treatment. Examples of personal barriers include reluctance to seek treatment and noncompliance with prescribed treatment regimens. Systemic barriers include a lack of available mental health resources, limited coverage by third party payers, and, most importantly, stigma in healthcare professionals (Noblett & Henderson, 2015; Corrigan et al., 2014, Tucker et al., 2013).

Negative attitudes of healthcare workers towards the mentally ill have been well-established in the literature (Cleary, Deacon, Jackson, Andrew, & Chan, 2012; Fernando, Deane, & McLeod, 2010; Happell & Gaskin, 2012). Healthcare providers, nurses, medical students, and nursing students have been identified as holding stigmatized beliefs against the mentally ill and the treatment of mental illness (Moll, 2014; Ewalds-Kvist & Lützén, 2013; Sadow et al., 2008; Adequya & Oguntade, 2007).

While the negative effects of this stigmatization on the patients are well known, there is less research examining the personal and social impact of these internalized attitudes on the healthcare professionals themselves. People who hold stigmatized beliefs may internalize these values and apply those same values to themselves (Corrigan et al., 2014). Healthcare professionals working in an environment that exposes them to stigmatized views towards mental illness may find it difficult to justify seeking help for their own mental health needs. There is a need for research that explores how healthcare professionals

internalize stigma and clarifies the role self-stigma plays in their usage of coping resources for mental health problems.

This research is essential as healthcare is a high stress occupation and studies have linked chronic stress to an increased risk for developing mental illness. (Vinkers, Joëls, Milaneschi, Kahn, Penninx, & Boks, 2014). Workplace stress is the primary source of chronic stress for adults in the United States (American Institute of Stress [AIS], 2013). Chronic stress states lead to the prolonged release of the stress hormone, cortisol. This can cause structural changes to the brain similar to changes observed in patients with mood and anxiety disorders, potentially implicating stress as a causative factor for mental illness (Popoli, Yan, McEwen, & Sancora, 2012). Research has shown that healthcare professionals experience high levels of occupational stress and have a higher than average risk for health problems related to workplace stressors (Gandi, Wai, Karick, & Dagona, 2011; Anagnostopoulous & Niakas, 2010; Tully, 2004; Ito, Fujita, Seta, Kitazawa, Matsumoto, & Hasegawa, 2014).

Among healthcare professionals, nurses experience significant workplace stressors such as inadequate staffing, high nurse-patient ratio, and interpersonal conflict (Gandi et al., 2011; Agagnostopoulous et al., 2010). Consequences of chronic stress on nurses has included increased sick leave, somatic complaints, cardiac disease, alcoholism, and increased risk of suicide (Tully, 2004). Chronic stress in the nursing profession has often manifested in burnout syndrome, a common phenomenon within the nursing profession. Symptoms of burnout include feelings of emotional exhaustion, depersonalization, and professional failure (Gandi et al., 2011; Agagnostopoulous et al., 2010). Burnout has been shown to significantly decrease executive function, attention and memory as well as work performance and has been considered a major factor in the ongoing nursing shortage (Gandi et al., 2011; Deligkaris, Panagopoulou, Montgomery, & Masoura, 2014). Chronic stress and burnout remain ongoing issues within the profession today. Identifying resources and barriers for effective stress management among nurses may be able to help mitigate the consequences of chronic stress, like the potential development of mental illness.

One important barrier, as previously discussed, was the stigma towards mental illness within the nursing profession. The effects of this stigma have impacted nurses on multiple levels. From a systemic perspective, the mental health resources that are available to nurses are often inadequate or lacking (Ross & Goldner, 2009; Moll, 2004). This may reflect an institutional stigmatization of mental illness within the healthcare field. Where mental health resources are available, they are underutilized. Past studies have suggested that this underutilization is related to the nurse's fear of discrimination. In one study, researchers found that nurses questioned the confidentiality of available resources and feared using them would lead supervisors and colleagues to perceive them as incompetent caregivers (Moll, 2004). Studies indicated that stigma affected nurses personally as well. In a study by Tei-Tominaga, Asakura, and Asakura (2014), researchers found that nurses stigmatized co-workers with mental illness more when compared to physical illness. Furthermore, this study found that nurses were more negative to co-workers returning to work after mental illness.

Similar parallels can be drawn between the experiences of nursing professional and nursing students because both populations encounter high stress (Galbraith, Brown, & Clifton, 2014). For nursing students, these stressors included anxiety related to academic and clinical performance, complex subject material, relationship issues, and financial difficulty (Pulidos, Augusto-Landa, & Lopez-Zafra, 2012; Pines, Rauschhuber, Norgan, Cook, Cancho-la, Richardson, & Jones, 2011; Henning, Ey, & Shaw, 1998). Studies have indicated that high stress levels in nursing students negatively impacted physical

and psychological health as well as academic performance (Klainin-Yobas, Keawkerd, Pumpuang, Thunyadee, Thanoi, & He, 2014; Kernan & Wheat, 2008). Additionally, researchers found that nursing students were at an increased risk for mental health issues and reported higher levels of depression and anxiety when compared to the general population (Chernomas & Shapiro, 2013; Cankaya & Duman, 2010). Despite these risk factors, nursing students were reluctant to receive treatment for stress and frequently utilized negative coping skills, including drinking, smoking, and comfort eating (Tully, 2004; Deary, Watson, & Hogston, 2003).

The prevalence of negative coping skills in nursing students may indicate stigmatized attitudes towards seeking help for problems resulting from stress. On top of the stigma towards seeking help, studies indicate that nursing students also have significant stigma towards mental illness (Cankaya et al. 2010). The combination of stigma toward help-seeking behaviors as well as stigma toward mental illness itself may negatively influence student coping strategies. Research by Cankaya et al., (2010) found that self-stigma is the most significant barrier preventing nursing students from seeking help with stress. Similar to the barriers in nursing, nursing students reported concerns over the confidentiality of available services and fear of prejudice from colleagues and supervisors. Nursing students also reported they would lose confidence in a colleague who was stressed and seeking help (Galbraith et al. 2014).

The current study was designed to explore how nursing students perceived the impact of mental illness on the competence of a caregiving professional. Participants were asked to rate the competency of a healthcare professional with mental illness. In the first condition, the caregiver was a registered nurse. In the second condition, the caregiver was a psychology major working as an intern in a hospital. It was theorized that the participant would perceive greater responsibilities for the employee based on the employee's professional role, responsibilities, and licensure. As a result, a higher standard for competence would be expected.

