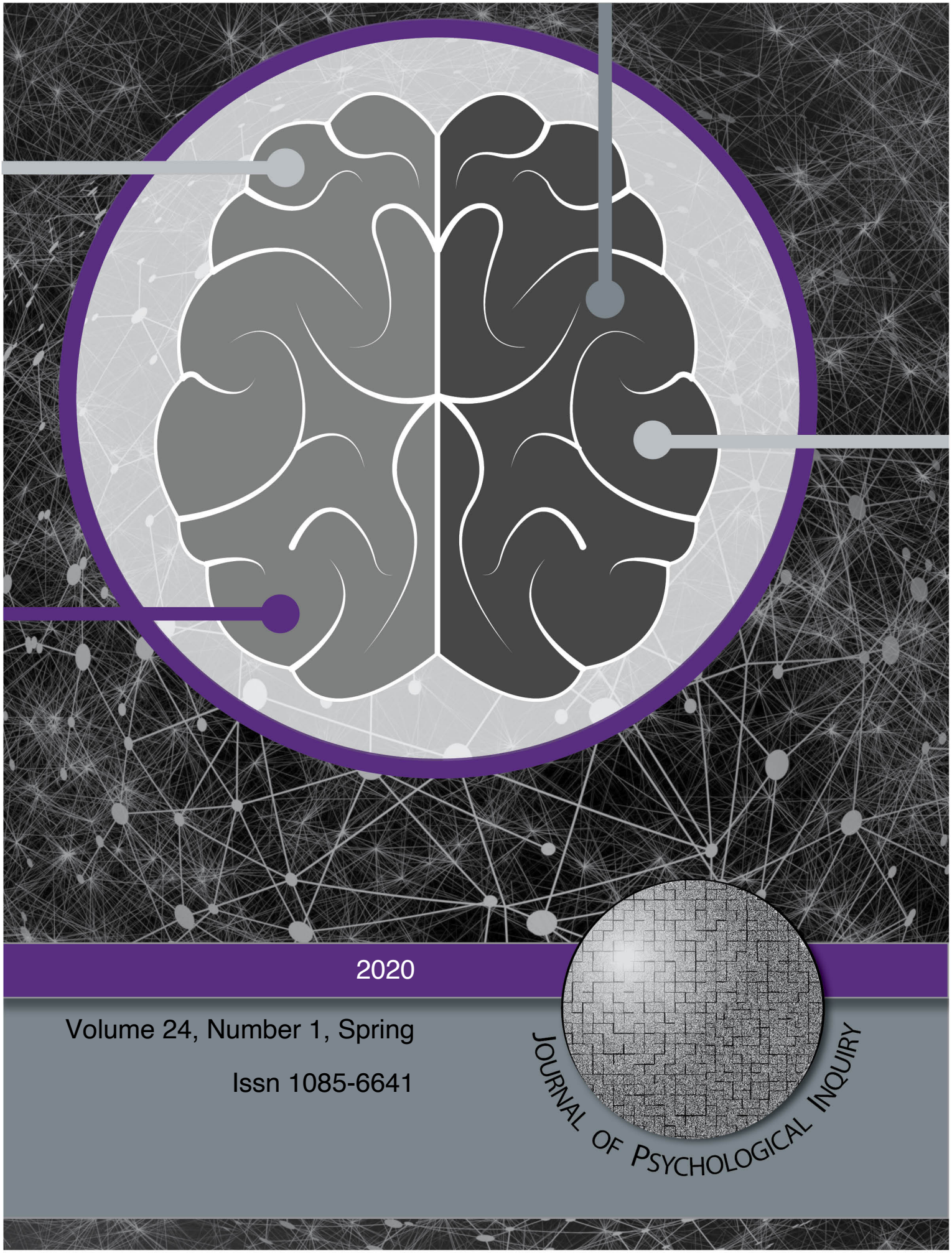

2020

Volume 24, Number 1, Spring

Issn 1085-6641

Journal of Psychological Inquiry

Journal of Psychological Inquiry
Editorial Board

Journal of
Psychological Inquiry

Volume 24 Number 1 2020

Journal Contents

Articles

Special Features - Dramatic

Special Features - Interview

From the Editor's Desk

Hello, world! Is there anybody out there?

What a year it has been already: a president impeached for just the third time in American history (quick quiz: can you name the other two American presidents to be impeached? Hint: Nixon wasn't one of them), and a cascading series of crises, beginning with a global pandemic, economic collapse, and widespread demonstrations denouncing police brutality and unfair treatment to people of color. And we haven't even gotten to the American presidential election, which promises to be a spectacle of its own.

The expression "May you live in interesting times" sounds like a blessing, but you can be forgiven for thinking that it's actually a curse. If you're reading this, then you've made it this far, and I hope you continue to be safe and sane. Hold on tight; the ride is sure to get even bumpier.

I can't imagine that any of us could have seen the challenges we have faced and continue to face in 2020. As psychological scientists, the year certainly has presented us with lots of stuff to arouse our curiosity about how people respond to unforeseen and tumultuous times. For a long time I've thought that creativity is the meaning of life, so if recent events inspire you to come up with great new research ideas, there will be some good to come from them.

Enough of that. This is the fourth issue of the Journal of Psychology Inquiry that I have edited with a great deal of help from my graduate student assistant, Autumn Taylor, and now that she has become expert at formatting articles for publication, I will no longer be able to rely on her expertise. Hopefully I'll retain some ability and knowledge for upcoming issues.

The Fall, 2020 issue of JPI already has its quota of articles, but be sure to submit your manuscripts to the JPI submission portal to be published in the Spring, 2021 issue.

Keep your spirits up, keep your eyes and ears open, and I hope to see the results of your research projects in the submission portal soon.

Ken Sobel
University of Central Arkansas
Managing editor

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 5-10

Elizabeth A Dahl, PhD., Award for Excellence in Undergraduate Research

EDUCATIONAL IMPLICATIONS OF A RELATIONSHIP BETWEEN MUSICAL INSTRUMENT AND PERSONALITY

RYAN D. SHELTON AND RAYMOND J. GREEN

TEXAS A&M UNIVERSITY-COMMERCE

Abstract – The present research investigated the question – Is there a relationship between musical instrument preference and personality? Participants completed the Big Five Indicator (BFI) to assess personality attributes. Multivariate analysis of variance found statistical differences between instrument groups and their total scores on the Neuroticism and Openness to Experience variables. In particular, clarinet players had the most distinctive profile having the highest scores on the Neuroticism dimension and lowest on the Openness dimension. Educational strategies were provided for instrument groups that had unique personality profiles.

Keywords: Big Five, musical instrument, academic motivation, music education

One of the most significant events in a young musician's life is the assignment of a musical instrument. It can alter their entire educational experience and subsequent career. For instance, a student who picks up the clarinet for the first time, or the teacher assigning the instrument, cannot predict if that instrument will lead to a career in music or a dead end. Still, while the music educator may only be concerned with a shortage of clarinets for the upcoming competition season, the student assigned the instrument could eventually pursue a degree in music and play clarinet professionally in a symphony orchestra for the next 40 years.

In the instrumental profession, countless stereotypes, myths, jokes and generalizations circulate about people who play different instruments. A quick Google search for "musical instrument jokes" will fill a browser with websites devoted to the mockery of musicians by the instrument they play. Research support is provided for some of these stereotypes and jokes as brass players have been found to be lower in sensitivity (Kemp, 1981c), loud mouthed, coarse, and 'heavy boozers' (Davies, 1978) and research indicates that string players are neurotic (Cribb & Gregory, 1999; Lipton, 1987). Despite the shared belief that personality and instrument choice is linked (Cribb & Gregory, 1999), it should be noted that research on this link is far from comprehensive and also rife with conflicting results.

The commonality of stereotypes and jokes, and the extant literature, raise a number of interesting questions.

- Are people with certain personalities drawn toward the timbrel, technical and aesthetic characteristics of certain instruments? If so, can this be assessed before children are assigned a musical instrument?
- Do the skills necessary to master the demands of specific instruments develop within an individual certain idiosyncrasies in behavior or personality traits?
- Do customs in composition and orchestration in a larger ensemble setting mold the musicians in that section into a certain type of person?
- Do individuals who lack certain characteristics abandon the pursuit of mastery of that instrument because their personality proved incompatible to the demands of that instrument? Or is it possible for educators to note these personality characteristics and work with or around them so that children do not become frustrated in their attempts to master their instrument?

The research described below attempted to determine if there truly were personality differences across different groups of instrumentalists. If there are, the implications could be far reaching. For example, if differences exist, band instructors in schools could distribute personality assessments to young people before assigning them to a specific section. Current research on factors influencing instrument assignment, and acceptance of that assignment by the student, focuses on the association of gender and instrument (e.g., Abeles, 2009; Conway, 2000). That is, different cultures view certain instruments as masculine or feminine and this can influence whether a child is comfortable playing that instrument (Delzell & Leppla, 1992). Individuals who play gender mismatched instruments may be socially ostracized (Kemp, 1986). Finally, if there are links between personality and instrument then teachers, coaches, and private instructors could find ways to develop and nurture students' latent character traits that will in turn affect or spur forward their musical success.

For practicality, the scope of this research has been limited to musicians in the wind instrumental division (concert band players). The groups studied will include flutists, clarinetists, double reed players (oboe and bassoon), saxophonists, hornists, trumpeters, trombonists, and low brass players (euphonium and tuba), and percussionists.

Personality can be defined as the unique personal qualities of an individual that influence a variety of characteristic behavior patterns across different situations and over time (Gerrig & Zimbardo, 2002). Over the last three decades, personality trait research has shifted toward an emphasis on the "Big Five" personality dimensions. These five dimensions were derived from factor analyses of the terms people use to describe themselves and others (John, Naumann & Soto, 2008), and are generally viewed as providing a comprehensive taxonomy of personality traits (McCrae & Costa, 1987). The five factors purported to comprise normal personality are: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (McCrae & Costa, 1989). A number of questionnaire-based instruments have been devised to assess personality including the 44 item Big Five Inventory (BFI), the Revised NEO Personality Inventory (NEO-PI-R), a shorter version of the NEO-PI-R, (NEO-FFI), and the lengthier Trait Descriptive Adjectives (TDA).

Although no substantial body of literature exists, other researchers have examined correlations between personality and instrument. Cutietta and McAllister (1997) administered the Junior Eysenck Personality Questionnaire (JEPQ) to students in grades 7-12 to determine propensity of those with a certain personality type to begin instrumental study in the schools and to investigate whether personality influence instrument choice. They did not find significant personality differences between instrument groups. Kemp (1981c), using Cattell's 16 Personality Factor Questionnaire (16PF), found that composers were significantly more introverted than were non-composers and that (1981c) string players scored significantly higher on aloofness than did other instrument groups. McManus & Furnham (2006) examined the influences of (1) education, (2) background, and (3) personality on involvement in the arts in a sample of students from a college in London, England. According to their research aesthetic activity was significantly and positively correlated to scores on the personality factor of openness, and was negatively correlated to scores on agreeableness and conscientiousness (McManus & Furnham, 2006). Kaufman and Rawlings (2004) found that string players were significantly higher on the Neurotic personality trait than were brass players in a sample of Australian undergraduates. Lipton (1987) used ratings by other to investigate the stereotypes that instrument groups have of other instrument groups and found that strings and brass players were consistently rated as being on the opposite end of the psychological spectra.

Mihajlovski (2013), using a sample of Macedonian musicians ranging from secondary school learners to adult professionals, found that brass players produced the most distinctive personality profile scoring high on Extraversion, Conventionality, Emotional Stability, Adjustment, and Lower Intelligence. Bell and Creswell (1984) uncovered greater inter-instrument differences among students studying at a college of music than for secondary school student instrumentalists. Specifically for instrumentalists, woodwind players were found to have significantly higher scores for tough-minded realism than did string or brass players. Woodwind players were also found to be more taciturn than string and brass players. Finally, woodwind players had significantly higher scores on the conscientiousness and persistence measures than brass players. Yet, Langendörfer (2008), using a sample of professional orchestra players, found that woodwind players were less conscientious than both string and brass players. Also, brass players demonstrated higher scores on socially prescribed perfectionism than did woodwind players.

In terms of educational research and musical choice, there is very little discussion of personality as a predictor of instrument assignment and subsequent success. The majority of music education researchers instead focus on the associations drawn between

instruments and gender (e.g., Conway, 2000, Johnson & Stewart, 2004). These researchers highlight the importance of comfort with one's instrument but frame this in terms of gender stereotypes, not personality factors. However, more general research has drawn a connection between personality and academic motivation. For example, Colquitt and Simmering (1998) found a positive relationship between Conscientiousness and a desire to learn content as opposed to meeting normative standards. Judge and Ilies (2002) conducted a meta-analysis of 65 studies and found that Conscientiousness and Neuroticism were significant predictors of goal setting, expectancy, and self-efficacy all of which are important academic concepts. Komarraju et al. (2009) found a strong relationship between conscientiousness, academic motivation and academic achievement. Further, they reported that Openness was positively correlated with intrinsic motivation, Extraversion to extrinsic motivation, and Agreeableness was negatively related to both academic motivation and achievement. Although none of these studies specifically looked at music and personality it seems reasonable to assume that these connections between personality and general academic motivation could extend to music education.

In an attempt to bring some clarity, the Big Five Inventory was provided to a sample of individuals at various stages of musical development who have demonstrated extended success on their instrument. The researcher expected that students playing instruments from the same instrument family—woodwind, brass, or percussion—would exhibit similar personality traits. Once these personality differences between instruments were discovered recommendations for teachers were provided.

Method

Participants

In order to establish some criteria for qualification as a musician on any given instrument, the subjects included: 1) professional musicians making their primary income teaching or performing on their instrument, 2) applied faculty at the collegiate level, 3) university students who have completed their barrier exams and were preparing for a junior or senior recital, and 4) high school students designated as an All State Musician by the Texas Music Educators Association. The sample sizes for each instrument grouping are as follows: clarinet (n=33); double reed (n=26); flute (n=28); horn (n=28); low brass (n=25); percussion (n=29); saxophone (n=24); trombone (n=27); and trumpet (n=25).

Psychological Instruments

The study employed the Big Five Inventory or BFI (John, Donahue, & Kentle, 1991). The BFI was chosen because of its strong psychometric properties and its brevity. The BFI has an internal consistency mean of .83, and a corrected convergent validity correlation of .95 with the Trait Descriptive Adjectives assessment (TDA) and with the NEO-FFI (John, et al., 1991).

Procedure

During the study, the researcher contacted music administrators (ensemble directors) and asked them to forward a link to an online version of the survey, and posted the link on the Texas Yellow Board (an online forum for Texas band directors). The subjects were asked to complete a questionnaire asking for their primary instrument and a basic portrait of their musical experience to determine if they fit in one of the four experience categories listed earlier. Attached to the questionnaire was the 44-item BFI survey. The researcher collected all the data for this research using the online survey. IRB approval was received from the authors' home institution before any data were collected.