These perceptions are important to assess because they may indicate unconscious attitudes towards mental illness entrenched in the healthcare field. If higher standards of competence are expected for healthcare professionals with mental illness, this may reinforce public attitudes of stigma which suggest that people with mental illness are less competent than people without. Identifying stigma earlier in nursing education can lead to the development of a curriculum that promotes mental health literacy and encourages positive coping.

It was hypothesized that participants would rate the competence of the employee working as a nurse differently than the employee working in an internship. Finally nursing majors were expected to rate the employee's competence differently from non-nursing majors.

Method

PARTICIPANTS

A convenience sample of 93 volunteers enrolled at a public northeastern university participated in the study. Of these participants, 38 were nursing majors and 55 were non-nursing majors. The study was advertised with flyers posted on bulletin boards in the nursing and psychology departments. Volunteers received course credit for participation based on the approval of their professors. All participants gave informed consent before inclusion in the study.

DESIGN

The study was a 2 x 2 between-subjects factorial that evaluated the effects of two independent variables on one dependent variable. For the first independent variable, profession type, the subject described in the paragraph was either a registered nurse or a psychology major intern. For the second

independent variable, participant's major, the participant reported that they were either a nursing major or non-nursing major. The dependent variable measured was the participants' total perceived competence score after reading a scenario describing a working professional, who was either a nurse or a psychology major intern, with mental illness.

MATERIALS

Informed Consent. Participants were required to give informed consent prior to inclusion in the study. The consent sheet described that the collected data would be kept confidential and that it might be published or presented if warranted. Finally, the sheets listed contact information for the researcher and faculty supervisor in case participants had any follow up questions.

Subject Paragraph. Participants were randomly assigned to read a paragraph describing one of two types of caregiving professions, nurse or psychology intern. The paragraph described Jane who was diagnosed with a chronic mental illness, worked full-time, and was receiving treatment for her illness. The only difference between the paragraphs was that Jane was either a registered nurse or a psychology major working as an intern in a hospital. (See Appendix A).

Questionnaire. After reading the paragraph, participants were asked to fill out a questionnaire which measured several variables. The dependent variable measured perceived competence. Participants were asked to rate Jane's professionalism and competence, which was measured by her appropriateness and how well she fulfilled the requirements of her position. The competence scale consisted of 4 items. The minimum score was 4 and the highest possible score was 20, with higher scores indicating higher perceived competence. Items were rated on a five-point scale. (See Appendix B).

PROCEDURE

The study was conducted in a lab located in the psychology department. Participants were asked to read and sign informed consent sheets before participating in the study. After informed consent was given, participants read the paragraph for their assigned condition. The conditions were previously shuffled to randomize the order. Next participants completed the questionnaire. Afterwards, participants were thanked for their time and dismissed.

RESULTS

This study examined the effect of type of healthcare profession and college major on participants' scores of perceived professional competence. Prior to evaluating the hypotheses, the reliability of the competence measure was calculated for these participants. Based on this sample, there was a reported Chronbach's Alpha coefficient of 0.82 for the questionnaire. This showed high reliability.

A 2 x 2 between-subjects factorial evaluated the effects of profession and college major, both individually and combined, on perceived competence scores. (See Table 1). The analysis failed to provide support for the hypothesis that type of caregiving profession significantly impacted competence scores, F (1, 86) = 0.45, $p > 0.05$. The average perceived competence scores in the registered nurse condition (M = 16.39, SD = 2.93) was not significantly different from the average participant score in the psychology major intern condition (M = 16.8, SD = 2.94).

On the other hand, the analysis revealed that perceived competence scores were significantly higher for nursing majors (M = 17.49, SD = 2.08) than non-nursing majors (M = 15.7, SD = 3.2), F (1, 86) = 8.54, $p < 0.05$, *partial* $\eta^2 = 0.09$. This outcome is opposite to the researcher's prediction. However, the analysis failed to identify a significant interaction between the type of healthcare profession and participant college major on competence scores, F (1, 86) = 0.036, $p > 0.05$.

Table 1: Competency Scores

PROFESSION TYPE	MEAN	STANDARD DEVIATION
Registered Nurse	16.39	2.93
Psychology Intern	16.80	2.94
MAJOR		
Nursing	17.49	2.08
Non-nursing	15.70	3.20

DISCUSSION

The study evaluated whether the type of healthcare profession and participant major would affect perceived competence scores. This study also accounted for stigma towards mental illness and attitudes towards seeking professional psychological help. Low competence scores indicated lower perceptions of competence in a caregiver with a mental illness whereas higher scores revealed higher perceptions of competence. This study failed to provide support for the hypothesis that participants would rate perceived competence differently based on type of caregiving profession. The data likewise identified no significant interaction between type of caregiving profession and college major.

Nursing majors, however, did rate perceived competence significantly higher than non-nursing majors. This contradicts the research findings of Galbraith et al. (2014) which indicated that nursing students had more negative attitudes towards peers who sought help for stress and anxiety. The differences between the current study and Galbraith et al., (2014) may indicate changing attitudes towards mental illness in the general population or the influence of the nursing education at this specific institution. These changes may also reflect the development of more positive attitudes towards seeking help for stress among nursing students.

Although this study did not provide support for all of the hypotheses, several limitations should be considered. Participant data was collected through self-report questionnaires, which may have allowed participants to provide responses they believed to be desirable as opposed to their genuine opinions. The questionnaire could have included a scale to measure participant motivation to provide socially desirable answers in order to control for this.

Additionally, while the competence instrument was reliable, individual questions may have been too broad or nonspecific to apply to either the nursing profession or mental health. Future surveys could include more focused questions to assess competence as a function of the nursing role or in relation to mental health. Another factor may have been the level of participant experience. Because the nursing majors were still in the student role, they may not have been influenced by stigma within the healthcare field.

The subject paragraph may also have impacted the research findings and resulted in non-significant data between variables. Although the paragraph was written to provide a neutral perspective, the subject may have been described overly positive. This could have conditioned participants to respond more positively on their questionnaires. In the future, a control paragraph in which the described subject has no diagnosis of mental illness could be included in order to provide an additional point of comparison for competency scores.