Results

A multivariate analysis of variance with instrument as the independent variable and the five personality traits as dependent variables yielded significant results, $F(40,1180)=2.1$, $p<.001$, indicating that there were differences between instrument groups on their total scores (see Table 1) on the personality traits. More specifically, subsequent ANOVAs indicated

Table 1

Average Psychological Trait Scores and Standard Deviations by Instrument

	Psychological Trait Scores				
Instrument	Openness	Neuroticism	Agreeableness	Conscientiousness	Extraversion
Clarinet	36.9 (4.5)[b]	25.1(5.6)[a]	33.7 (4.3)	30.6 (5.1)	25.6 (7.9)
Double Reed	39.9 (4.6)[a,b]	24.4 (5.3)[a,b]	34.0 (5.8)	29.4 (4.4)	27.8 (5.2)
Flute	38.4 (5.1)[a,b]	24.0 (4.5)[a,b,c]	35.2 (6.8)	31.1 (5.6)	26.1 (5.3)
Horn	41.2 (5.0)[a,b]	22.9 (6.4)[a,b,c]	34.5 (6.1)	31.8 (5.0)	27.0 (6.8)
Low Brass	39.4 (7.0)[a,b]	19.8 (6.1)[b,c]	34.0 (5.8)	29.9 (5.7)	25.9 (7.3)
Percussion	42.2 (4.1)[a]	20.5 (5.6)[b,c]	33.6 (5.3)	33.2 (4.3)	26.2 (6.6)
Saxophone	36.8 (5.1)[b]	20.9 (5.2)[a,b,c]	34.8 (4.7)	29.6 (5.6)	28.5 (7.1)
Trombone	39.5 (5.6)[a,b]	19.5 (4.7)[c]	34.7 (5.6)	32.0 (5.4)	25.2 (5.2)
Trumpet	40.4 (5.7)[a,b]	20.0 (6.3)[b,c]	34.3 (5.8)	29.6 (5.7)	28.2 (6.9)

Note. Superscripts indicate significant subsets.

that there were only significant differences on two of the personality traits – Neuroticism, $F(8,236)=4.35$, $p<.001$, partial eta squared =.13, and Openness to Experience, $F(8,236)=3.40$, $p=.001$, partial eta squared =.10 .

Neuroticism

Tukey post-hoc analyses were calculated to determine which instrument groups differed from each other on each variable. For the neuroticism variable, trombone players' scores were significantly lower than those of clarinet players and double reed players (see Table 1). Clarinet players had the highest mean score (i.e., were more neurotic) and differed significantly from percussion, trumpet, low brass and trombone players' scores.

Openness to Experience

For the Openness to Experience variable, clarinet players' scores differed significantly from the scores of horn and percussion players and percussion players scores also significantly differed from those of saxophone players. That is, horn and percussion players were significantly more open to experience than the clarinet and/or saxophone players.

Summary

The statistical analyses revealed differences between instrumentalists on two of the five personality variables – neuroticism and openness to experience. Trombone players had significantly lower scores on neuroticism whereas clarinet players scored notably higher than other instrument groups. Clarinet players were unique once again in that they scored significantly lower on openness to experience than all instrument groups other than saxophonists, whereas horn and percussion players were more open to experience than the other instrument groups.

Discussion

While strong personality identity profiles were not demonstrated for each instrument group, the data did indicate significant differences between some instruments on the Neuroticism and Openness dimensions. The question remains, do the significant differences in these personality dimensions suggest that music educators can, or should, use different motivational strategies for different instrument groups? Research linking personality traits and academic motivation suggests that the answer is yes. Numerous researchers (e.g., Fink 2015; Judge & Ilies, 2002; Komarraju, Karua, & Schmeck, 2009) Payne, Youngcourt, & Beaubien, 2007) have reported that students' academic motivation beliefs are influenced to some extent by personality traits. Komarraju and Karau (2005) found strong correlations between BFI personality traits and the Academic Motivations Inventory (AMI; Moen & Doyle, 1977) and their research provides a specific model for discussing how educators could apply information about their students' personalities to increase success in the music classroom. AMI motivators were grouped into the three domains of Avoidance, Engagement, and Achievement. The Avoidant student (debilitating anxiety, economic orientation, demanding, withdrawing, disliking school and discouraged about school) was defined by high scores on Neuroticism and Extraversion. The Engaged student (thinking, facilitating anxiety, desires self-improvement, influencing, approval and affiliating) comprised high scores on Openness and Extraversion. The Achieving student (persisting, achieving, grades orientation and competing) was defined by high scores on Conscientiousness, Neuroticism and Openness. How could this data influence the music educator's approach?

Neuroticism Variable

Within the Neuroticism variable, clarinet players scored significantly higher than percussion, trumpet, low brass and trombone players. Similarly, double reeds players also scored significantly higher than trombone players. The literature shows that Neurotic individuals are most closely linked with the academic style of Avoidance and benefit the most from extrinsic stimuli (Komarraju & Karau, 2005). Komarraju and Karau (2005) describe avoidant students as those who "tend to feel discouraged about school, worry about failure, withdraw in the classroom, and take courses for extrinsic reasons." Thus, the music educator can expect that motivational strategies with strong emphasis on extraneous benefits will yield more effective results with clarinet and double reed players than with trombones and low brass.

Openness Variable

Similarly, within the Openness variable, percussion players scored significantly higher than clarinet and saxophone players. The extant literature indicates that openness is significantly linked with the academic style of Engagement, which Komarraju and Karau (2005) describe as including those who are sociable and who are likely to benefit from discussion and interactive learning. For the music educator, this means that interaction and exploration may be more effective motivational strategies for percussionists than clarinetists and saxophonists. This seems consistent with the technical demands of percussionists to frequently explore new timbres in their ever-expanding repertoire of instruments, techniques and orchestration customs. Their instrument also involves the most amount of kinesthetic, physical interaction.

The Intersection of Neuroticism and Openness

Both Neuroticism and Openness to Experience were positively linked to Achievement. Achievement can be described as responsible, intellectually curious, achievement oriented, hard-working, and competitive. Whereas the personality traits of Neuroticism and Openness to Experience distinguished between instrument groups in terms of Engagement and Avoidance, those personality traits link the clarinet and percussion groups in terms of Achievement. Thus, although the music educator might have different approaches in terms of the two instrument groups related to the use of extrinsic awards and exploration, they might find that a focus on grades and competition will prove most effective within the clarinet and percussion sections of the wind ensemble.

Clarinetists

Clarinetists demonstrated the most detailed profile as they were the highest scoring on the Neuroticism dimension and among the lowest on the Openness dimension. This personality "profile" provides the music educator the most tailored understanding of this group's specific needs and idiosyncrasies. Based upon this data, clarinetists should benefit from extrinsic motivation, perhaps in the form of grades and competition, but not from intrinsic or exploratory experiences. Further, if keying in on the anxiety linked to neuroticism, clarinetists should avoid publicly playing pieces for which they are uncertain of their technical expertise (Kemp, 1981c).

Limitations and Suggestions for Future Research

Causation cannot be evaluated through this method of research, so, other researchers may undertake studies of motivation, teacher-student relationships, etc. to explore why students with certain personality traits prefer or succeed on certain instruments. Although the connection between personality and success with a particular music group seems logical, it could easily be influenced by some unknown third variable. For instance, participant gender was not measured in the current study. It is plausible that instrument groupings fell along gender lines. Mihajlovski (2013) faced a similar issue in his study when all 58 brass players identified as male. Although there is debate on the importance of gender differences on personality assessments (Samuel et al., 2010) subsequent research can tease out if these differences are motivated by gender, instrument choice, or some intersection of the two variables. Further, the survey asked participants for their primary instrument, it did not assess whether they played multiple instruments or if they had originally been assigned a different instrument. If a performer played multiple instruments it could certainly confound the link between personality and instrument success. Additionally, the research was conducted with the tacit assumption that instruments were assigned to students, which is the most common approach in school districts. However, it is possible that some students allowed students to choose their instrument. It is unclear how the relationship between personality and instrument might be changed if students chose their own instrument as opposed to being assigned an instrument.

Further, music educators may unwittingly praise certain traits and their behavioral manifestation due to stereotypes they hold. This would create a form of self-fulfilling prophecy where only those who originally fit the stereotype feel compelled to continue. A longitudinal study observing a large sample of music students over the course of their musical careers might help to more clearly address the causal nature of the relationship. Finally, connecting academic motivation to personality and instrument group was applied post hoc and could be examined in a separate study, which included motivators as part of the questionnaire provided to participants.

References

Abeles, H. (2009). Are musical instrument gender associations changing? *Journal of Research in Music Education, 57(2),* 127-139.

Bell, C.R., & Cresswell, A. (1984). Personality differences among musical instrumentalists. *Psychology of Music, 12(2),* 83-93. http://dx.doi.org/10.1177/0305735684122002

Colquitt, J.A., & Simmering, M.J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A Longitudinal Study. *Journal of Applied Psychology, 83(4),* 654-665. http://dx.doi.org/10.1037/0021-9010.83.4.654

Conway, C. (2000). Gender and musical instrument choice: A phenomenological investigation. *Bulletin of the Council for Research in Music Education, 146,* 1-16.

Cribb, C, & Gregory, A.H. (1999). Stereotypes and personalities of musicians. *The Journal of Psychology: Interdisciplinary and Applied, 133(1),* 104-114. http://dx.doi.org/10.1080/00223989909599725

Cutietta, R, and McAllister, P.A. (1997). Student personality and instrumental participation, continuation, and choice. *Journal of Research in Music Education, 45(2),* 282-294. http://dx.doi.org/10.2307/3345587

Davies, J.B. (1978). *The Psychology of Music.* London: Hutchison.

Delzell, J.K., & Leppla, D.A. (1992). Gender association of musical instruments and preferences of fourth-

grade students for selected instruments. *Journal of Research in Music Education, 40,* 93-103.
Fink, J.R. (2015). Structural equation models examining the relationships between the big five personality factors and the music model of academic motivation components. Unpublished dissertation. Virginia Tech University. Blacksburg, VA.
Gerrig, R.J., & Zimbardo, P. G. (2002). *Psychology and Life, 16/e*. Boston, MA: Allyn and Bacon.
John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 114-158). New York, NY: Guilford Press.
John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory—Versions 4a and 54*. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.
Johnson, C.M., & Stewart,. E.E.(2004). Effect of sex identification on instrument assignment by band directors. *Journal of Research in Music Education, 52,* 130-140.
Judge, T.A., & Iles, R. (2002). Relationship of personality to performance motivation: A meta-analytic review. *Journal of Applied Psychology, 87,* 797-807. http://dx.doi.org/10.1037//0021-9010.87.4.797.
Kaufman, L., & Rawlings, D. (2004). The role of personality and musical experiences in shaping music students' intentions to become performers. In S.D. Lipscomb, R. Ashley, R.O. Gjerdingen, & P. Webster (Eds.), *Proceedings of the 8th International Conference on Music Perception and Cognition* (pp. 478-481). Adelaide, Australia: Causal Productions.
Kemp, A. (1981c). Personality differences between the players of string, woodwind, brass, and keyboard instruments, and singers. *Council for Research in Music Education Bulletin, 66,* 33-38.
Kemp, A. (1986). *Psychology & Personality of Musicians: The Musical Temperament*. Oxford, UK: Oxford University Press.
Komarraju, M., & Karau, S.J. (2005). The relationship between the big five personality traits and academic motivation. *Personality and Individual Differences*, *39(3)*, 557-567. http://dx.doi.org/10.1177/030573568192007
Komarraju, M., & Karau, S.J., & Schmeck, R.R. (2009). Role of the Big Five personality traits in predicting college students' academic motivation and achievement. *Learning and Individual Differences, 19(1),* 47-52. http://doi:10.1016/j.lindif.2008.07.001.
Langendörfer, F. (2008). Personality differences among orchestra instrumental groups: Just a stereotype? *Personality and Individual Differences, 44(3),* 610-620. http://dx.doi.org/10.1016/j.paid.2007.09.027
Lipton, J.P. (1987). Stereotypes concerning musicians within symphony orchestras. *The Journal of Psychology, 121(1),* 85-93. http://dx.doi.org/10.1080/00223980.1987.9712647
McManus, I. C., & Furnham, A. (2006). Aesthetic activities and aesthetic attitudes: Influences of education, background and personality on interest and involvement in the arts. *British Journal of Psychology, 97(4)*, 555-886. http://dx.doi.org/10.1348/000712606X101088
McCrae, R.R., & Costa Jr., P.T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52(1),* 81-90. http://dx.doi.org/10.1037/0022-3514.52.1.81
McCrae, R.R., & Costa Jr., P.T. (1989). The structure of interpersonal traits: Wiggin's Circumplex and the Five-Factor Model. *Journal of Personality and Social Psychology, 56(4),* 586-595. http://dx.doi.org/10.1037//0022-3514.56.4.586
Mihajlovski, Z. (2013). Personality, intelligence, and music instrument. *Croatian Journal of Education, 15(1),* 155-172.
Moen, R., & Doyle, K.O. Jr. (1975). Construction and development of the Academic Motivations Inventory (AMI). *Educational and Psychological Measurement, 37(2),* 509-512. http://dx.doi.org/10.1177/001316447703700229.
Samuel, D.B., Ansell, E.B., Hopwood, C.J., Morey, L.C., Markowitz, J.C., Skodol, A.E., & Grilo, C.M. (2010). The impact of NEO PI-R gender-norms on the assessment of personality disorder profiles. *Psychological Assessment, 22(3),* 539-545. http://dx.doi.org/10.1037/a0019580

Author Note
Ryan D. Shelton, Department of Music, Texas A&M University-Commerce; Raymond J. Green, Honors College, Texas A&M University-Commerce.

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 11-16

GAMIFICATION AND A POSITIVE SPILLOVER EFFECT FROM PERSONAL LIFE TO WORK

HALEY BANKS

MORNINGSIDE COLLEGE

Abstract – The purpose of the current study was to examine if it was possible to create positive spillover from personal to work life using gamification. I hypothesized that the use of game-like elements (levels) would increase the number of experiences a participant recalled and that recalling positive events would create a boost in well-being after completing a work-like task. In order to evaluate this hypothesis, data was collected from 45 participants. Participants were placed in three groups (15 in each): recalling happy experiences with levels, recalling happy experiences without levels, and recalling neutral experiences without levels. As predicted, those in the gamification group recalled more personal experiences than participants not introduced to the game-like elements. There was evidence that recalling happy experiences was associated with an immediate increase in wellbeing. Those in the groups recalling happy experiences reported higher wellbeing than those in the neutral group after the experience recall. However, there was no evidence of a positive spillover effect after a boring, work-like task.

People spend large amounts of their waking lives at work; given the connection between happiness and productivity (e.g., Oswald, Proto, & Sgroi, 2015) it is essential that employers care about the happiness of their employees. Not only is it important that employees are happy while on the job, but it is also important that they are happy at home. Gamification is a technique that may help employers discover new ways to keep their employees happy.

Gamification is defined as "the use of game design elements in non-game contexts" (Deterding, Sicart, Nacke, O'Hara, & Dixon, 2011, p. 2). Not to be confused with games or game theory, gamification is not the development of complete games or the playing of games. Instead, gamification is simply taking pieces from the construction of games and applying them in areas of life that do not involve games. Some examples of different game elements that can be applied are badges, levels, points, scoring, leaderboards, and rewards (Richter, Raban, & Rafaeli, 2015).

There are many theories that try to explain why game elements can be effective outside of the realm of true games. For example, the success of the game element "levels," whereby players reach subsequent levels after completing a task or meeting some challenge, stems from theories like self-efficacy, goal setting, expectancy value, and social comparison (Richter et al., 2015). Richter et al. explain these theories as follows: The application of levels can cause people to want to succeed, or reach the final level, and also set goals for themselves to reach the desired level. Through the use of levels, people may also expect outcomes dependent upon their attainment of certain levels. In other words, reaching specific levels may translate to the receiving of a prize, which urges motivation. Finally, placing people in levels can cause people to want to reach for higher levels in order to impress others or gain social status through their achievements.

Because of the potential for improved outcomes, gamification has been gaining popularity and has been implemented into many research studies (Hamari, Koivisto, & Sarsa, 2014). For example, Anderson, Huttenlocher, Kleinberg, and Leskovec (2013) examined the use of badges on a website called Stock Overflow, a question-answering based website. Badges are a game element used to motivate people to hit certain achievements. A familiar use of badges is found in motivating young children in Girl Scouts and Boy Scouts to try new things by rewarding them with patches that can be displayed on their uniforms. Anderson et al. (2013) outlined the significance of badges and how they were easily used to shape consumer behavior. They

evaluated if they could manipulate users into answering more questions through an incentive based framework. Overall, they found the use of badges on this website caused an increase in user activity.

Other organizations, such as schools, use gamification, even if they do not identify their techniques as gamification. For example, gamification comes into play with the incentive technique used in school fundraisers. Children are given the opportunity to help raise funds for their school by selling products from a certain company. When the children are given the book of products they are able to sell, they are usually also given a book of prizes that they can win. Specifically, children reach certain levels depending on how many items they sell. For example, if they sell five items they may be in the first level and receive the first level prize. If they sell 10 items they may be in the second level and receive the second level prize and the first level prize, and so on. This technique is using the game elements of levels and prizes to encourage young children to sell as many items as possible.

There are also research studies that apply gamification without directly referencing it. Schumacher, et al. (2013) conducted a study that aimed to increase stair utilization in employees using a point system, which is a game element. For every flight of stairs an employee took, they received a point, and those points were later redeemed for money. They were successful in getting employees to increase their use of the stairs using this incentive program, and the application of gamification.

Overall, these studies and real life examples suggest that gamification is a technique that may be beneficial for increasing productivity; however, additional research is needed to fully understand its effectiveness and applicability. The workplace is a thriving domain that has been examining ways to utilize gamification. One area of interest for businesses to implement gamification and expand on its usefulness is the spillover effect from personal life to work life.

The spillover effect is when emotions from one area of life spill into other areas of life (Kossek, & Ozeki, 1998). Specifically, most of the research (Mitchell, Eby, & Lorys, 2015; Wiese, Seiger, Schmid, & Freund, 2010) has focused on spillover between personal and work life. Experiences in either areas of people's lives, whether personal or work life, can cause a negative spillover, where unpleasant feelings transfer to the other areas of life. Alternatively, experiences can create a positive spillover, where the outcome is pleasant feelings spilling over to other areas.

Much of the previous research on spillover has examined the negative spillover from work to personal life. Negative experiences from work that spill over to family have been shown to have a greater impact on decreasing job satisfaction than conflict that spills over from family to work (Kossek, & Ozeki, 1998). Butt, Hu, Shafi, and Malik (2015) examined how work and family conflict impacted job satisfaction. Questionnaires were used to gather data from their participants about the amount of conflict experienced through work and family and also career satisfaction. Their results showed that participants who had more work to family conflict were less satisfied with their job. They found that women experienced more work-to-family conflict compared to men, and older people were more affected than younger individuals by work-to-family conflict. Research like this shows that conflicts at work can create a negative spillover to personal life, which results in lower job satisfaction.

The spillover effect does not always have to be negative, though. Simply sharing positive experiences from a person's life with another person can increase happiness (Lambert, et al., 2013). For example, Wiese et al. (2010) found that individuals who were told to think about a positive family-related experience after thinking about a job-related failure showed faster emotional recovery than those told to think about a positive job-related experience. This positive spillover from family to work created an increase in participants' wellbeing.

Although positive spillover has been examined, it is still relatively under studied. We do not know, for example how long these effects last. Also, no one has examined if adding gamification to the recall of positive experiences can increase this spillover effect. Thus, the goal of the current study was to examine whether gamification could be used to create a positive spillover effect from personal-to-work life. I created a situation where participants were asked to recall experiences in their personal life and then perform a work-like task while measuring their wellbeing throughout the study. I hypothesized that the use of game-like elements would increase the total number of events (positive or neutral) a participant would recall during a 10 minute period. I also hypothesized, based on findings regarding positive personal experience spillover to job-related failures (Wiese, et al., 2010), that recalling positive experiences would create a boost in wellbeing that would last through completing a work-like task.

Methods

Participants

Undergraduate students at a small, Midwestern liberal arts college served as participants for this study. This study had 45 participants with 15 males and 30 females. A majority of the participants came from general

psychology classes where they either received credit or extra credit for participating. All procedures were approved by the Institutional Research Review Board.

Materials

*Wellbeing***.** Wellbeing was assessed three times during the study using a Wellbeing Assessment Scale. This scale was based off Wiese, et al (2010). There were four horizontal scales that each spanned from 0 mm to 75 mm. Each assessment measured (1) *happy – sad*, (2) *proud – disappointed*, (3) *relaxed – tense*, (4) *content – discontent*. Participants were asked to place a mark on the scale in a place that described how they currently felt. Marks closer to the positive adjectives indicated higher wellbeing. Scores for all four scales were averaged together to get a general wellbeing score. Internal consistency was good; Cronbach's α ranged from .85-.87.

Work. Participants completed a tedious task meant to simulate the potentially routine aspects of work. Specifically, participants were asked to cut out a variety of small shapes.

Manipulation check. Finally, participants were asked to answer a few questions about the cutting task that they performed to determine whether or not it was boring enough. They were asked if they liked performing the task (*yes/no*), if they would perform the task in their free time (*yes/no*), and to rate the task on how boring it was on a 1-5 scale.

Procedure

Participants were tested individually. At the beginning of the study the informed consent was distributed and time was given for the participant to fully read and sign. Then, the participants' baseline wellbeing was assessed using the four analog scales. Participants were randomly assigned to one of three groups differing on type of experience and gamification.

Experience Type. Participants were asked to recall events/experiences that were either happy or neutral. Those assigned to the happy condition were asked to recall happy experiences in their personal life within the past month and rate each experience on how happy it made them feel on a 1-5 scale with one being extremely unhappy and five being extremely happy. Those who recalled neutral experiences were asked to recall neutral experiences in their personal life within the past month and rate each experience on how vivid it was on a 1-5 scale.

Gamification. Gamification was introduced by allowing participants to fall into different game levels based on the number of experiences they recalled. The document that they received allowed participants to be placed within four levels. For every ten happy experiences the participant wrote down he/she advanced to the next level. Level one indicated that they were "Beginning to think positive!" whereas level four indicated that they were a "Professional Positive Thinker!"

Groups. Participants were placed in three group which varied on two dimensions: type of experiences recalled and use of gamification. Group One (happy-levels) had the gamification elements applied and were asked to recall happy experiences. Participants in Group Two (happy-no levels) were asked to recall happy experiences in their personal life within the last month, but were not exposed to the game elements. Participants in Group Three (control group) were asked to recall neutral experiences and were not exposed to the game elements.

For all three groups, the participants spent ten minutes thinking about and writing down their personal life experiences. After the ten minutes, participants filled out the second wellbeing assessment to determine how this first task affected their wellbeing.

Next, participants performed the work-like task (cutting) for ten minutes. After the cutting task, the participant filled out the final wellbeing assessment to determine if there was a positive spillover effect of wellbeing from personal to work life. At the end of the study participants were asked to fill out the manipulation check to find out if the work task was boring.

Results

In order to evaluate if there were differences in the total number of experiences recalled between those who were exposed to gamification and those who were not, a one-way ANOVA analyzing the number of experiences by group was conducted. Results suggested that gamification did cause participants to recall more personal experiences, as can be seen in Figure 1. The

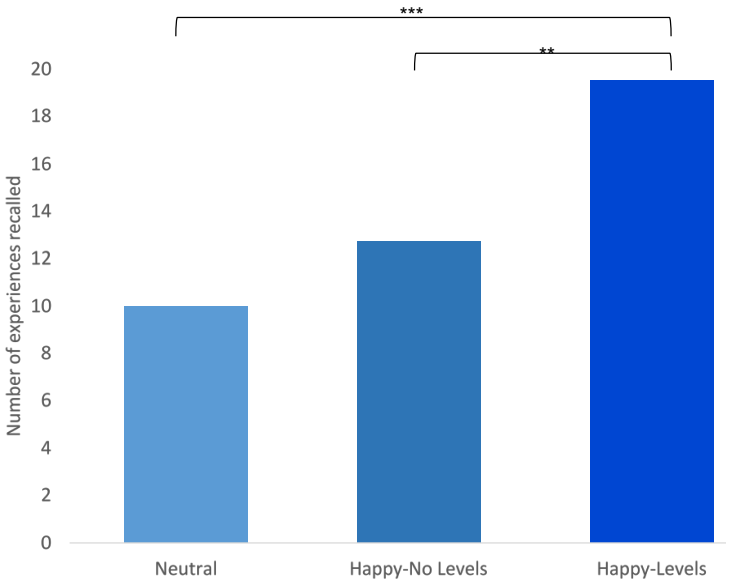

Figure 1. Number of experiences recalled in each experimental group.

*p < .05. ** p < .01. *** p < .001.

number of experiences recalled differed by group, $F(2, 42) = 10.98$, $p < .001$. Post-hoc analyses revealed that those in the gamification group, Group 1, ($M = 19.53$, $SD = 7.15$) recalled significantly more events than those in Group 2 ($M = 12.7$, $SD = 5.92$, $p = .002$) and those in Group 3 ($M = 10.00$, $SD = 3.55$, $p = .001$). There was not a significant difference in the number of events recalled between the groups with no gamification elements.

Next, in order to evaluate whether there was a main effect of time or group on wellbeing and to evaluate if there was an interaction between time and group in predicting wellbeing, data were analyzed using a 3 (time) x 3 (group) mixed-design ANOVA with a within-subjects factor of time (first, second, and third wellbeing assessment) and a between-subjects factor of group (level, no levels, neutral). Mauchlys Test of Sphericity was violated ($\chi 2 = 6.40$, $p = .041$), therefore the F-statistic was corrected using Greenhouse-Geisser estimates. The main effect of time was marginally statistically significant $F(1.75, 73.39) = 2.58$, $p = .09$, $\eta_p^2 = .06$. Specifically, pairwise comparisons revealed that wellbeing at the second wellbeing assessment ($M = 58.76$) was marginally statistically significantly ($p = .06$) higher than wellbeing at the first assessment ($M = 55.21$).

The main effect of group was not statistically significant $F(2, 42) = 1.54$, $p = .227$, $\eta_p^2 = .07$. There was also no evidence of an interaction between time and group $F(3.50, 73.39) = 1.18$, $p = .32$, was also no evidence of an interaction between time and group $F(3.50, 73.39) = 1.18$, $p = .32$, $\eta_p^2 = .05$. See Figure 2 for a graph showing the scores of each group across the three assessments.

Thus, there was some evidence that recalling happy experiences lead to a temporary boost in wellbeing. To further evaluate this possibility, the two groups reporting on happy experiences were combined, and a 2 (happy vs neutral) X 3 (time) mixed ANOVA was evaluated. Because the assumption of homogeneity of covariances, as assessed by Box's test of equality of covariance matrices, was not met ($p = .019$), separate repeated measures ANOVAs were run for each group. Results revealed that for those in the neutral group, there was no significant difference in wellbeing across the three time points $F(1.38, 19.38) = .37$, $p = .67$, $\eta_p^2 = .03$ (Greenhouse-Geisser corrected). However, there were significant differences across time for those who reported happy experiences, $F(1.65, 47.70) = 4.03$, $p = .03$, $\eta_p^2 = .12$ (Greenhouse-Geisser corrected). Pairwise comparisons revealed that those who reported happy experiences showed a statistically significant average increase in wellbeing (M difference = 5.38) between time 1 and time 2 ($p = .029$). However, there was no evidence of a positive spillover effect as wellbeing returned to baseline levels after the boring work task (Mean difference between Time 1 and Time 3 $p > .5$).

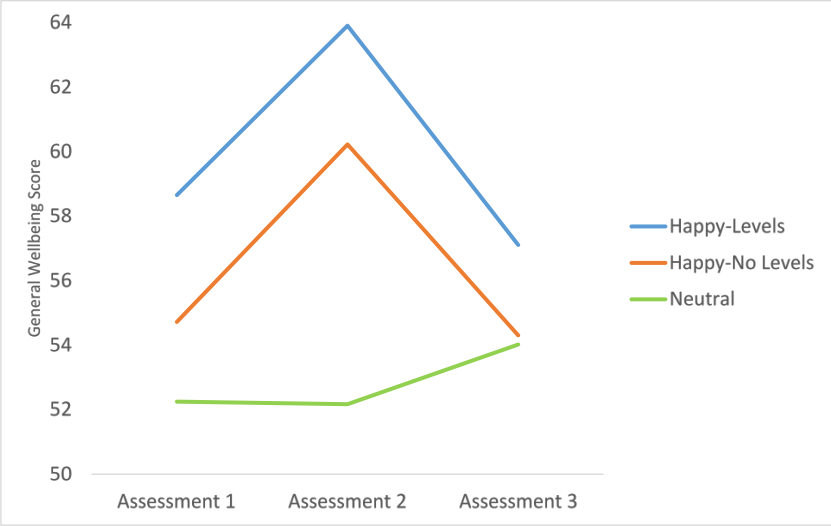

Figure 2. Time of wellbeing assessment and group interaction throughout study.

Discussion

I aimed to evaluate how gamification interacted with a positive spillover effect from personal to work life. Gamification in this study was shown to be effective in regards to increasing event recall but was not related to wellbeing. Participants who were exposed to the game-like element levels recalled on average more personal experiences than those who were not exposed to the game-like element levels. This supports the idea that the application of levels can cause people to want to succeed and reach further levels (Richter et al., 2015).

When looking at the positive spillover from personal to work life, the results did not support the hypotheses. When participants were recalling happy experiences in their personal life, they did show a slight increase in wellbeing compared to those in the control group. Also, after completing the work-like task of cutting out shapes, participants that recalled happy experiences in their personal life showed a decrease in wellbeing (returning to baseline). This is the opposite effect from what was expected based on previous research (e.g., Wiese et al., 2010). If the positive spillover effect were found, participant's wellbeing would have increased after recalling happy personal experiences and remained at similar levels after completing the cutting task.

Overall, Hypothesis 1 was supported; the application of gamification did cause

participants to recall more personal experiences. Hypothesis 2 was not supported; recalling happy experiences from personal life was not associated with a statistically significant increase in wellbeing. There was evidence that thinking about happy experiences did cause a boost in wellbeing immediately afterwards, similar to the effects found by Lambert et al. (2013) suggesting that sharing a positive experience increases happiness. However, writing down positive events did not create a strong enough effect for the benefits to last through a boring task.

Previous research has suggested that sharing happy experiences with others is more beneficial than writing them down alone (Lambert, et al., 2013). It is possible that writing down happy experiences from someone's personal life does not create a strong enough effect for the benefits to last through a boring task. One way to strengthen the effects would be to have participants discuss their happy experiences with another person. In the current study, it was not feasible to have participants talk about their personal experiences with the researcher or with another person because it would confound the results from the gamification. If participants were getting positive feedback from another person either verbally or nonverbally, it would have been difficult to determine what caused the increase in wellbeing.