Overall, the findings of this study suggest that attitudes towards mental illness in nursing students may be changing. The data suggests that some nursing students may not see mental illness as a threat to competency in healthcare workers. This may reflect changes in the curriculum of nursing schools or in the public knowledge about mental illness in general. The nursing program at this particular institution may provide a more positive perspective on mental illness that helps mitigate stigma. Follow-up research could focus on comparing stigmas between undergraduate nursing students, graduate nursing students, and experienced nurses to identify whether these shifts in attitude reflect a generational change or are localized to the particular institution.

Although this study did not replicate the findings, a review of literature shows a significant body of evidence documenting the prevailing stigma towards mental illness and help seeking among nurses and nursing students. As previously stated, internalized stigma in the mentally ill decreases treatment utilization and delays entry into care (Corrigan et al., 2014; Tucker et al., 2013). Considering the implications of nursing burnout and the ongoing nursing shortage, future research should examine internalized stigma among nurses and nursing students and whether it impacts their use of coping resources. Identifying nursing curriculum that promotes positive attitudes towards mental health and coping is another important step in addressing stigma in nursing students. Research in these areas may help identify ways to promote mental health literacy, provide additional support for nurses and nursing students struggling with stress and burnout, and remove barriers to care.

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Appendix A

Jane is a registered nurse who works 40 hours a week at a local hospital providing care for adults. For the most part she enjoys her job although it can be challenging and very stressful at times. Her commute to work is 25 minutes without traffic. Three years ago, after experiencing persistent fatigue and mood changes, Jane was diagnosed with a chronic mental illness. She currently receives treatment for her illness, which includes a combination of medication and weekly psychotherapy sessions to manage her symptoms. In her last performance review, she received a generally positive evaluation from her supervisor. Jane does not smoke and is a social drinker. She lives alone and does not have any pets.

Jane is a psychology major intern who works 40 hours a week at a local hospital providing care for adults. For the most part she enjoys her job although it can be challenging and very stressful at times. Her commute to work is 25 minutes without traffic. Three years ago, after experiencing persistent fatigue and mood changes, Jane was diagnosed with a chronic mental illness. She currently receives treatment for her illness, which includes a combination of medication and weekly psychotherapy sessions to manage her symptoms. In her last performance review, she received a generally positive evaluation from her supervisor. Jane does not smoke and is a social drinker. She lives alone and does not have any pets.

Appendix B

For questions 1-4, please use the following scale and select the number that best represents your opinion on the line adjacent to the question.

1. The employee described in the paragraph above was professional.

1	2	3	4	5
Very Unprofessional	Somewhat Unprofessional	Neither Professional nor Unprofessional	Somewhat Professional	Very Professional

2. The employee described in the paragraph above was competent.

1	2	3	4	5
Very Incompetent	Somewhat Incompetent	Neither Competent nor Incompetent	Somewhat Competent	Very Competent

3. The employee described in the paragraph above was appropriate for the position.

1	2	3	4	5
Very Inappropriate	Somewhat Inappropriate	Neither Appropriate nor Inappropriate	Somewhat Appropriate	Very Appropriate

4. The employee described in the paragraph above was able to fulfill all the requirements of the position.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

The Sound of Exercise!

Does Music Affect Workout Intensity?

CHELSEA AQUINO,
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AND **GABRIEL SHVARTSMAN**
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Abstract

Listening to music has been demonstrated to influence behavior during exercise (Jones, Ermatinger, Waite, & Zhang, 2015; De Bourdeaudhuij, Crombez, Deforche, Vinaimont, Debode, & Bouckaert, 2002; Terry & Karageorghis, 2006; Karageorghis & Priest, 2011; Birnbaum, Boone, & Huschle, 2009; Yamamoto, Ohkuwa, Itoh, Kitoh, Terasawa, Tsuda, Kitagawa, & Sato, 2003). Past studies have focused on the modulation of physiological responses (Jones et al., 2015; Yamamoto et al., 2003; Bigliassi et al., 2012; Atan, 2013; Birnbaum et al., 2009; Savitha, Mallikarjuna, & Chythra, 2010). In this investigation, workout intensity was found to be related to music rhythm. Subjects listened to varying music tempos while performing jumping jacks. Participants exposed to fast tempo music had a faster completion time than those who listened to slow tempo music or the white noise. Slow tempo music and white noise did not significantly differ from one another. Together, these findings suggested that faster tempo music may motivate individuals to complete exercises faster.

Many people listen to music while exercising. Some people are less motivated to go to the gym if they do not have their headphones. Different types of music may be used as rhythm motivators to intensify workouts (De Bourdeaudhuij, Crombez, Deforche, Vinaimont, Debode, & Bouckaert, 2002; Terry & Karageorghis, 2006; Karageorghis & Priest, 2011). Past research has looked at music and its ability to capture attention, uplift spirits, generate moods, change or regulate emotions, trigger memories, increase work production, decrease inhibitions, and motivate rhythmic movements (Terry & Karageorghis, 2006). The relationship between music and the above factors leads to the question: Does music affect workout intensity?

Investigations have found a relationship between physiological response and the influence of music during medium to high intensity cycling (Jones, Ermatinger, Waite, & Zhang, 2015; Yamamoto, Ohkuwa, Itoh, Kitoh, Terasawa, Tsuda, Kitagawa, & Sato, 2003; Bigliassi, Dantas, Carneiro, Smirmaul, & Alttimari, 2012). Jones et al. (2015) found that participants who listened to music when exercising increased their normal heart rate and increased their effort. Also, fast and medium music tempos increased exertion, while the slow tempo music decreased arterial pressure while exercising. Jones et al. (2005) supported that different tempos of music produced different physiological changes, which supports the current study's hypothesis.

Yamamoto and colleagues (2013) examined participants performance, heart rate, the concentration of lactate and ammonia in the blood, and the concentration of catecholamine in the in the blood before and after music manipulations while enduring high intensity cycling. Listening to either slow or fast music did not produce significant results in blood lactate levels, ammonia levels, and catecholamine levels prior to the exercise. However, while taking blood vitals, the researchers found that listening to fast music before the high intensity cycling elevated the epinephrine plasma level and the slow music lowered the norepinephrine plasma level. The fast music provided an increase in epinephrine levels, creating an adrenaline rush to complete the exercise. This is important because the stimulation of fast music due to an adrenaline rush supports the current study's hypothesis that fast music may affect one's intensity while exercising.