The small sample size is another potential limitation of the current study. There were only 15 participants in each condition. Having a small sample size can decrease the power to find statistically significant results. Statistical analysis show a trend such that wellbeing increasing after thinking about positive personal experiences, and it is expected that this trend might be statistically significant with more participants in each condition. There were also a limited number of males, 15 out of 45 participants, with more females than males in each condition; however, there is no reason to expect gender differences in the effect.

Researchers should continue to investigate the use of gamification to increase output on tasks in future studies. The results from this study show that gamification is an effective technique when trying to get participants to increase output. This finding could have a significant impact in the workforce when trying to motivate employees to work harder. The use of gamification in this study required little effort and no money. Implementing gamification in the workplace could be cost effective and beneficial to both the employer and the employees.

Additionally, future research could examine how to extend the positive effects of recalling happy experiences. In this study, the use of gamification to get participants to think about numerous positive experiences in their personal life was not strong enough to cause the benefits to last across the work-like task. Finding ways to make the boost in wellbeing stronger could potentially cause the effects to last longer.

References

Anderson, A., Huttenlocher, D., Kleinberg, J., & Leskovec, J. (2013). Steering user behavior with badges. *Proceedings of the 22nd International Conference on World Wide Web*, 95-106. Retrieved from https://www.cs.cornell.edu/home/kleinber/www13-badges.pdf

Butt, M., Hu, B., Shafi, K., & Malik, B. H. (2015). The negative relationship between work family conflict and career satisfaction and the role of individual differences. *International Journal of Academic Research in Business and Social Sciences*, *5*, 102-113. doi: 10.6007/IJARBSS/v5-i8/1766

Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification. Using game-design elements in non-gaming contexts. *Proceedings of the 2011 Annual Conference Extended Abstracts on Human Factors in Computing Systems*, 2425-2428.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?—A literature review of empirical studies on gamification. *Proceedings of the 47th Hawaii International Conference on System Sciences*, 3025-3034, doi: 10.1109/HICSS.2014.377.

Kossek, E., & Ozeki, C. (1998). Work–family conflict, policies, and the job–life satisfaction relationship: A review and directions for organizational behavior–human resources research. *Journal of Applied Psychology*, *83*, 139-149. doi: 10.1037//0021-9010.83.2.139

Lambert, M., Gwinn, M., Baumeister, F., Strachman, A., Washburn, J., Gable, L. (2013). A boost of positive affect: The perks of sharing positive experiences. *Journal of Social and Personal Relationships, 30*, 24–43. doi: 10.1177/0265407512449400

Mitchell, M. E., Eby, L. T., & Lorys, A. (2015). Feeling Work at Home: A Transactional Model of Women and Men's Negative Affective Spillover from Work to Family. *Gender and the Work-Family Experience*, 121-140.

Oswald, A. J., Proto, E., & Sgroi, D. (2015). Happiness and productivity. *Journal of Labor Economics, 33*(4), 789-822.

Richter, G., Raban, D. R., & Rafaeli, S. (2015). Studying gamification: The effect of rewards and

incentives on motivation. In T. Reiners, L. C. Woods (Eds.), *Gamification in education and business*, 21-46. Switzerland: Springer International Publishing.

Schumacher. E. J., Utley. J., Sutton. L., Horton. T., Hamer. T., You. Z., & Klapow. C. J. (2013). Boosting workplace stair utilization: A study of incremental reinforcement. *Rehabilitation Psychology*, 58, 81-86. doi: 10.1037/a0031764

Wiese, S., Seiger, P., Schmid, M., & Freund, M. (2010). Beyond conflict: Functional facets of the work–family interplay. *Journal of Vocational Behavior, 77*, 104-117. doi: 10.1016/j.jvb.2010.02.

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 17-24

THE EFFECTS OF STRESS AND CONFIDENCE ON PERFORMANCE

NATALIE G. KEIRNS

OKLAHOMA CHRISTIAN UNIVERSITY

Abstract – In a society focused on productivity and progress, stress is an expected part of daily life. So much so, in fact, that individuals commonly live with horrible side effects of stress and cease to even notice the consequences. Could it be possible, though, for stress to act in a positive way? Previous research has found that stress increases performance in spatial tasks. Further, research has shown that confidence is often a buffer to the negative effects of stress. However, there is little research investigating the interaction of these two variables in a context in which stress is expected to be beneficial. This study investigated whether stress and confidence would interact in a way that produced optimal results, compared to the other experimental conditions. A 2x2 factorial ANOVA showed no significant differences between the means of the four groups. Likewise, significant main effects were not found for stress or confidence.

Keywords: stress, confidence, spatial reasoning performance, evaluative stress

In today's fast-paced, productivity-centered society stress often has a constant presence. Stress is manifested at work, at home, by relationships, by deadlines; the list goes on and on. The stressors in life cripple many people, but it may be possible that stress can sometimes be beneficial. Each source may produce a different type of stress that looks and feels different, and each type of stress can produce vastly different results. It seems that if a person is confident in his or her ability, stress could be a variable that brings out the best in his or her work. This is a situation that has not been well investigated, though, for most research on stress is done with the stressor carrying a negative connotation.

Introduction

Yerkes and Dodson (1908) performed a well-known experiment that established the theory that there is an optimal level of arousal that produces the best performance. They found that mice developed a white-black discrimination habit more or less quickly depending on both the difficulty of discrimination and the intensity of the punishment for an incorrect response. In general, they found that moderate stress, but not extreme stress, leads to the best performance. Further, Matlin and Zajonc (1968) proposed the theory of social facilitation, which states that the presence of an audience will lead to the subject's dominant response over the subordinate response. In other words, in a task that the individual is competent in, social pressure will bring out the best performance. However, in a task in which the individual is incompetent, the poorer performance will result. It is possible that an impaired performance is due to fear or anxiety about negative evaluation.

Risk of receiving negative evaluation from other individuals is a particular type of stressor called social-evaluative threat (Smith, Birmingham & Uchino, 2012). Stressors of this nature are experienced on a nearly daily basis – they can come from interactions with peers, performance standards in a classroom or workplace, or evaluative situations, such as job interviews. Smith et al. (2012) found that social-evaluative threat was associated with increased blood pressure, which is a common sign of stress or anxiety. In a deeper look at why social-evaluative threat increases anxiety, Makkar and Grisham (2011) found that in an evaluative situation negative self-imagery caused an increased experience of anxiety. However, the negative effects of a threat to self-image can be buffered by self-affirmation. This buffering can occur even if the content of the self-affirmation (e.g., writing an essay about positive values) is unrelated to the content of the actual threat (e.g., midterm exams) (Sherman, Bunyan, Creswell & Jaremka, 2009).

Peng, Schaubroeck, and Xie (2015) support the idea that self-efficacy can buffer the negative impact of stress. They investigated the relationship of these factors in the context of job demands and job self-efficacy (JSE),

and in the context of school-related stressors and academic self-efficacy (ASE). This study was based on self-report measures of both stress and self-efficacy levels. Peng et al. (2015) found that for individuals with stable and variable low JSE, job demand was related to strain. They also found that stressors in school were more detrimental to students with stable high ASE than variable high ASE. The researchers proposed that variable high ASE is more beneficial due to it being more flexible and able to adapt expectations based on various challenges or performances.

While the studies above looked at negative stressors, stress has also been looked at as a variable that increases performance. For instance, Akirav et al. (2004) found a dose-dependent effect of corticosterone in rats performing a water maze task in either cold or warm water. Specifically, the best performance and retention of skills occurred under a moderate level of stress, with both mild and high levels of corticosterone impairing performance. Spatial navigation tasks, such as the one just mentioned, as well as eyeblink conditioning, have often been used as criteria to measure animals' performance under stress (Duncko, Cornwell, Cui, Merikangas, & Grillon, 2007). However, these criteria have not often been used to measure the effects of stress in humans. Duncko et al. (2007) assigned participants (males under the age of 40) to either a stress or no stress condition. The participants in the stress condition underwent a cold pressor test in which the dominant hand was immersed into ice water. The participants in both conditions then participated in eyeblink conditioning and the virtual navigation Morris water task. Stress was shown to increase activity in both the hypothalamic-pituitary-adrenocortical axis and sympathetic nervous system, and resulted in increased performance in both tasks.

Confidence is another variable that has been widely researched in terms of its effect on performance. Hendy, Schorschinsky, and Wade (2014) investigated this topic with a sample of college students. The participants completed a self-report inventory of various math behaviors, such as class attendance, homework completion, and textbook usage. Further, they completed a similar inventory assessing math beliefs, such as consequences of math behaviors, math confidence, and math barriers. Higher math confidence was associated with more positive math behaviors. Stankov and Lee (2008) also investigated the relationship between confidence and performance. Participants from 2-year and 4-year colleges completed an exam that assessed reading, listening, writing, and speaking skills. The participants then completed self-report instruments that measured a variety of variables, including confidence. Confidence was positively correlated with accuracy on both the reading and listening sections of the exam, which are the two sections that were researched most thoroughly. Further, Nounopoulos, Ashby, and Gilman (2006) found that confidence buffers the detrimental effects of perfectionism in adolescents, and correlates with a higher GPA.

The work of Nounopoulos et al. (2006) began to look into the interaction of stress and confidence, and their combined effect on performance. Hadjistavropoulos et al. (2012) continued research on this topic by investigating the relationship between fear of falling, balance confidence, and balance performance. Participants (older adults from their Canadian community) completed self-report questionnaires assessing fear of falling, balance confidence, and state-trait anxiety. The participants then completed four balance tasks – floor walk holding tray, floor walk without tray, elevated platform walk holding tray, and elevated platform walk without tray. The participants' performance was assessed and both physiological measures of anxiety and self-report measures of anxiety were taken. Walking on the elevated platform had a significant negative impact on gait performance, and exacerbated the negative impact of dual tasking (holding the tray). Balance confidence was shown to buffer detrimental effects in the low anxiety conditions, but fear of falling was shown to be the best predictor of gait performance.

In the study above fear was shown to be more powerful than confidence in predicting performance. As mentioned previously, though, the countless types of stress are affected by different variables in different ways. When put under an evaluative stressor, confidence has been shown to be a significant buffer of negative effects (VanYperen, 2007). Participants engaged in a verbal skills task in either an evaluative or a non-evaluative condition. The evaluative condition was told they would be personally evaluated in front of the group at the end of the session, and the non-evaluative condition was told nothing. When confidence levels were left to naturally occurring differences, versus being manipulated, there was a significant three-way interaction between situation (evaluative versus non-evaluative), confidence, and time (task performance). In the evaluative condition, low confidence individuals performed poorly more often, and reported high levels of interfering thoughts that were not related to the task. Therefore, it was proposed that confidence mediates the relationship between stress and performance by minimizing cognitive interferences.

If confidence buffers the effects of a negative evaluative stress condition, what will be its role in an evaluative stress condition that has only positive consequences? An evaluative stress condition – in the context of this study – can be defined as a condition where performance will be evaluated and has known positive consequences, or specifically, rewards. The majority of the stressors discussed above, and evaluative stressors in particular, present a negative environment to participants. However, as found by Duncko et al. (2007), sometimes stress can lead to an elevated performance. When investigating the effects of an evaluative stressor with only positive consequences known, it can be presumed that this stressor would heighten arousal, concurrent with Yerkes and Dodson's work (1908). Further, the evaluative aspect could serve as a virtual "audience," concurrent with Matlin and Zajonc's work (1968). By manipulating confidence, the dominant response in the high confidence group would be the correct answer and the dominant response in the low confidence group would be the incorrect answer. Thus, the current study sought to investigate whether the above theories intersect a way such that an evaluative stressor will heighten arousal to a point that the dominant response (i.e., the correct response), as manipulated by confidence, will result. Therefore, it was hypothesized that participants in the stress condition would perform better than those in the no stress condition, and that participants in the high confidence condition would perform better than those in the low confidence condition. Further, participants in the stress/high confidence condition were expected to perform best out of all the groups.

Method

Participants

Participants were students enrolled in a general psychology course at a small Midwestern university in the Fall 2015 semester. The students voluntarily signed up for the study, and were compensated for their participation by earning one credit toward their general psychology grade. Of the total number of students involved (N = 72), there were more females (n = 42, 58%) than males (n = 30, 42%). The average age of participants was 18.6 years. The majority of participants reported being Caucasian (87.5%), with the remainder reporting as African American (4.2%), Asian or Pacific Islander (4.2%), or Latino (2.8%).

Materials

Mock letter.

The researcher constructed a mock letter from a fabricated organization in order to manipulate evaluative stress. The organization was the "Education Advancement Research Association" (EARA). The letter explains that the EARA requests research participation from the university and offers potential monetary compensation to select participants who are asked to complete a second phase of the study. A copy of the letter is included in Appendix A.

Confidence instruction.

Participants in the high- and low-confidence groups received particular instructions that fostered the respective confidence levels. The high confidence groups were told that the task was designed for use in public high schools, and that the average score by high school freshmen was 85%. The low confidence groups were told that the task was recently developed by graduate psychology programs, and that the average score of first-year graduate students was a 65%. The scripts for confidence manipulation are included in Appendix B.

Santa Barbara Solids Test.

Performance was measured with a modified version of Santa Barbara Solids Test (SBST). The original SBST consists of 29 multiple-choice questions asking the participant to recognize cross-sections of various types of shapes (Cohen & Hegarty, 2012). Due to time constraints, only 19 of the questions were administered in the current study. This test was determined to be of appropriate difficulty for high school and college-aged students (Cohen & Hegarty, 2012). Ten students participated in a pilot test of this measure performed at a small Midwestern university in the spring of 2015. The average score on the test was 45.5%, the maximum was 72.4%, and the minimum was 3.5%. The standard deviation was 25.5.

Procedure

Following random assignment, participants completed one of four treatment conditions: stress/high confidence (SHC), stress/low confidence (SLC), no stress/high confidence (NSHC) and no stress/low confidence (NSLC). All participants completed a general demographic questionnaire. Researchers read the mock letter aloud to the stress conditions but not to the no-stress conditions. Further, each participant in the stress conditions received a copy of the letter, and the letter was displayed on PowerPoint. Researchers then presented instructions for the Santa Barbara Solids Test to all conditions. The instructions included expectations of success for high confidence conditions and expectations

of failure for low confidence conditions, as mentioned above. The only variations in the instructions between groups were the presentation of the letter to the stress conditions and the manipulation of confidence. All participants completed the Santa Barbara Solids Test, were debriefed, and then allowed to exit the study.

Results

The Santa Barbara Solids Test was graded by hand and scored as a number of correct answers out of 19 questions. A 2x2 ANOVA was used to analyze the differences between the four groups – stress high confidence, stress low confidence, no stress high confidence, no stress low confidence – and the interaction effect between stress and confidence. The means and standard deviations are presented in Table 1.

The results of the ANOVA showed no significant main effect of stress, $F(1, 68) = .93$, $p = 0.34$, $\eta^2 = .014$. The main effect of confidence approached significance, $F(1, 68) = 2.89$, $p = .09$, $\eta^2 = .041$. Further, no significant interaction effect between the two variables was found, $F(1, 68) = .32$, $p = .57$, $\eta^2 = .005$.

Discussion

The goal of this study was to utilize stress so that it would interact with confidence to improve performance on a spatial reasoning test. Stress was defined as an evaluative condition that had known positive consequences. Specifically, participants were under the impression that their performance would be evaluated and would determine their eligibility for financial compensation. Further, high or low confidence was induced through instructional manipulation.

The first hypothesis was that participants in the stress condition would perform better than participants in the no stress condition. This hypothesis was not supported; though the mean score was higher in the stress condition than the no stress condition, the difference did not meet the criteria for statistical significance. This finding does not support previous research, such as the works of Akirav et al. (2004) and Duncko et al. (2007). These studies found that stress increased spatial-related performance in both rats and humans, respectively. The difference between the findings of this study and the findings of previous research could be related to the amount or type of stress the participants were under. Both of the studies mentioned above utilized a version of the cold-pressor test, while the current study employed an evaluative stressor.

The results of the current study also do not support previous findings that stress leads to a decreased performance (Makkar & Grisham, 2011, VanYperen, 2007). In the aforementioned studies an evaluative stressor was used, but with a greater potential for negative consequences. Therefore, the type of stress that was presented in the study may explain this discrepancy as well, as it was associated with only positive consequences. Participants believed that they had the chance to be selected for monetary compensation, but if they were not selected there was no negative feedback or criticism. Future research should continue to explore whether creating an evaluative situation with positive consequences is a potential avenue of utilizing stress in a beneficial manner.

The second hypothesis was that participants in the high confidence condition would perform better than participants in the low confidence condition. The mean of the high confidence group was greater than the mean of the low confidence group, but this difference only approached statistical significance. There is a generous amount of research confirming the positive relationship between confidence and performance (Hadjistavropoulos et al., 2012; Hendy et al., 2014; Stankov & Lee, 2008; Nounopoulos et al., 2006). However, the results of this study do not support this claim. A factor worth noting is that all the above studies measured confidence as a naturally occurring variable through self-report measures. In contrast, the current study aimed to manipulate confidence through experimenter instruction. Likewise, VanYperen (2007) found a significant relationship between confidence and performance when confidence was left to naturally occurring differences, but not when confidence was manipulated. Taking all of these factors into consideration it is possible that the lack of significance found in this study could be explained by using a manipulated confidence

Table 1

Performance Under Stress at Varying Levels of Confidence

Stress	Confidence	*M*	*SD*	*N*
Stress	Low	10.95	5.54	19
	High	12.21	4.54	19
	Total	11.58	5.04	38
No Stress	Low	9.24	4.78	17
	High	11.76	3.82	17
	Total	10.50	4.45	34
Total	Low	10.14	5.19	36
	High	12.00	4.16	36
	Total	11.07	4.77	72

variable rather than looking at confidence as a trait of the individual participants.

The last hypothesis was that stress and confidence would interact and lead to the stress high confidence group scoring best out of all the groups. This hypothesis was made in light of two well-known theories – the Yerkes-Dodson law (1908) and the theory of social facilitation (Matlin & Zajonc, 1968). However, this hypothesis also was not supported. The stress high confidence group had the highest mean out of all the groups, but the difference was not significant. It is possible that the manipulation of stress did not increase arousal to the optimal level that Yerkes and Dodson proposed would increase performance. It is also possible that the manipulation of confidence did not successfully lead to the right answer being the "dominant response" found in Zajonc's theory.

A limitation of this study is the manipulation of the variables may or may not have been salient enough to have the desired effect. Both variables were manipulated via instructions given by the experimenter. Attempts were made to increase the saliency of the variables, such as presenting the participants with the instructions via PowerPoint, hand-out, and experimenter presentation. However, it is still possible that the manipulation was not strong enough to produce significant effects. Further, the lack of significance could also be due to limited power caused by a small sample size. Given that my effect sizes were small, low sample size or weak manipulation could both be potential explanations; thus, replication with a more potent stressor and/or larger sample is needed. Lastly, there was one experimenter error in the presentation of the variables. A research assistant misspoke and briefly mentioned the mock letter to a no stress condition. There were no questions from participants pertaining to this matter and the error was minimal; it is unlikely to have affected the results of the study.

In order to look further into the relationship between stress and confidence it would be helpful to analyze confidence as a personality trait versus a manipulated variable. Further, there is much to be gained from investigating the effects of different types and strengths of stressors in order to determine how to reach the desired effect. In particular, it would be of interest to utilize a similar positive evaluative stressor that causes an increased amount of arousal compared to the one employed in the present study.

References

Akirav, I., Kozenicky, M., Tal, D., Sandi, C., Venero, C., & Richter-Levin, G. (2004). A Facilitative Role for Corticosterone in the Acquisition of a Spatial Task Under Moderate Stress. *Learning & Memory, 11*, 188-195. doi:10.1101/lm.61704

Cohen, C. A., & Hegarty, M. (2012). Inferring cross sections of 3D objects: A new spatial thinking test. *Learning and Individual Differences, 22*, 868-874. doi:10.1016/j.lindif.2012.05.007

Duncko, R., Cornwell, B., Cui, L., Merikangas, K. R., & Grillon, C. (2007). Acute exposure to stress improves performance in trace eyeblink conditioning and spatial learning tasks in healthy men. *Learning & Memory, 14*, 329-335. doi:10.1101/lm.483807

Hadjistavropoulos, T., Carleton, R. N., Delbaere, K., Barden, J., Zwakhalen, S., Fitzgerald, B., . . . Hadjistavropoulos, H. (2011). The relationship of fear of falling and balance confidence with balance and dual tasking performance. *Psychology and Aging, 27*(1), 1-13. doi:10.1037/a0024054

Hendy, H. M., Schorschinsky, N., & Wade, B. (2014). Measurement of math beliefs and their associations with math behaviors in college students. *Psychological Assessment, 26*(4), 1225-1234. doi:10.1037/a0037688

Makkar, S. R., & Grisham, J. R. (2011). Social anxiety and the effects of negative self-imagery on emotion, cognition, and post-event processing. *Behaviour Research and Therapy, 49*(10), 654-664. doi:10.1016/j.brat.2011.07.004

Matlin, M. W., & Zajonc, R. B. (1968). Social facilitation of word associations. *Journal of Personality and Social Psychology, 10*(4). 455-460.

Nounopoulos, A., Ashby, J. S., & Gilman, R. (2006). Coping resources, perfectionism, and academic performance among adolescents. *Psychology in the Schools, 43*(5), 613-622. doi:10.1002/pits.20167

Peng, A. C., Schaubroeck, J. M., & Xie, J. L. (2015). When confidence comes and goes: How variation in self-efficacy moderates stressor–strain relationships. *Journal of Occupational Health Psychology, 20*(3), 359-376. doi:10.1037/a0038588

Sherman, D. K., Bunyan, D. P., Creswell, J. D., & Jaremka, L. M. (2009). Psychological vulnerability and stress: The effects of self-affirmation on sympathetic nervous system responses to naturalistic stressors. *Health Psychology, 28*(5), 554-562. doi:10.1037/a0014663

Smith, T. W., Birmingham, W., & Uchino, B. N. (2012). Evaluative threat and ambulatory blood pressure: Cardiovascular effects of social stress in daily experience. *Health Psychology, 31*(6), 763-766. doi:10.1037/a0026947

Stankov, L., & Lee, J. (2008). Confidence and cognitive test performance. *Journal of Educational*

Psychology, 100(4), 961-976. doi:10.1037/a0012546

Van Yperen, N. W. (2007). Performing well in an evaluative situation: The roles of perceived competence and task-irrelevant interfering thoughts. *Anxiety, Stress & Coping, 20*(4), 409-419. doi:10.1080/10615800701628876

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology, 18*(5), 459-482. doi:10.1002/cne.920180503

Appendix A

EDUCATION ADVANCEMENT RESEARCH ASSOCIATION

August 2, 2015

Dr. Ryan Newell, Ph.D., L.B.P.
Chair, Department of Psychology and Family Studies
Oklahoma Christian University
2501 East Memorial Road
Edmond, OK 73013

Dr. Newell,

In recent years there has been much research done on improving public education systems nationwide. We are currently investigating various ways to improve the education of our students. It is a top priority of EARA to assure our citizens that our young people are being given an education that prepares them both for college and beyond.

In order to reach this goal, the Education Advancement Research Association is evaluating the addition of enrichment activities to general public education. In order to assess the impact these activities have on overall learning and student success, the EARA is comparing ability on a spatial reasoning task with ACT scores in college freshmen. We presume that if spatial ability correlates with higher ACT score there is reason to further investigate the addition of enrichment activities along these lines to public schools, in order to provide students with a more well-rounded education.

We request the participation of Oklahoma Christian University's psychology department in performing this research. This is a multi-phase investigation and upon completion of the first phase at your institution we will contact valid candidates for the second phase, for which there will be monetary compensation. If your institution would like to be involved with gathering the requested data, please contact Mary Scott at mscott@eara.net.

Sincerely,
Mary Scott
President, EARA

Appendix B

Participants in the high confidence conditions were given the following instructions:

Circle the cross-section you would see when the grey cutting plane slices the object. Imagine that you are facing the cutting plane head-on, as if you were looking in a mirror. Make your choice based on the shapes of the possible answers, not their sizes.

In past assessments, high school freshmen have reported an average score of 85%.

This is an untimed test. Work at your own pace. You can ask the experimenter a question at any time.

Participants in the low confidence conditions were given the following instructions:

Circle the cross-section you would see when the grey cutting plane slices the object. Imagine that you are facing the cutting plane head-on, as if you were looking in a mirror. Make your choice based on the shapes of the possible answers, not their sizes.

This test has recently been developed by a graduate psychology program. The first-year graduate students who have taken the test report an average score of 65%.

This is an untimed test. Work at your own pace. You can ask the experimenter a question at any time.

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 25-31

NONVERBAL CUES AND THEIR ASSOCIATION WITH SELF-ESTEEM

HANNAH M. KUDER AND TAY HACK

ANGELO STATE UNIVERSITY

Abstract – Nonverbal cues from one's peers can positively or negatively impact one's self-esteem. Eye gaze is a particular nonverbal cue that affects self-esteem through either direct or indirect gaze. For our study, we hypothesized that those who were exposed to the averted eye gaze of individuals would experience lower self-esteem than those who were exposed to the direct eye contact of individuals. This is because nonverbal cues such as eye contact are associated with strong negative feelings, such as ostracism. We also explored whether or not the age of the individual in the picture with an averted gaze would cause greater changes in self-esteem for those who viewed them. We believed that participants who were exposed to young adults with averted eye gaze would have lower self-esteem than those who were exposed to older adults with averted eye gaze. In order to test our predictions, participants viewed four pictures that exhibited either young or older adult faces with either direct eye contact or averted eye gaze. Results showed that self-esteem for those who viewed faces displaying averted gaze was significantly lower than for those who viewed faces with direct gaze. Additionally, there was a significant difference in self-esteem between those who viewed the young adult faces with averted gaze versus those who viewed the older adult faces with averted eye gaze. Results from this study may be applied to real world situations.

Humans long to feel good about themselves and gain the approval of others; however, that does not always happen and many times self-esteem suffers as a result. Self-esteem is the positive or negative assessment of one's self (Coopersmith, 1967) and is just one aspect of the self-concept, which is a set of beliefs individuals have about themselves (Markus, 1987). Self-esteem varies among individuals. Some people have higher self-esteem than others; however, levels of self-esteem tend to fluctuate (Heatherton & Polivy, 1991). That is, when exposed to different social situations, one's self-esteem can rise or fall depending on the nature of the social situation, one's experiences, and the surrounding environment (Blumberg, 1972; Felson, 1980; Leary, Cottrell, & Phillips, 2001; Wuang & Highouse, 1997). In relation to self-esteem and its effects, a study by Josephs (2003) showed that higher self-esteem can be linked to more independence, better confidence, and overall better health. In contrast, those with lower self-esteem tend to suffer from anxiety and depression.

Self-esteem can be both maintained and changed by one's social environment and the reactions from others. The looking-glass self is a theory that suggests that schemas, constructs of beliefs about ourselves are formed by the reactions of others and is how our self-esteem develops (Cooley, 1902). Cooley referred to the looking-glass self as a means by which one's own self is evaluated or measured. We imagine the judgments others make of us based on their reactions, and we respond to these imagined beliefs with a variety of feelings such as shame or cowardice. In response to those "reflected appraisals" and opinions from others, our self-esteem can be lowered or boosted. Heatherton and Polivy (1991) found that self-esteem varies and changes as the situation demands. One reason for this is that humans are highly social and therefore rely on others to form their self-esteem (Leary & Baumeister, 2000).

One reason that the social aspect of self-esteem is so easily molded is the fact that people tend to surround themselves by peers and members of an ingroup. The social identity theory explains that the groups with whom people identify are an important source of self-esteem (Tajfel, 1982; Turner, 1987). Because people need acceptance from ingroups, being excluded by them can be terrifying and threatening to self-esteem (Lakin, Chartrand, & Arkin, 2008). Significant drops in self-esteem can be linked to direct verbal feedback from peers, and recent research suggests that nonverbal cues can also lead to a drop in one's self-esteem (Lamer, Reeves, & Weisbuch, 2014). Nonverbal cues are universal

in nature and are considered to be a means of communication through small body movements or actions (Darwin, 1872). While a decrease in self-esteem may be subtle, nonverbal cues such as facial emotion can have an effect, and in an instant, change how one feels (Adams, Franklin, Nelson, & Stevens, 2010; Leary, 1999).

Eye expressions, in particular, have been shown to affect self-esteem. Eye contact is a particularly strong nonverbal cue that is often picked up on by others (Langton, Watt, & Bruce, 2000). Additionally, there are certain eye expressions associated with emotional meaning. For example, someone might believe that a person displaying averted eye contact is cold or evasive. Likewise, someone might believe that a person displaying direct eye contact is respectful and sincere (Mason, Tatkow, & Macrae, 2005). Interestingly, averted eye gaze, or looking away from a person, can also lead to negative effects in self-esteem and can lead to a feeling of being excluded. Wirth, Sacco, Hugengerg, and Williams (2010) conducted a study to measure the self-esteem of participants who were exposed to averted eye gaze. They found that those who were exposed to faces displaying averted eye gaze reported feeling ostracized. These feelings of being ostracized can lead to negative emotions such as anger, loneliness, and a drop in self-esteem (Williams, 2002).

Another study investigated the effects of averted eye gaze on self-esteem. Lamer, Reeves, and Weisbuch (2014) found that eye contact from another person can alter the way people feel about themselves. They presented photographs of faces displaying varied eye contact (i.e., direct eye contact, partial eye contact, and averted gaze) depicting varied emotions (joy, neutral, and anger), and then measured participants' self-esteem. They found that self-esteem was lower for those who were exposed to pictures showing averted eye gaze displaying a joyful expression (i.e., smiling) than those who were exposed to pictures showing averted eye gaze while displaying an angry expression, which was contrary to what they predicted. The authors proposed that this might have occurred because averted eye gaze can also be a nonverbal cue for evaluating another person; however, their study was not able to determine the reason why participants experienced lower self-esteem for the joyful expression. In the present study, we wanted to find a reason why Lamer, et al. found that people looking away while smiling resulted in lower self-esteem for perceivers. We believed that individuals experience lower self-esteem despite the pictures displaying a joyful expression because the averted eye gaze leads to a feeling of being dismissed or ignored. To determine what people might be thinking and feeling when presented with smiling faces with an averted eye gaze, they responded to an open-ended question asking them to explain what was going through their mind when imagining an interaction with the people in the photos.