Bigliassi and colleagues (2012) focused on the influence of music during particular moments in a 5km time trial while cycling. Three conditions

were investigated: a) music during warm up, b) music during exercise, and c) no music. The measurements consisted of time, power output, heart rate, the rating of exertion, and mood. None of the variables showed a significant difference between groups, but the exertion was smaller when the participants listened to music during or before the exercise compared to the no music condition. Overall music did not affect the performance or the physiological response, which indicated that music may not influence workout intensity.

Other research used the effect of music upon sprint and cycle ergometer exercises to test participants' anaerobic workout performance (Atan, 2013). Two different anaerobic exercise tests were used while exposing the participants to three music conditions: a) "slow rhythm music," b) "fast rhythm music," and c) "no music," each on separate days. Atan (2013) found the three musical conditions did not show a significant difference in the anaerobic power tests among the blood lactate and heart rate levels. Atan's (2013) results showed music does not affect anaerobic exercise. Atan (2013) provided valuable insight for the current study, specifically that the blood lactate and heart rate levels did not differentiate between the musical conditions.

Research also investigated the effect of music during and after medium to high intensity treadmill exercising (Birnbaum, Boone, & Huschle, 2009; De Bourdeaudhuij et al., 2002; Savitha, Mallikarjuna, & Chythra, 2010). Birnbaum et al. (2009) examined the effects of slow and fast music on hemodynamic and cardiovascular responses during medium intensity treadmill workouts. They found that listening to music significantly increased some of the cardiovascular responses, but not all. This research provided an insight that music may have an impact on some physiological attributes.

De Bourdeaudhuij and colleagues (2002) research explored the effects of music distractions while having obese adolescents and children run on a treadmill. The participants completed four treadmill sessions. The first and last session consisted of a distraction. The distraction included a favorite song of the participant being played while on the treadmill. This experiment found that the obese children and adolescents ran 40 seconds longer when exposed to the music distraction. Results from this study suggested music is a motivator for obese individuals who are exercising. Also, more importantly, it suggests that music may motivate individuals to prolong their workouts and increase their workout intensity.

The influence of music was investigated to see if it produced more motivation while exercising (Terry & Karageorghis, 2006; Karageorghis & Priest, 2011). The synchronous music theory was hypothesized to produce more exertion and intensity in workouts for its impact on motivation. Terry and Karageoghis (2006) suggested that music influences exercise enjoyment, extension, and has the capability of improving public health. An assessment of affective and physiological response to motivational music during medium intensity treadmill running was done. The findings included an effect in all conditions and differences between the motivational music condition and the control condition. Listening to background music (also known as asynchronous music) while exercising was found to produce no conscious synchronization between music and tempo. Asynchronous music is characterized by a lack of conscious awareness between the movement and tempo while synchronous music uses the performing of repetitive movements with the rhythmic elements. Findings showed asynchronous music was more influential in how participants felt and synchronous music elicited faster times than no music. Karageorghis and Priest (2011) evaluated the possible approaches to the effects of music in exercise. The researchers explored the effects of music on exercisers and explored the use of pre-task music and in-task synchronous music. Karageorghis and Priest (2011) established that the empirical work focuses on the asynchronous use of in task-music

and it identifies that carefully selected music could promote enhancement in physical performance and psychological benefits during high-intensity exercise, although it is ineffective in reducing perceptions of exertion beyond the anaerobic workouts. Together, these studies provided valuable information regarding synchrony of music and its impact on motivating individuals to intensify their workouts.

Savitha, Mallikarjuna, and Chythra (2010) conducted experiments to measure effects of different musical tempos on post-exercise recovery. Participants volunteered to do a medium intensity treadmill exercise for three consecutive days. The pulse rate, blood pressure, and rating of perceived exertion was measured during the post exercise relaxation period to see if different music tempos had an impact. The results showed that slow music produced a faster recovery time for systolic blood pressure, diastolic blood pressure, pulse rate recovery, and recovery exertion, compared to the other music conditions. This research showed that slow music can produce a faster overall recovery time after exercising.

This current study examined the different rhythmic tempos of music and its impact on exercise intensity. Previous research has found that fast music tempos have some physiological effects and may motivate individuals to produce workout times (Jones et al., 2015; De Bourdeaudhuij et al., 2002; Terry & Karageorghis, 2006; Karageorghis & Priest, 2011; Birnbaum et al., 2009; Yamamoto et al., 2003.) We hypothesized that those who listened to fast tempo music would have a faster completion time than those who listened to the slow tempo music or white noise. This research differentiated itself from the previous studies because it used the jumping jack exercise as a standard and used completion times as a measure of exercise intensity. Unlike using an ergometer cycle or running on a treadmill, jumping jacks can be done anywhere and the intensity level stays the same. The previous studies used physiological measures to detect changes, but this study used completion times as a measure of workout intensity. That being said, the dependent variable was the time to complete the given exercise. The independent variable was classified by different tempos of music: fast, slow, and white noise. The influence of different rhythms of music may provide insightful information that could help individuals have more intensified workouts.

Method

PARTICIPANTS

Convenience sampling was used to obtain 45 student participants (thirteen males and thirty-two females) from a northeastern public university. If students were enrolled in psychology classes, they were compensated for their participation with course credit or extra credit if applicable.

MATERIALS

Participants signed an informed consent form and completed a demographic questionnaire (see Appendix A). The demographic information on the sheet included the following: age, gender, if they play a sport, if they listen to music while exercising, and (if applicable) what type of music do they listen to while exercising. Three musical conditions were used: a) "White Noise One," b) the song "Sweet Caroline" by Neil Diamond was used as the slow tempo condition, and c) the song "Animals" by Martin Garrix was the fast tempo condition. "Animals" by Martin Garrix was 5 beats per minute (bpm) faster than "Sweet Caroline" by Neil Diamond. Participants were required to wear an armband and headphones while completing the task. The researchers used a stop watch to record the time to complete the 30 jumping jacks.

PROCEDURE

Participants were greeted at the door as they entered the lab, and were asked to complete an informed

consent form. Participants were then instructed to complete a sheet that asked them demographic information. When finished, an iPod armband was secured around their right arm, and they were told to put the headphones on over their ears. The participants were then instructed to do 30 jumping jacks when the music started to play and were also instructed to say "done" as soon as they finished the task. We used a stop watch to record exercise duration (in seconds) to complete the given task.

RESULTS

A one-way between subjects ANOVA showed that the time in seconds it took to complete the jumping jacks varied by the music condition, F (2, 42) = 11.73, $p < 0.05$, $\eta^2 = 0.36$. Tukey's post hoc procedure indicated that those who listened to fast paced music (M = 24.99, SD = 4.34) completed the jumping jacks significantly faster than those who listened to slow paced music (M= 30.33, SD = 3.38) and those who were exposed to the white noise (M = 31.15, SD = 3.55). There was not a significant difference between the slow paced music and white noise condition.

DISCUSSION

The present experiment found data supporting the proposition that music affects exercise intensity. The fast music condition produced faster completion times than the slow and white noise music conditions. Faster completion times suggested that an individual completed a more intense workout. We believe the combination of fast paced music and the vigorous exercise of 30 jumping jacks stimulated the participant's movements to match the beat. Terry and Karageoghis (2006) research aligned with the present study's hypothesis because they found that the synchronous music (music matching the workout movements) produced faster movements and workout times. Terry and Karageoghis (2006) only used fast motivational music and the no music condition. The present study chose to use fast tempo music, slow music, and white noise. The idea of matching beats in the music with the bodily movements could explain the differences in completion times in our study.

De Bourdeaudhuij et al. (2009) also found that music has an effect on workout intensity. De Bourdeaudhuij and colleagues (2009) tested to see if music was a motivator to prolong the exercise, while the current research investigated whether three tempos of music (fast, slow and white noise) had an effect on completion times. Although De Bourdeaudhuij and colleagues (2009) only tested music verses no music instead of a variation of tempos, both the De Bourdeaudhuij et al (2009) study and the current study found that music can be used as a rhythm motivator to produce exercise results. Specifically, fast rhythm music showed a significant difference in the present study.

There were some limitations in our experiment. One limitation that may have interfered with the results of this current study was not taking into account individual differences in exercise ability. Some participants may naturally be able to complete 30 jumping jacks in a fast pace and music may not affect their intensity. If physiological vitals were taken before and after the task, it could have indicated one's individual exercise ability. Using physiological measurements would benefit this study because it would include insight to the participant's maximal exertion instead of just relying on a standard. Previous research did take physiological responses, such as oxygen levels and blood pressure to determine if music affected exercise intensity, while the current study investigated the different tempos of music and the completion times of 30 jumping jacks. (Jones et al., 2015; Yamamoto et al., 2003; Bigliassi et al., 2012; Atan, 2013; Birnbaum et al., 2009; Savitha, Mallikarjuna, & Chythra, 2010).

However, physiological measurements taken in previous research have produced inconsistent results. (Yamamoto et al., 2003; Bigliassi et al.,

2012; Atan, 2013; Birnbaum et al., 2009; Savitha, Mallikarjuna, & Chythra, 2010.) Yamamoto and colleagues found that music did not affect the concentration of lactate, ammonia, and catecholamine in the blood, but found epinephrine levels did differ. Bigliassi et al. (2012) did not find a significant difference in heart rate, rate of exertion, time, and power output while listening to music while exercising. Atan's (2013) investigation did not find significant differences in the blood lactate and the heart rates of participants while exercising to the variations of music. Binbaum and colleagues (2009) found some significant cardiac responses, but not all, while investigating how music impacts high intensity treadmill running. Lastly Savitha, Mallikarjuna, and Chythra (2010) found that slow music produced faster recovery times in systolic blood pressure, diastolic blood pressure, pulse rate, and the recovery exertion. Together cardiac responses as well as blood pressure concentration seem to show an inconsistent indication of results.

Another limitation was the armband. The armband was not tight enough so it slipped off of the participant's arm as they completed the jumping jacks. This could have been a distraction. We suggested that the participants do one-handed jumping jacks if they felt the armband slipping off. This situation did arise and is a disadvantage to our results. For future experiments, the music should be played out loud instead of through headphones attached to an armband.

Lastly, another limitation could have been the duration of the exercise. The exercise in the current study was short compared to previous studies. Particularly previous studies tested individuals using 15-20 minute exercise intervals (Jones et al., 2015; Yamamoto et al., 2003; Bigliassi et al., 2012; Birnbaum, Boone, & Huschle, 2009; Savitha, Mallikarjuna, & Chythra, 2010; Atan, 2013). In this study we used a standard of 30 jumping jacks and timed how long it took participants to complete the task. Normally it took a matter of seconds to complete the task. This meant that there was not a large range of data. However, the participants did find the 30 jumping jacks a challenging task even though it was completed in a short amount of time.

In summary, this study tested if different paces of music affect exercise intensity, specifically having faster completion times while completing 30 jumping jacks. The results indicated that fast tempo music has a faster completion time than slow tempo music and white noise. This suggested that fast tempo music could possibly help individuals motivate themselves to exert more effort to have a faster completion time or people like to mimic the fast music in their movements.

Physical health is very important to people in today's society. Decoding the behavioral mechanisms that motivate individuals to intensify workouts peaks many individuals' interests. Since this present study yielded significant results, it provided an insight that music does affect work out intensity.

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Appendix A

DATA COLLECTION SHEET

Subject Number: _____

Music Condition Number: _____

Male or female? ☐ Male ☐ Female

Do you listen to music while you exercise? ☐ Yes ☐ No

If you answered yes above, what type of music do you typically listen to while exercising?

_____

Do you play a sport for the school? ☐ Yes ☐ No

How old are you? _____

The time it took to complete 30 jumping jacks: _____

The Effect of Gender on Ability to Recognize Facial Expressions of Emotions

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Abstract

Females have been found to recognize facial expressions of emotion faster and more accurately than males (Hall & Matsumoto, 2004; Hall, Hutton, & Morgan, 2010; Forni-Santos & Osório, 2015; Babchuk, Hames, & Thompson, 1985). The basis of this study was developed due to the inconsistent results regarding which emotions are more easily identified and due to the lack of research regarding identifying emotions of different strengths (Forni-Santos & Osório, 2015). It is hypothesized that females will recognize emotions more accurately than males, anger will be the most easily identified emotion, fear will be the hardest emotion to identify, and strong versions of an emotion will be recognized more easily than slight versions. Participants were asked to identify emotions from a set of images depicting human facial expressions. Each image was of one emotion and either a strong or slight version of that emotion. Results showed no significant difference between gender and the correct percentage of each emotion. However, stronger versions of emotions were more accurately identified than slight versions, and significant differences were found between the emotions.