Additionally, we explored the effect of age of the individuals in the photos on self-esteem, which the previous study did not address. We predicted that those who were exposed to the young adult faces with averted eye gaze would experience lower self-esteem than those who were shown the older adult faces with averted eye gaze. Previous research supports the idea that nonverbal cues, especially eye contact, have a strong effect on emotions and the fear of being evaluated (Wirth, J. H., Sacco, D. F., Hugenberg, K., & Williams, K. D., 2010; Leary, 1983). We believe that young adult faces with averted eye gaze would cause lower self-esteem than older adult faces because of in-group bias (Tajfel, 1982; Turner, 1987). In other words the college-age participants would be more likely to feel rejected by the young adults in the pictures because they belong to the same age group. Lastly, we investigated if fear of negative evaluation would predict changes in self-esteem for those who view faces displaying direct eye contact versus faces displaying an averted gaze. We believe this would be a valid predictor because averted eye gaze is associated with negative feelings and being excluded (Lakin, Chartrand, & Arkin, 2008).

Method

Participants

Participants were recruited through Angelo State University's SONA system, a database used for recruiting participants for psychology experiments. Participants received course credit for their participation. Of the 114 participants who participated in this study, 71.9% self-reported as female, 27.2% as male, and 1% reported as other. The age of the participants ranged from 18 to 44 (M = 20.89, SD = 4.96). Participants also provided their race, in which 53.5% self-reported as Caucasian, 31.6% as Hispanic, 7.0% as Asian/Pacific Islander, 5.3% as African American, and 2.6% reported as other.

Materials and Procedure

We used four photographs retrieved from an online face database (Ebner, Riediger, & Lindenberger, 2010). The photos included male and female individuals, photographed from the neck up, and smiling while making direct eye contact. The photos feature young adult ages between 18-29, and older adult ages between 50-69. We edited each of the four pictures to display averted eyes using Photoshop Elements 12 (Adobe

Figure 2. Sample photographs of young and older adults displaying direct or averted eye gaze.

Systems Inc., 2014; see Figure 1). Our study utilized a between-subject design and included four conditions: direct eye contact, young adult; direct eye contact, older adult; averted eyes, young adult; and averted eyes, older adult. All participants were presented the same scales and questions to answer.

The Brief Fear of Negative Evaluation (BFNE) scale (Leary, 1983) was used as a predictor for differences in self-esteem as a result of exposure to the faces. The scale included 13 items with acceptable reliability (α = .75). The BFNE assesses fear of being evaluated by others. Example questions from the BFNE scale include: "*Other people's opinions of me do not bother me*" and "*I am frequently afraid of other people noticing my shortcomings.*" The answer options for the questions were measured using a Likert scale from 1 = "*Not at all characteristic of me,*" to 5 = "*Extremely characteristic of me.*" Larger numbers reflect greater fear of being negatively evaluated. Participants' self-esteem was measured after being exposed to a nonverbal cue (direct eye contact vs. indirect eye contact) exhibited by different individuals (young and older). To measure the effects of the direct and indirect eye contact on self-esteem, we used the Heatherton and Polivy scale (1991) which measures state self-esteem. The scale included 20 items with excellent reliability (α = .92). The Heatherton and Polivy scale contains such questions as, "*I feel satisfied with the way my body looks right now*" and "*I feel as smart as others,*" which utilized a Likert scale ranging from 1 = "*Not at all*" to 5 = "*Extremely.*" Larger numbers reflect more positive self-esteem. The order of all the questions was randomized for each participant.

Participants arrived to the lab where the experiment was conducted. The experimenter described what the study was about and gave instructions for how the study would proceed. After participants provided consent, they were seated at individual computers where they completed the study presented via MediaLab (Jarvis, 2008), which is experiment software that presents stimuli and records responses. Participants first were presented with questions from the BFNE scale. After answering the questions, participants were asked to complete several questions from the Big Five Personality test (John & Srivastava, 1999) that served as filler items. After answering these additional questions, participants were exposed to the four pictures that portrayed the young or older individuals exhibiting direct eye contact or an averted gaze. The order of the pictures was randomized within the conditions.

To help encourage participants to become emotionally involved in the study, they were asked to imagine putting themselves in a situation in which they were interacting with the individuals in the pictures and telling the individuals about themselves. The text that participants read was, "*Imagine that you've just met this person and the two of you are in a casual conversation together. While you are introducing yourself and describing a little bit about who you are, this is the expression on the person's face.*" Participants were shown four pictures in sequence, one after the other. Each picture was timed to stay on the screen for 15 seconds so that participants would have time to imagine their interaction with the person pictured on the screen. After being exposed to all four of the pictures, participants were asked to answer questions from the Heatherton and Polivy (1991) scale to measure their self-esteem.

After participants finished the self-esteem questions, they were presented with an open-ended question that asked, "During your imagined interactions you were asked to imagine talking to the different people displayed in the photos and to imagine telling them about yourself. As you looked at their expression, what went through your mind?" Once participants had written their thoughts, they were presented with the demographic questions that asked them to report their gender, age, and race. After finishing the demographic questionnaire, participants were presented with a debriefing that explained the purpose of the study and presented additional information, such as contact information for the faculty advisor. The debriefing was timed to stay on the computer screen for 40 seconds. Once this timed screen had passed, participants were thanked and then dismissed.

Results

We first predicted that participants exposed to the averted eye gaze pictures would experience lower self-esteem compared to the participants who were shown pictures of people exhibiting direct eye contact. To test our hypothesis, we conducted an independent samples t-test with self-esteem as the dependent variable. As predicted, results indicated that the self-esteem of those who were exposed to faces displaying averted gaze (*M* =

3.45, *SD* = .68) was significantly lower than those who were exposed to the faces with direct gaze (*M* = 3.73, *SD* = .72), $t(112) = 2.13$, $p = .035$, $d = .40$.

Additionally, we predicted that those who viewed the young adult faces displaying an averted eye gaze would experience lower self-esteem compared to those who viewed the older adult pictures with averted eyes. To determine whether there was a difference between the four types of photos (i.e., young faces with direct gaze; young faces with averted gaze; older faces with direct gaze; older faces with averted gaze), we conducted an Analysis of Variance (ANOVA) with the four types of photos as independent variables, and self-esteem as the dependent variable. Results indicated that there was a significant difference between the four groups, $F(3, 110) = 4.91$, $p = .003$, $\eta_p^2 = .12$.

Post hoc Tukey tests were conducted on all possible pairwise contrasts, and revealed a significant difference in self-esteem for those who were exposed to older faces with an averted gaze compared to young faces with an averted gaze ($p = .02$). However, the direction of this effect was contrary to our prediction. In other words, as seen in Figure 2 those who were exposed to older adult faces with averted eye gaze actually reported lower self-esteem (*M* = 3.18, *SD* = .75) compared to those who were exposed to the young adult faces with averted eye gaze (*M* = 3.70, *SD* = .50). Although not predicted, post hoc Tukey tests also revealed significantly lower self-esteem for those who were exposed to older faces with an averted gaze (*M* = 3.18, *SD* = .75) compared to older faces displaying a direct gaze (*M* = 3.83, *SD* = .63; $p = .003$). No other significant effects were found between the four groups.

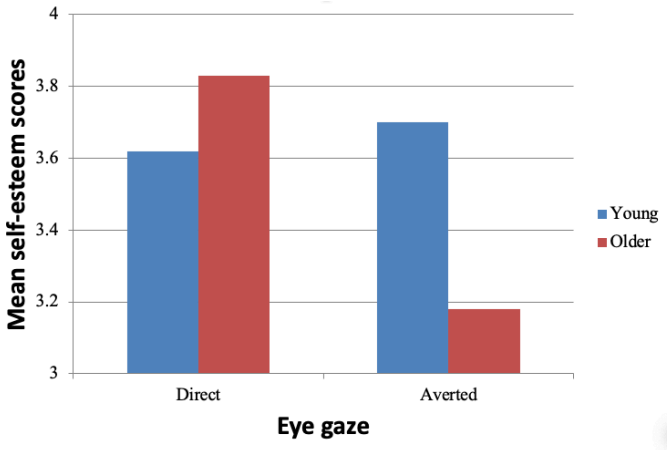

Figure 2. Mean self-esteem scores after viewing young or older faces displaying direct or averted eye gaze.

We also investigated whether fear of negative evaluation predicted self-esteem for those who viewed the faces displaying direct versus displaying an averted gaze. To test this, we regressed self-esteem scores on to scores of the BFNE scale. Fear of negative evaluation significantly predicted self-esteem for those who were exposed to photos of individuals displaying an averted gaze, $\beta = -.56$, $t(58) = -4.62$, $p < .001$ and explained a significant proportion of variance in these self-esteem scores, $R^2 = .27$, $F(1, 57) = 21.30$, $p < .001$. Likewise, fear of negative evaluation also significantly predicted self-esteem scores for those exposed to photos of individuals displaying a direct gaze, $\beta = -.68$, $t(55) = -4.61$, $p < .001$, explaining a significant proportion of variance in these self-esteem scores, $R^2 = .28$, $F(1, 54) = 21.29$, $p < .001$. Therefore, people's fear of negative evaluation was a reliable predictor for self-esteem for both types of imagined interactions (direct gaze vs. averted gaze). In other words, the greater the fear of being evaluated negatively, the lower the reported self-esteem, which was true regardless of the imagined interaction partner's eye gaze.

Finally, we explored whether potential gender or racial differences in reported self-esteem. Results indicated that self-esteem did not significantly differ as a function of participant's gender or race (*F*'s < 1; see Table 1 for means).

Discussion

We predicted that those who were exposed to averted eye gaze of individuals would experience lower self-esteem compared to those who were shown pictures of individuals displaying direct eye contact. The results

Table 1

Race	Mean	*SD*	*n*
Asian/Pacific Islander	3.32	.82	8
Black, not of Hispanic origin	3.28	.55	6
Hispanic	3.71	.73	36
White, not of Hispanic origin	3.56	.71	61
Other	3.93	.29	3

Gender	Mean	*SD*	*n*
Men	3.79	.53	31
Female	3.51	.77	82
Other	3.40	-	1

Note. Means and standard deviations of self-esteem for participants' race and gender.

supported our prediction that there was lower self-esteem for those exposed to the faces displaying averted eye gaze. In this way, our findings replicate the findings of Lamer, et al. (2014), who predicted that nonverbal cues cause an effect in self-esteem. They found that self-esteem was lower for those who were exposed to pictures showing indirect eye contact while displaying a happy expression than those who were exposed to pictures showing indirect eye contact while displaying an angry expression, which was contrary to what they predicted. In the present study, we attempted to find the reason for why people might have perceived the averted eye gaze as negative, despite the fact that the individual in the picture was smiling. We predicted that faces of smiling individuals looking away would be perceived as displaying a sarcastic, insincere, or fake smile designating a sense of dismissal. Responses to the open-ended question were consistent with this idea. For example, an individual who observed the young adults with averted eye gaze wrote: "*I was thinking about how their eyes were not looking in my direction. I felt like they were not paying attention to the things I was saying and there was something more interesting or someone they would rather be speaking to behind me. Their expression did not concern me, I was focused more on their eyes."* Another participant wrote: "*They were all looking in a different direction therefore I was not so sure whether or not they were listening to what I was saying."* According to these replies, the smile from the individual did not matter to them as much as the lack of eye contact. One participant commented that "*My first reaction was the thought that they were fake smiling"* which may be the reason for the change in self-esteem despite the individual's smile in the picture. Our prediction was supported in that the individuals exposed to the faces displaying averted eye gaze experienced a negative change in self-esteem and that the smiling was viewed as being dismissive or excluding, which relates to the findings of Wirth et al. (2010).

Additionally, we predicted that those who were exposed to the young adult faces with averted eye gaze would experience lower self-esteem than those who were shown the older adult faces with averted eye gaze. Our prediction was not supported. Moreover, according to the answers to the open-ended question, the older adult faces with averted eye gaze were perceived to have a more negative, critical, and particularly judgmental reception as compared to the averted eye gaze in young adults. One participant, in response to the open-ended question wrote: "*That I said something that they didn't agree with or liked. That they were judging me."* On the other hand, some participants showed that they held these older adults in a higher regard and were particularly concerned with the eye gaze averted. One participant expressed that he/she was concerned by the averted eye contact by writing: *"I noticed that they weren't looking at me but instead off to the side. If I was having a conversation with them and they did that I would feel like that [sic] wanted to go talk to someone else or needed to go, so I would end the conversation quickly. I also felt like their opinion is important because they are older and could have job connections."* Our initial prediction was that the participants would experience a greater change in self-esteem when viewing the young adult faces with averted eye gaze; however, this was not supported. While there was still an effect for self-esteem, the participants who viewed the older adult faces with averted eye gaze reported the lowest self-esteem. An explanation for the lower self-esteem reported by young adults in response to the older faces looking away might be explained by Terror Management Theory (TMT).

The TMT theory suggests that we as humans have a fear of our own death, and that associated terror experienced by this realization motivates us to engage in behaviors to lessen our mortal fear (Greenberg, Pyszczynski, & Solomon, 1986). According to TMT, self-esteem functions to provide people's personal life with meaning and is a way that people protect themselves from mortality salience and the anxiety associated with the terror of eventual death (Solomon, Greenberg, & Pyszczynski, 1991). Moreover, researchers suggest that exposure to elderly individuals can make salient the idea of people's inevitable death (Martens, Goldenberg, & Greenberg, 2005), which, according to our findings, might be exacerbated when elderly individuals display behavior that dismisses or devalues the young adult (i.e., looking away). Therefore, viewing images of older faces with an averted gaze might have negatively affected the young adults' self-esteem buffer against their subconscious death-related anxiety, resulting in a lower self-esteem. Future studies might test this idea by incorporating measures of death anxiety.

Our study did have limitations in the way it was structured. It is worth mentioning that many of the participants who answered the open-ended question shared a similar description in how they viewed the photos of the people who were portrayed in the study. One participant wrote: "*I thought that the facial expression would change."* Our study could have been conducted differently by changing the way participants viewed the images. As a follow-up to this experiment, researchers might consider using faces with dynamic movement rather than a static picture. If a video clip could be produced to show people the dynamic movement of someone else turning to look away from

them, it might result in different or more drastic effects on self-esteem. Another limitation in our study could be that some participants entered the study with already low or high self-esteem. Although random assignment is expected to equalize any pre-existing differences between groups, future studies might utilize a pretest and posttest measure to detect changes in self-esteem resulting from exposure to eye gaze.

Our findings could be further explored or applied to other studies in the future, particularly those which are focusing on self-esteem and nonverbal cues. Additionally, the findings could be applied to real life situations. In creating more eye contact, two individuals would create a better connection between each other (Kleinke, 1986). Similarly, avoiding eye contact can cause someone to form negative impressions or feelings toward the other individual (Mason, Tatkow, & Macrae, 2005), which can lead to a self-fulfilling prophecy. Self-fulfilling prophecy is a term that describes situations in which people's expectations about a person can lead to the outcome they expected (Rosenthal & Jacobson, 1968). For example, a study conducted by Word, Zanna, and Cooper (1974) found that when White participants interviewed a Black applicant, they unconsciously became more impersonal; this, in turn, led the Black applicant to react awkwardly or nervously, thereby confirming the White interviewers' expectations that the Black applicant was subpar. Likewise, if an individual is in a conversation with an interaction partner who does not make direct eye contact, the individual might believe the person is not interested, not engaged, or is being dismissive. This assumption might then lead the individual to treat the interaction partner in a negative way by acting cold or aloof. The interaction partner might then pick up on this negative behavior and behave negatively in response by being standoffish. The interaction partner's cold behavior then reinforces the individual's assumptions, thereby creating a self-fulfilling prophecy. This idea is supported by a response to the open-ended question concerning the imagined interaction to a person displaying an averted eye gaze: "*They were not making eye contact and I could care less about the conversation with them."* In this way, eye contact, or lack thereof, can demonstrate why self-fulfilling prophecies can occur when eye contact is not made. If people believe they are being treated negatively, they will likely respond with negativity which may lead to negativity. In this way, making eye contact can assist in giving both individuals a positive experience.