It is commonly believed that women are more emotional and better able to express and understand emotions than men (Donges, Kersting, & Suslow, 2012). Looking at which emotions females may be better at recognizing has provided inconsistent results (Forni-Santos & Osório, 2015). Additionally, little research has been done on the strength of one's emotions. The present study aims to determine the relationship between gender, type of emotion, and strength of emotion in one's ability to recognize facial expressions of emotions.

Facial expressions provide accurate information about emotion and are a form of nonverbal behavior (Ekman, 1957; Ekman & Friesen, 1977). Nonverbal behavior is one of the ways an organism communicates in its early stages of life (Ekman, 1957). However, it was unclear whether this behavior was universal or specific to individual cultures. Charles Darwin first looked at nonverbal behavior when he began to study human facial expressions of emotions in the late 1860s and early 1870s (Snyder, Kaufman, Harrison, & Maruff, 2010). Darwin corresponded with French physician and physiologist, Guillaume-Benjamin-Amand Duchenne, who applied galvanic electrical stimulation directly to facial muscles and produced over 60 photographic plates showing that there were different facial muscles that were responsible for each emotion (Snyder, Kaufman, Harrison, & Maruff, 2010). Darwin hypothesized that there were a fewer set of core emotions that could be consistently expressed and interpreted across cultures (Snyder et al., 2010). Darwin was the first to systematically study the universality of fundamental emotions (Snyder et al., 2010). He looked at emotional expressions across the mammalian line and saw the shared ancestry of these expressions in different species (Snyder et al., 2010).

Ekman (1970) continued Darwin's line of work when he went to New Guinea and recruited participants who had not seen movies, did not speak or understand English or Pidgin, did not live in any Western settlement or government towns, and never worked for a Caucasian. These criteria were used to eliminate the possibility that the participants had learned to imitate or recognize facial expressions unique to Western culture (Ekman, 1970). Each participant was shown three photographs, were told a story about an emotion, and then asked to choose the picture that fit the story (Ekman, 1970). The results were significant with the exception that fear was not distinguished from surprise (Ekman, 1970). Next, Ekman asked the New Guineans to pose emotions, and videotapes of these emotions

were shown to college students in the U.S. who were accurately able to judge them (Ekman, 1970). The third experiment involved videotaping the facial expressions of Japanese and U.S. college students while they watched a film that showed neutral and stress-inducing material (Ekman, 1970). Results showed the same facial responses to stress across both cultures (Ekman, 1970). Overall, Ekman (1970) achieved results that were conclusive for six universal facial expressions of emotions: anger, disgust, fear, happiness, sadness, and surprise.

The universal emotions have been used in other consequential studies that showed women are more accurate in identifying facial expressions of emotions than men (Hall & Matsumoto, 2004; Hall et al., 2010; Forni-Santos & Osório, 2015). Hall and Matsumoto (2004) had participants view the Japanese and Caucasian Facial Expressions of Emotion (JACFEE) and rate the presence or absence of anger, contempt, disgust, fear, happiness, sadness, and surprise using a 9-point scale. Results showed that women were more variable in their ratings compared to men, and they also tended to give higher ratings (Hall & Matsumoto, 2004). This demonstrated that women were better at detecting facial expressions and the subtle changes in the expressions than men. A second study done by Hall and Matsumoto (2004) utilized a Japanese and Caucasian Brief Affect Recognition Test (JACBART), which was created by inserting a JACFEE image for 0.07, 0.13, or 0.20 seconds on videotape into the middle of a one second image of a neutral face by that same expresser. Results showed that women were more accurate than men in determining the emotional meaning, even when stimuli were presented so fast that they were at the edge of conscious awareness (Hall & Matsumoto, 2004). This suggested relatively automatic cognitive processing differences in men and women (Hall & Matsumoto, 2004). Women also gave higher ratings than men, which is consistent with the result from the prior study (Hall & Matsumoto, 2004).

Hall et al. (2010) also utilized Ekman (1970) universal emotions in their experiment to determine if there were gender differences in allocation of attention to different facial regions. Hall et al. (2010) investigated the relationship between gaze patterns performance of recognizing facial expressions using eye-tracking methods. Male and female faces with expressions of anger, disgust, fear, happiness, sadness, and surprise were morphed into 30 to 100 percent intensities (Hall et al., 2010). The faces were presented for three seconds and participants were then to respond as quickly and accurately as possible indicating which of the six emotions they believed was presented (Hall et al., 2010). Results showed that women correctly responded faster than men (Hall et al., 2010). Additionally, women spent more time looking at the eye region than males did, and women more often looked to the eye region before looking to the mouth in comparison to males (Hall et al., 2010). Males, however, made longer first fixations on the eyes and mouth than females, which could indicate their difficulty in processing this information (Hall et al., 2010). These findings offer an explanation of the female advantage in facial expression recognition (Hall et al., 2010).

Additionally, a critical literature review done by Forni-Santos and Osório (2015) summarized the findings that women outperformed men in correctly identifying emotions. In regards to specific emotions, Forni-Santos and Osório (2015) concluded that men and women performed similarly in recognizing happiness, surprise, anger, and disgust. The recognition of fear showed ambiguous results with about half of the studies showing that women outperform men and the other half showing men and women perform similarly (Forni-Santos & Osório, 2015). However, women were often more accurate in identifying sadness than men (Forni-Santos & Osório, 2015). A study done by Hampson, van Anders, and Mullin (2006) supported this latter finding with the results of a series of computerized tasks showing that females had faster reaction times than males in identifying positive and neg-

ative emotions. Additionally, females had faster reaction times in all of the four negative emotions (fear, sadness, disgust, and anger). Therefore, women showed a much larger advantage in identifying negative emotions than men (Hampson et al., 2006). Furthermore, Fox et al. (2000) found that the detection of anger was faster and more accurate than the detection of happiness. Amado, Yildirim, and İyilikçi (2011) paralleled these results in a series of studies that showed that changes from neutral to angry male faces were detected faster than changes from neutral to fearful and happy male faces. Males and females detected the change in angry male faces at an equal speed (Amado et al., 2011).

In contrast to the aforementioned studies, Donges et al. (2012) found that women were better at recognizing positive emotions compared to men. Their study involved showing participants a "prime" face (i.e. sad, happy, and neutral expressions) so that participants could rate whether the neutral face expressed positive or negative emotion (Donges et al., 2012). The inconsistent results regarding which emotions are easier to identify could be due to the frequency in which facial expressions are observed in everyday life (Calvo, Gutiérrez-García, Fernández-Martín, & Nummenmaa, 2014). Calvo et al. (2014) had participants record, over the course of three days, each time they saw a facial expression that could be incorporated into a happy, sad, angry, fearful, disgusted, and surprised emotion. The order in which each face occurred from most to least frequently was happy, surprised, sad, angry, disgusted, and fearful (Calvo et al., 2014). Results showed that as the frequency of each expression increased, so did the accuracy recognition and response time (Calvo et al., 2014).

One theory for the female advantage in the recognition of facial expressions of emotions is the primary caretaker hypothesis (Babchuk, Hames, & Thompson, 1985). This hypothesis predicts that the sex that has dominated infant caretaking through evolutionary time will demonstrate important caretaking skills. These skills include the quick and accurate recognition of infant emotional cues that are acquired as a result of the high infant mortality rate throughout evolutionary history and the numerous potential hazards to infant development (Babchuk et al., 1985). Females have been the dominate caretakers and, therefore, were predicted to be more prompt and accurate in recognizing infant facial expressions of emotion compared to males (Babchuk et al., 1985). Babchuk et al. (1985) tested this hypothesis by measuring speed and accuracy in identifying infant facial expressions of emotions. Results supported the hypothesis; however, previous childcare experience was shown to have no effect on this difference (Babchuk et al., 1985).

Sawada et al. (2014) conducted a study that revealed findings in favor of the primary caretaker hypothesis. Females were found to detect arousing facial expressions faster than males. This suggests that females are more efficient in detecting important signals within emotional facial expressions (Sawada et al, 2014). In terms of childrearing, being able to rapidly identify these important signals will help maintain the health of an infant (Sawada et al, 2014). Sawada et al. (2014) also found that negative emotions were detected more rapidly, but that this finding was more apparent in males than females. This suggests another evolutionary cause that males have been more subjected to aggression in terms of mating or hunting than females have (Sawada et al, 2014). These evolutionary hypotheses have led the researcher of the present study to determine whether females will be able to recognize facial expressions of emotions more accurately than males and whether anger will be the most easily identified emotion. The primary caretaker hypothesis could also explain the results found by Hoffmann, Kessler, Eppel, Rukavina, and Traue (2010) that women recognized subtle facial displays of emotion more accurately than men, but there was no difference between men and women when strong emotions were displayed. Since females are better at detecting important signals, the present study will seek to de-

termine whether strong versions of an emotion will be recognized more accurately than slight versions.

The researcher has hypothesized that females will be able to recognize facial expressions of emotions more accurately than males because they are the dominant caretakers. It is also hypothesized that strong versions of an emotion will be recognized more accurately than slight versions. Recognizing threats and anger as well as hiding fear has become a vital part of survival. Thus, it is hypothesized that anger will be the most easily identified emotion, and fear will be the hardest emotion to identify.

Method

PARTICIPANTS

A convenience sample of 44 undergraduate students (22 males and 22 females) 18 years of age or older at Western Connecticut State University participated in this study. Participants were recruited through a flyer posted on a bulletin board in the psychology department. Some participants received course credit for their participation.

DESIGN

This study was a mixed factorial research design. The independent variables were gender, emotion, and strength of emotion. Emotion type was analyzed within-subjects and had six levels: anger, disgust, fear, happiness, sadness, and surprise. Strength of emotion was analyzed within-subjects and had two levels: slight and strong. The dependent variable was the correct percentage of each emotion.

MATERIALS

There were a total of five different PowerPoint presentations, each consisting of the instructions and black and white images of the six facial expressions of emotions (Appendix A). There were slight and strong versions of each emotion. Each emotion had two different images of the strong version, and two different images of the slight version, with the exception of disgust which only had one image of the slight version. Images were of six males and seventeen females found from Paul Ekman's book, *Emotions Revealed*, and on Google.com including images from Paul Ekman's Emotions Revealed and Pictures of Facial Affect (POFA) photo sets. An answer sheet (Appendix B) was provided for participants to circle which emotion they believed was being presented during each trial.

PROCEDURE

Participants were first given an informed consent form to read and sign. Participants were then randomly assigned to one of five different PowerPoints. The first slide of every PowerPoint provided instructions on how the experiment was to be implemented. When the participants were ready to begin the first trial started by showing an image of a facial expression. The image was shown for one second, and the next slide prompted the participant to answer. Five seconds were given to do this until an auditory tone prompted them to stop. The inter-trial interval was four seconds. Subjects completed a total of 23 trials. The entire experiment took about four minutes to complete.

Results

A two-way repeated-measures analysis of variance was conducted to evaluate, both individually and combined, the effects of gender, emotion, and strength of emotion on the correct percentage of each emotion. The analysis did not identify a significant main effect of gender on the correct percentage of each emotion, $F(1, 42) = 1.45$, $p > 0.05$. However, the analysis identified a significant main effect of emotions on the correct percentage of each emotion, $F(5, 42) = 23.68$, $p < 0.05$, *partial* $\eta^2 = 0.36$. The order of emotions from highest correct percentage to lowest correct percentage was

surprise (M = 0.74, SD = 0.22), sadness (M = 0.66, SD = 0.30), happiness (M = 0.63, SD = 0.25), disgust (M = 0.49, SD = 0.27), anger (M = 0.39, SD = 0.27), and fear (M = 0.29, SD = 0.23). Likewise, there was a significant main effect of strength of the emotion on the correct percentage of each emotion, F (1, 42) = 94.63, $p < 0.05$, *partial* $\eta^2 = 0.69$. The stronger version of an emotion (M = 0.66, SD = 0.17) was correctly identified more than the slight version of an emotion (M = 0.41, SD = 0.15). The analysis identified a significant interaction of strength of emotion and emotion on the correct percentage of each emotion, F (5, 42) = 17.45, $p < 0.05$, *partial* $\eta^2 = 0.29$. The stronger versions of each emotion were correctly identified more than the slight versions for all emotions with the exceptions of fear and surprise. The analysis identified a nonsignificant interaction between strength of emotion and gender on the correct percentage of each emotion, F (1, 42) = 1.928, $p > 0.05$. Likewise, there was a nonsignificant interaction between emotion and gender on the correct percentage of each emotion, F (5, 42) = 0.22, $p > 0.05$. Finally, the analysis identified a nonsignificant interaction between strength of emotion, emotion, and gender on the correct percentage of each emotion, F (5, 42) = 1.03, $p > 0.05$.