In conclusion, the effects of nonverbal cues, such as eye gaze, can affect self-esteem in a positive or negative way; therefore, the power of nonverbal cues can greatly influence the feelings of others. In addition, our findings suggest that the age of an interaction partner can affect self-esteem as well. According to our results, older adults had the greatest impact on younger people's self-esteem, which could imply that individuals valued the older adult's judgments and opinions of them. It is also important to consider the effects of eye contact and self-esteem in day-to-day life. Applying our findings to actual interactions, eye contact could potentially positively or negatively influence the self-esteem of others.

References

Adams, J., Franklin, R. B., Nelson, A. J., & Stevenson, M. T. (2010). Compound social cues in human face processing. In R. B. Adams Jr., N. Ambady, K. Nakayama, & S. Shimojo
(Eds.), *The science of social vision* (pp. 90-107). New York, NY: Oxford University Press.

Blumberg, H. H. (1972). Communication of interpersonal evaluations. *Journal of Personality and Social Psychology, 23*(2)*,* 157-162.

Darwin, C. (1872). *The expression of the emotions in man and animals*. London: John Murray.
Felson, R. B. (1980). Communication barriers and the reflected appraisal process. *Social Psychology Quarterly,* 223-233.

Greenberg, J., Pyszczynski, T. & Solomon, S. (1986). The causes and consequences of a need for self-esteem: A terror management theory. In R .F. Baumeister (ed.), *Public Self and Private Self* (pp. 189-212). Springer-Verlag (New York).

Heatherton, T. F., & Polivy, J. (1991). Development and validation scale for measuring state self-esteem. *Journal of Personality and Social Psychology, 60*(6), 895-910.

Jarvis , B. G . (2008). MediaLab (Version 2008.1.33). [Computer Software] New York: Empirisoft Corporation .

John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research,* (pp. 102–138). New York: Guilford Press.

Josephs, R. A., Bosson, J. K. & Jacobs, C. G. (2003). Self-esteem maintenance processes: Why low self-esteem may be resistant to change. *Personality and Social Psychology Bulletin, 29*(7), 920-933.

Kleinke, C. L. (1986). Gaze and eye contact: A research review. *Psychological Bulletin, 100*(1), 78 –100.

Lakin, J. L., Chartrand, T. L., Arkin, R. M. (2008). I am too just like you: Nonconscious behavioral mimicry as an automatic behavioral response to social exclusion. *Psychological Science, 19*(8), 816-822.

Lamer, S. A., Reeves, S. L., Weisbuch, M. (2014). The nonverbal environment of self-esteem:

Interactive effects of facial-expression and eye-gaze on perceivers' self-evaluations. *Journal of Experimental Psychology, 56*(1), 130-138.
Langton, S. R. H., Watt, R. J., & Bruce, V. (2000). Do the eyes have it? Cues to the direction of social attention. *Trends in Cognitive Sciences, 4*(2), 50-59.
Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin, 9*(3), 371-376.
Leary, M. R. (1999). Making sense of self-esteem. *Current Directions in Social Science, 8*(1), 32-35.
Leary, M. R., & Baumeister, R. F. (2000). The nature and function of self-esteem:
Sociometer theory. In M. P. Zanna (Ed.). *Advances in experimental social psychology*, (Vol. 32, pp. 1–62). San Diego: Academic Press.
Leary, M. R., Cottrell, C. A. & Phillips, M. (2001). Deconfounding the effects of dominance and social acceptance on self-esteem. *Journal of Personality and Social Psychology, 81*(5), 898-909.
Martens, A., Goldenberg, J. L., & Greenberg, J. (2005). A terror management perspective on ageism. *Journal of Social Issues, 61*(2), 223-239.
Mason, M. F., Tatkow, E. P., & Macrae, C. N. (2005). The look of love; Gaze shifts and person perception. *Psychological Science, 16*(3), 236-239.
Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectation and pupils' intellectual development*. New York: Holt, Rinehart, and Winston.
Solomon, S., Greenberg, J., & Pyszczynski, T. (1991). A terror management theory of social behavior: The psychological functions of self-esteem and cultural worldviews. *Advances in Experimental Social Psychology 24*(93), 159.
Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology, 33*(1), 1-39.
Turner, J. C. (1987). *Rediscovering the social group: A self-categorization theory*. Oxford, England: Basil Blackwell.
Wirth, J. H., Sacco, D. F., Hugenberg, K., & Williams, K. D. (2010). Eye gaze as relational evaluation: Averted eye gaze leads to feelings of ostracism and relational devaluation. *Personality and Social Psychology Bulletin, 36*(7), 869-882.
Word, C. O., Zanna, M. P., & Cooper, J. (1974). The nonverbal mediation of self-fulfilled prophecies in interracial interaction. *Journal of Experimental Social Psychology, 10*(2), 109-120.

Author Note
This research was supported by an Undergraduate Faculty-Mentored Grant from Angelo State University.
Correspondence concerning this article should be addressed to Tay Hack, Department of Psychology, Sociology, & Social Work, Angelo State University, San Angelo, TX 76909.
Contact: tay@angelo.edu

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 32-41

EXAMINING THE RELATIONSHIP BETWEEN SCREEN TIME AND THE BIOPSYCHOSOCIAL ASPECTS OF HEALTH

LAUREN A. MESSBARGER AND JULIE J. LANZ

UNIVERSITY OF NEBRASKA AT KEARNEY

Abstract – Technology use has drastically increased over the last five years. The following study was conducted to observe the relationship between screen time and an individual's health. Health was defined using the biopsychosocial model of health, focusing on the biological, psychological, and social aspects of health. There were 170 participants surveyed via an online survey website called Mechanical Turk. Participants were between the ages of 19 and 72. Screen time was measured as the time reported spent on devices (e.g., computers, tablets) both for work and recreational purposes. Measures related to a person's health included: BMI (body mass index), sleep quality, and pain (biological health), stress, anxiety, optimism, and mood (psychological health), and perceived social support (social health). Results of this study suggest that screen time does affect some aspects of a person's health. Specifically, total screen time was related to physical pain (biological health). Recreational screen time was positively correlated with perceived stress as well as negatively correlated with optimism (psychological health). Recreational screen time was negatively correlated to social support (social health). These results suggest that recreational screen time could be more detrimental to the health of individuals as compared to work or total screen time. Further analyses were conducted concluding a negative relationship between work screen time and the hours of sleep an individual reported receiving per night. Limitations of this study are that the study was only conducted at one point of time, so there is no way to infer causation. Future research should focus on how work screen time affects sleep.

Keywords screen time, health, biological health, psychological health, social health, sleep, gender

Internet usage has drastically increased over the last 10 years, from a little over 50% of adult Americans being "online" to 90% of Americans using the internet daily (Perrin & Kumar, 2019). Further, TV time has increased by 38 minutes a day from 2004 to 2009, with time on computers and playing video games also increasing 27 minutes and 24 minutes respectively (Krause & Sawhill, 2016). This increased use of screens has had an impact on our daily lives, such as our social interactions and even our physical health (Kraut, Lundmark, Patterson, Kiesler, Mukopadhyay, & Scherlis, 1998; Costigan, Barnett, Plotnikoff, & Lubans, 2012). In fact, many studies have concluded that excess screen time in children and adolescents can affect different aspects of their health. For example, one study found results indicating that lower levels of screen time are associated with lower depressive symptoms (Kremer, Elshaug, Leslie, Toumbourou, Patton, & Williams, 2014). Another study found a strong positive correlation with the amount of time mid-adolescents spend on screens and the rate of obesity (Maher, Olds, Eisenmann, & Dollman, 2012).

Screen Time

According to Screen Time and Children (2016), screen time is defined as any activities completed in front of a screen. These activities include watching television, working on a computer, and/or playing video games, as well as any time spent on phones, iPads, iPods, and tablets. Recent polls suggest that while technology use has grown, the number of Americans going online has recently plateaued because the market is nearly saturated (i.e., almost everyone has a device that can connect to the internet; Perrin & Kumar, 2019). Even more, there are currently more devices connected to the internet than exceeds the number of people in the world (Mikkonen, 2016).

Many studies have been conducted observing the relationship between screen time and children; however, very little research has been done on the effects the screens may have on adults. One study found that screen

time was positively associated with obesity among Canadian adults (Shields & Tremblay, 2008). Past research suggest that high amounts of screen time had a negative impact on quality of life when combined with little or no physical activity (Davies, Vandelanotte, Duncan, & van Uffelen, 2012). For example, one case study followed a college sophomore for one year. Researchers found that after he spent a lot of time online, he began to experience "a slightly depressed mood, changes in sleep/work schedules, frequent class absences, poor academic performance, and conflict with parents" in the second semester (Anderson, 2001, p. 21). The goal of this study is to further examine the relationship between screen time on adult health and well-being.

Biopsychosocial Model of Health

Health is defined as a state of complete physical, mental, and social well-being; it is not simply the absence of disease or ailment (WHO, 1948). Health is more than just physical components; life events play a role as well. The biopsychosocial model is an updated model of health that has helped influence the health psychology movement. Earlier models focused on just the biological component of health. For example, in the 1800's, physiologist Claude Bernard focused on stress on the body and the importance of the internal environment. In 1880, Bernard emphasized the idea of homeostasis, which is the internal balance of the body. Walter Cannon provided an early framework for understanding the relationship between stress and physiological symptoms in the 1930's. His work was an expansion beyond previous anecdotal demonstrations for the relationship between stress and physiological outcomes. For example, stress causes an increase in adrenaline as well as an increase in heart rate and blood pressure. This relationship is referred to as the fight-or-flight response (Friedman, 2011). However, it is now recognized that health is more than the absence of illness, it is a spectrum ranging from optimal wellness to death (Sarafino & Smith, 2014). Specifically, health is a combination of biological, psychological, and social factors that have an impact on a person's functioning.

Biological Health

Biological health is also referred to physical health (Andrasik, Goodie, & Peterson, 2015). There is an inverse relationship between biological health and screen time. Specifically, increases in sedentary screen time are associated with more sleep problems, pain, weight gain, and less physical activity (Costigan et al., 2012). Thus, there is an inverse relationship between biological health and screen time through the common factor of sedentary behavior. Sedentary behavior is any time which is time spent not being active and moving, or engaging in minimal body movement (Costigan et al., 2012). Many studies have concluded that extended sedentary behaviors may result in severe health complications such as metabolic risk, obesity, diabetes, and cardiovascular disease (Healy et al., 2008; Warren, Barry, Hooker, Sui, Church, Blair, 2010; Wilmot et al., 2012). For example, one study found a link between screen time and metabolic syndrome in children (Mark & Janssen, 2008). This study reported that the sedentary time had a minimal impact on this relationship, thus concluding that screen time played a significant role in the results. This study also reported a positive correlation between television and obesity in children (Mark & Janssen, 2008).

Hypothesis 1a (H1a): Screen time will be negatively correlated with BMI.

A study was conducted implementing a "sit-stand" device to sedentary employees. This device allowed employees to stand during the workday, reducing sedentary behavior. This study found that after a two-week implementation of the sit-stand program, pain reported by employees was reduced by 54% (Pronk, Katz, Lowry, Payfer, 2012).

Hypothesis 1b (H1b): Screen time will be positively correlated with physical pain.

A study conducted in 2007 found that individuals who experience excessive amounts of time on phones or using the internet were more likely to experience sleep disorders such as insomnia (Jenaro, Flores, Gomex-Vela, Gonzalex-Gil, & Caballo, 2007). Past research found that using screens before bed resulted in less sleep for children. This is true for television, computers, video games as well as mobile devices such as cell phones (Hale & Guan, 2015).

Hypothesis 1c (H1c): Screen time will be negatively correlated with sleep quality.

Psychological Health

Psychological health is composed of emotions, cognitive, mental and personality domains (Andrasik et al., 2015). Past research has concluded that excessive screen time is associated with a poorer quality of health (Hamer, Stamatakis, & Mishra, 2010). This study defined psychological health as positive mood, low stress levels, as well as low anxiety levels and high levels of optimism. Another study found that children who experienced lower screen time expressed lower depressive symptoms (Kremer et al., 2014). In other words, there is a pattern such that more screen time is related to worse psychological health. Looking beyond children, one study of college students found that high levels of cell phone use and Internet use were related to higher levels of

anxiety (Jenaro et al., 2007). However, little research has examined the relationship between overall screen time and measures of psychological health such as anxiety or perceived stress in adult samples.

Hypothesis 2a (H2a): Screen time will be negatively correlated with mood.

Hypothesis 2b (H2b): Screen time will be positively correlated with perceived stress.

Hypothesis 2c (H2c): Screen time will be positively correlated with state anxiety.

Hypothesis 2d (H2d): Screen time will be negatively correlated with optimism.

Social Health

Social health refers to environmental, cultural, family, and work factors (Andrasik et al., 2015). Early research on the effects of the Internet on social support found negative relationships between Internet use and psychological health, which had a negative impact on public opinion (Shaw & Gant, 2002). However, later research has found that Internet use seems to have a positive effect on perceived social support (Costigan et al., 2012). Given these mixed results, it is possible that the more screen time a person engages in that is not used to communicate with others, the less time they spend interacting with other individuals.

Hypothesis 3 (H3): Screen time will be negatively correlated with perceived social support.

Men and Women

In addition to how screen time is spent between genders, past research suggests gender differences in the amount of time spent on screens. While a higher number of women over the age of 18 report watching television for shorter amount of time (one hour or less a day), a greater number of men report watching television of longer amounts of time (greater than four hours a day; Eisenmann, Bartee, & Wang, 2002). The results of this study can be extended to other devices such as tablets and computers. Anderson, Economos, and Must (2008) reported differences in the amount of time spent on a screen between men and women, with men expressing more time watching TV and playing video games. Another study found gender differences in use of internet, but this study also states that the difference is accounted for in a difference in Internet experience (Weiser, 2000). It is very likely that men spend a greater amount of time on screens than women do. If there is a significant difference in the amount of time spent on screens, it would potentially affect the health of the individuals by gender.

Hypothesis 4 (H4): There will be a significant difference in the amount of screen time for men and women.

Past research has concluded that women use the internet more for social contact compared to men (Fogel & Nehmad, 2009). Other studies also suggest that women have more extensive social networks. This could be caused by the fact that on average women invest more in personal relationships (Boneva, Kraut, & Flohlich, 2001). It is possible that because women use screens to maintain relationships that the screen time affects their social relationships as well. Given these results, it is possible that the biopsychosocial health of men and women may be differentially affected by their use of screens such that women benefit from the use of screens because of the social component whereas for men, there is no social benefit.

Hypothesis 5 (H5): Gender will moderate the relationship between screen time and social support of a significant other.