Discussion

This study examined whether males or females were more accurate in identifying facial expressions of emotions and whether strong or slight versions of each emotion were more easily identified. This study also looked at which emotions are easiest to identify and which are the hardest. The results of this study did not provide support for the researcher's hypothesis that females would be able to recognize facial expressions of emotions more accurately than males. These results do not parallel those of many previous studies (Hall & Matsumoto, 2004; Hall et al., 2010; Forni-Santos & Osório, 2015; Babchuk et al., 1985; Hampson et al., 2006). The results also did not support the primary caretaker hypothesis that the sex that has dominated infant caretaking through evolutionary time will demonstrate important caretaking skills (Babchuk et al, 1985). The previous finding of Sawada et al. (2014) that females are more efficient in detecting important signals within emotional facial expressions were also not supported.

One explanation for why the results of this study did not coincide with previous research is that in modern times, females are no longer the primary caretakers. Males have taken on a much larger role than they used to (Amato, 1989), and as a result, the change in findings between genders in recognizing emotions could mirror the change between genders and their role as primary caretaker. It is possible that males are developing more of an instinct to care for the safety and health of children.

A potential confound in this study was that the minimum amount of time that each image could be shown for was one second due to the program used to run the experiment. However, several of the studies done that achieved significant differences did so when the stimuli were presented for less than one second (Hall & Matsumoto, 2004; Dongres et al., 2012). A facial expression displayed for a fraction of a second is known as a micro expression (Ekman, 2009). Micro expressions are unique because you have to be trained to see them (Ekman, 2009). Anyone can recognize the universal expressions that appear on the face for a few seconds, but you have to be trained to be able to see the micro expressions that can last only one-twenty-fifth of a second (Ekman, 2009). The difference in gender and recognizing facial expressions could be a result of micro expressions. It is possible that females have a biological head start in the training of micro expressions.

The researcher's hypothesis that strong versions of an emotion would be identified more accurately than slight versions was supported by the results of

the study. This finding is of importance since there is not an abundance of research that has looked at this before. The degree to which an emotion is being displayed could resemble whether or not someone is trying to conceal an emotion. When emotions are concealed, micro expressions occur and show how a person is really feeling before they are consciously aware of the expression they are making (Ekman, 2009). This is important to determine someone's true feelings, even if their words contradict it (Ekman, 2009).

The hypothesis that anger would be the most easily identified emotion and fear would be the hardest emotion to identify was partially correct – fear was the hardest emotion to identify, however, anger was not the easiest. These results did not support those of Fox et al. (2000) who found that detection of anger is faster and more accurate than the detection of happiness. The results also do not support what Sawada et al. (2014) found about negative emotions being detected more rapidly than positive emotions. The findings of Donges et al. (2012) that women were better at recognizing positive emotions compared to men were also not supported. In this present study, sadness was recognized more easily than happiness. The results of the present study, however, do support the findings of Amado et al. (2011) who found that changes in fearful faces were detected at slower speeds than changes in angry faces. Amado et al. (2011) suggested that this may be due to the fact that a perceived environmental danger indicated by a fearful face directs attention away from the face and instead towards other locations in the visual scene. The results of the present study are also similar to those of Calvo et al.(2014) which showed that as the frequency of each expression increased, so did the accuracy recognition and response time. The most frequently occurring emotions that Calvo et al. (2014) found were happiness, surprise, and sadness, and the least frequently occurring emotions were anger, disgust, and fear. The present study showed that the most accurately recognized emotions were surprise, sadness, and happiness, and the least accurately recognized emotions were disgust, anger, and fear. Therefore, the more accurately identified emotions in the present study could be due to the fact that those emotions are frequently occurring.

The results of the present study allowed the researcher to formulate several new questions that could be explored through additional research. First, the premise of this study could be revised with a greater focus on the degree to which different emotions are able to be identified, both overall and by gender, and why. There is potential for follow-up studies since previous research has been inconsistent with these findings (Forni-Santos & Osório, 2015). Another follow-up study could explore why females have been found to be more accurate in recognizing emotions than males. Babchuk (1985) primary caretaker hypothesis is well developed and has a great deal of support; however, maybe there is a specific biological explanation to this phenomenon. Future studies could examine differences in the brains of males and females when they are looking at micro and macro expressions. Snyder et al. (2010) touched upon the possible biological component when discussing recent research that shows facial recognition of emotion dysfunction in several neurological disorders where there is a disruption of the complex frontal-striatal-limbic circuitry that underlies the fast and accurate perception of emotion. This shows that certain areas in the brain play a role in emotion recognition, and these areas could differ between males and females. Age should also be examined to see if young females are better than young males at recognizing facial expressions of emotions as well. If there is a biological component to this phenomenon, maybe it is something in the female brain that gives them an advantage from birth. Age is also an important factor because, as Calvo et al. (2014) suggested, a decline in the frequency of emotional expressions among the elderly could be due to a greater amount of emotional control. The elderly could also experience greater difficulty in identifying facial expressions as a result of

a decrease in signal clarity due to a loss of flexibility in muscle tissue, or wrinkles and folds in the skin (Calvo et al., 2014).

The rebirth of the field of facial expressions of emotions has flourished into several fields of psychology – clinical, developmental, personality, physiological, and social (Ekman, 1993). Emotion is a form of nonverbal behavior and is a mechanism of communication (Ekman, 1957). As this study shows, inconsistent results have been common in this research, which allows a great amount of room to still decipher why these differences occur. These differences should continue to be explored across the many areas of psychology in order to better understand how people communicate with each other.

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Appendix A

Appendix B

Are you male or female? ☐ Male ☐ Female

TRIAL	EMOTION (CIRLCE ONE)						
1	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
2	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
3	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
4	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
5	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
6	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
7	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
8	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
9	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
10	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
11	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
12	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
13	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
14	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
15	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
16	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
17	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
18	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
19	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
20	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
21	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
22	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise
23	Anger	Contempt	Disgust	Fear	Happiness	Sadness	Surprise

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