Method

Participants

This study had a total of 172 participants in the United States, (86 males 50.3%, 85 females 49.7%). Participants were collected from a website called Mechanical Turk (MTurk), an Amazon website that gathers workers to complete online tasks. These workers were required to have a 95% HIT rate or higher, which is defined as the amount of satisfactory work they complete. A survey consisting of biological, psychological, and social health was completed by participants.

The minimum age reported was 19 years, with a maximum of 72. The average age reported was 37.8 years, (SD = 11.4). A majority of participants reported being white, (N = 140, 81.9%). Other reported races are African American (N = 13, 7.6%), Asian (N = 10, 5.8%), Hispanic, Latino, or Spanish, (N = 5, 2.9%), and American Indian (N = 2, 1.2%).

Materials

Participants were asked to complete an online survey. The survey consisted of ten measures. Two of the measures were related to screen time. Three of the measures examined biological health. Four measures examined psychological health, and one measure examined social health. Individual responses were also recorded concerning demographics.

Screen Time. Participants answered questions estimating how much time they spent on various screens. Questions were divided into two categories (recreational and work; e.g., “Please indicate how many hours per week you spend on each device for work purposes”). Within each category, screens were divided into five types (computers, tablets, TV, phone, and video games - PS, Nintendo, Xbox, other).

BMI.

Body Mass Index (CDC, 2015) was calculated using height and weight. The BMI is a ratio that indicates a person's health based on their height and weight (e.g., underweight, average, overweight, and obese.)

Pain.

Pain was measured using the Nordic Pain Scale (Kuorinka et al., 1987). This frequency scale asks participants to indicate how often they experience pain in certain parts of the body such as their neck, shoulders, and knees (e.g., "No, I've never had trouble in this area," "Yes, I have had trouble in the last seven days."). Higher scores indicate more pain and injury.

Sleep quality.

To measure sleep quality, the 8-item Epworth Sleep Scale (Johns, 1993) was used. This scale does not measure how much sleep was received the night before, but rather how likely a person is to fall asleep during different activities throughout the day such as watching TV, indicating the effectiveness of sleep received. The Epworth Sleep Scale is a four-point scale ranging from 1 = Would never doze to 4 = High chance of dozing. The higher a participant's score, the more likely they were to fall asleep during daily activities.

Mood.

The Brief Mood Inspection Scale (Mayer & Gaschke, 1988) was used to measure a participant's current mood. The brief mood scale was a four-point scale asking participants to indicate whether they felt a certain emotion. The scale ranged from 1 = Definitely do not feel to 4 = Definitely feel. There are 16 adjectives participants needed to rate their mood (e.g., happy, lively, nervous). The higher a participant's score on mood, the more positive their mood.

Perceived Stress.

The Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) was used to indicate the stress levels of each participant. Participants were asked to report how often they felt a certain way in the last month on a five-point scale (1 = Never, 5 = Very often). This scale has 14 statements in which the participants responded to (e.g., "In the last month, how often have you been upset because of something that happened unexpectedly"). A higher score indicates higher levels of stress perceived by participants.

Anxiety.

The State-Trait Anxiety Scale (Marteau & Bekker, 1992) is a six-item scale, used to measure anxiety levels of each participant based on the moment that the survey was completed. This scale has a four- point Likert scale (1 = Not at all, 2 = Somewhat, 3 = Moderately, 4 = Very Much). Participants responded based on how they felt at the moment (e.g., "I feel calm," "I feel tense," "I feel upset"). The subscales measure state and trait anxiety, and higher scores indicate higher levels of anxiety.

Optimism.

Life Orientation Test-Revised (Burke, Joyner, Czech, & Wilson, 2000) was used to measure a person's outlook on life (i.e. optimism). This scale has ten items, (e.g., "In uncertain times, I usually expect the best," "I'm always optimistic about my future"). This scale used a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). Higher scores indicate a higher level of optimism experienced by participants.

Perceived Social Support.

To measure this, the Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Faley, 1988) was used. The Multidimensional Scale of Perceived Social Support is a seven-point scale of agreement (1 = Very strongly disagree to 7 = Very strongly agree). It uses statements such as "My family really tries to help me," "I can count on my friends when things go wrong," and "There is a special person who is around when I am in need." This scale breaks the social categories down into family, friends, and significant others. Higher scores indicate higher levels of perceived social support.

Procedure

IRB approval was received before recruitment of participants began. The participants were asked to fill out an online questionnaire on the MTurk website. A link to Qualtrics, an online survey software, was provided on MTurk to those who were interested and met the qualifications (e.g., lived in the United States and had a HIT rate above 95%). Participants were first shown the informed consent. Those that agreed "Yes" proceeded to the survey. Those that clicked "No" were not allowed to take the survey. At the end of the survey, the participants were given a six-digit random generated code to enter in MTurk to receive compensation. Participants received $1 compensation for completing the survey.

Statistical Analyses

SPSS V. 23 was used to analyze hypotheses 1-4 and the Interaction! V1.7.2211 program by Daniel Soper was used for analyzing hypothesis five. Two participants were excluded for failure to correctly answer both attention check questions (e.g., "Please respond agree") for a total of 170 participants.

To assess outliers in the dataset, z-scores were calculated for all measures in the study and there were a few cases > 3.29, suggesting outliers (Tabachnick &

Fidell, 2007). These outliers were found in the measures of screen time and BMI. Regarding screen time, there were outliers in total screen time and recreational screen time. Total screen time had one participant with a z-score of 3.80. Recreational screen time had one with a z-score of 4.28. These outliers were not removed from the dataset. The data are still plausible when considering people do spend time on multiple screens at the same time. BMI had two outliers due to z-scores of 4.17 and 3.76. BMI was calculated as a ratio of height to weight. These individuals were not removed from the dataset as a high BMI is possible and would be defined as severely obese.

Results

Participants spent an average of 82.65 hours (*SD* = 30.33) on screens a week total, both recreational and work screen time combined. This time is spent between an average of 36.54 hours (*SD* = 18.78) spent on screens at work, and 46.11 hours (*SD* = 24.73) spent on screens for recreational purposes. A minimum of 10 hours a week and a maximum of 198 hours a week was reported for total screen time. Interestingly, for two participants, the maximum hours spent on a screen were greater than the number of hours in a week (168 hours). This is likely accounting for by individuals using multiple devices at once (i.e., watching TV and being on a computer at the same time). The most hours reported for both work and recreational purposes was for participants spending time on computers (see Figure 1, Table 1). Screen time spent on a computer was the only device in which the time spent on work was greater than time spent on recreational purposes.

Hypothesis 1 examined the relationship between screen time and biological health. The relationships between total screen time, recreational screen time, and work screen time were not significantly correlated to BMI (r = .02, p = .8; r = -.06, p = .47; r = .11, p = .19 respectively; see Table 3 for all correlations). Hypothesis 1a was not supported. There was a significant positive correlation between total screen time and pain such that participants who reported more time on screens experienced more pain in the last seven days in any part of their body (r(85) = .24, p = .03). The remaining 85 participants reported having no pain in their body over the last seven days. Hypothesis 1b was supported. There was also no significant relationship between total, work or recreational screen time and sleep quality (see Table 2); hypothesis 1c was not supported. This suggests that the relationship between screen time and biological health is small to moderate (Cohen, 1992).

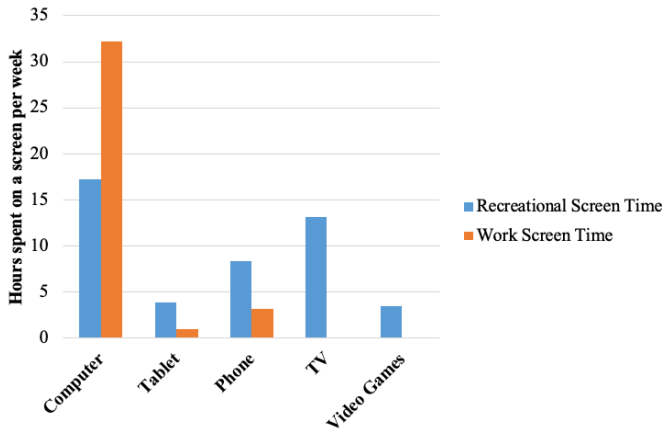

Figure 1. Differences in screen time by device for recreational and work purposes

Hypothesis 2 examined the relationship between screen time and psychological health. The results indicated no significant correlations between work screen time and psychological effects. Recreational screen time was positively correlated with perceived stress (r = .18, p = .02) and negatively correlated with optimism (r = -.15, p = .05). In other words, the more recreational screen time adults engaged in, the more stress they reported and the less optimistic they felt. After examining the correlations between screen time and psychological health, all r-values were below .24, suggesting that the relationship between screen time and psychological health is small to moderate (Cohen, 1992).

Hypothesis 3 examined the associations among screen time and social heath. Recreational screen time was significantly negatively correlated with perceived social support from a significant other (r = -.27, p < .01), family (r = -.2, p = .01), and friends (r = -.16, p = .04). The more recreational screen time (e.g., watching TV, playing on the computer) participants reported, the less overall social support they perceived. Social support from a

Table 1

Hours Spent on Screens per Week

	Device				
	Computer M (*SD*)	**TV** M (*SD*)	**Tablet** M (*SD*)	**Phone** M (*SD*)	**Video Games** M (*SD*)
Work Screen Time	32.15 (*16.91*)	0.09 (*.67*)	1.03 (*4.01*)	3.19 (*6.12*)	.08 (*.61*)
Recreational Screen Time	17.25 (*12.7*)	13.19 (*14*)	3.89 (*7.21*)	8.35 (*9.39*)	3.43 (*5.47*)

Table 2

Correlations among Study Variables

	M (*SD*)	TST	RST	WST	ESS	BMI	Pain	State Anxiety	Trait Anxiety	Stress	Mood	Optimism	PSS – SO	PSS – Family	PSS - Friends
TST	82.53 *(30.3)*	-													
RST	46.11 *(24.7)*	.79**	-												
WST	36.54 *(18.8)*	.58**	-.05	-											
ESS	1.8 *(.41)*	.08	.1	-.01	-										
BMI	27.18 *(7.3)*	.02	-.06	.11	.07	-									
Pain	3.38 *(2.53)*	.24*	.15	.16	-.05	.12	-								
State Anxiety	1.89 *(.78)*	.04	.05	.01	.08	-.004	.3**	-							
Trait Anxiety	1.77 *(.8)*	.03	.03	.01	.14	.05	.31**	.88**	-						
Stress	2.6 *(.65)*	.13	.18*	-.02	.11	.08	.2	.79**	.77**	-					
Mood	2.98 *(.61)*	-.01	-.08	-.09	-.11	.09	-.23*	-.83**	-.78**	-.74**	-				
Optimism	3.53 *(.81)*	-.06	-.15*	.1	-.02	.01	-.11	-.67**	-.62**	-.7**	.67**	-			
PSS-SO	5.39 *(1.71)*	-.18*	-.27*	.05	.04	.16	-.16	-.52**	-.41**	-.5**	.52**	.55**	-		
PSS-Family	5.29 *(1.63)*	-.14	-.2*	.04	-.02	.17	-.11	-.45**	-.38**	-.47**	.5**	.58**	.68**	-	
PSS-Friends	5.28 *(1.48)*	-.08	-.16*	.09	.04	.04	-.03	-.52**	-.41**	-.49**	.57**	.58**	.67**	.65**	-

Note: ** $p < .01$; * $p < .05$; Alpha reliabilities are noted on the diagonal; TST = Total Screen Time; RST = Recreational Screen Time; WST = Work Screen Time; ESS = Epworth Sleepiness Scale; BMI = Body Mass Index; PSS-SO = Perceived Social Support-Significant Other; PSS-Family = Perceived Social Support-Family; PSS-Friends = Perceived Social Support- Friends

significant other was significantly negatively correlated with total screen time as well (r = -.18, p = .02). However, total screen time and perceived social support from family and friends was not significant (r = -.14, p = .07; r = -.08, p = .32). The more total screen time a person reported (e.g., hours spent watching TV, playing on a computer, or for work), the less social support they reported feeling from a significant other. Hypothesis 3 was supported.

We used three independent-samples *t*-tests to compare differences in screen time between the genders, and there were no significant differences in recreational time ($t(169) = .79$, p = .43), work screen time ($t(169)$ = .05, p = .96), or total screen time ($t(169) = .05$, p = .50) between genders suggesting that both genders engage in similar amounts of screen time (see Table 3 for means and standard deviations). Hypothesis 4 was not supported.

We conducted a moderation analysis using Interaction! to examine the gender differences in the relationship between total screen time and social support for men and women. Hypothesis 5 was supported, $F(3,167) = 2.99$, p = .03. We examined the unstandardized simple slopes for men (b = .-.014, SE_b = .01, p = .01) and women (b = -.005, SE_b = .01, p = .24; see Figure 2). In other words, gender was found to moderate the relationship the amount of time a person spends on a screen per week and their perceived social support from a significant other. Men that spent large amounts of time

Table 3

Means and Standard Deviations of Gender Differences in Screen Time

	Men		Women	
	M	*SD*	M	*SD*
Total Screen Time	84.20	*32.45*	81.08	*82.13*
Work Screen Time	36.60	*17.92*	36.47	*19.73*
Recreational Screen Time	47.59	*25.65*	44.61	*23.81*

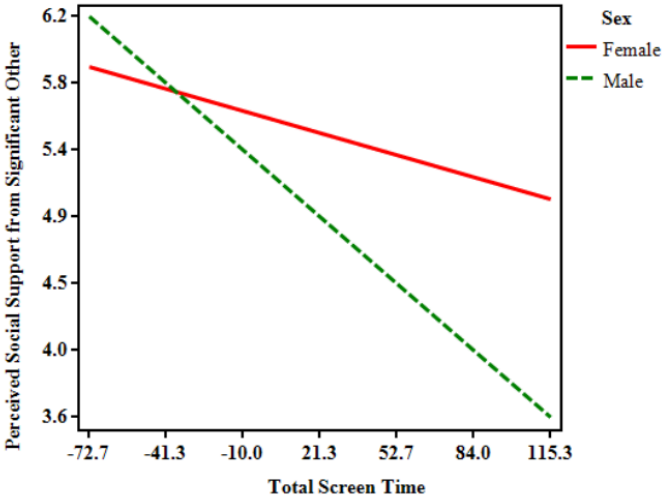

Figure 2. Gender interaction between screen time and social support by a significant other

on any screen (TV, computer, etc.) reported less support from a significant other in their lives, whereas women experienced no difference in support. It can be concluded that the social health of men is more affected by using screens compared to the social health of women.

Post Hoc

Further analyses were conducted to analyze sleep quality, amount of sleep, and screen time. There was a significant negative correlation between sleep quality and hours of sleep (r = -.23, p < .001), indicating that the more sleep participants reported, the less likely they were to fall asleep during daily activities. The only significant relationship between hours of sleep and screen time was a significant negative correlation between screen time at work and hours of sleep (r = -.23, p < .001), suggesting that the more screen time at work people reported, the less sleep they got at night. However, there was no relationship between recreational screen time and hours of sleep.

Discussion

As technology use becomes more dominant in everyday society, it is important to understand the risks involved. There are millions of devices used every day (Mikkonen, 2016). The results of past research have found that there is a relationship between screen time and health in children. Our study's results suggest that this trend continues into adulthood; there is a relationship between screen time and aspects of health in adults as well.

One contribution of this study was to examine the entire domain of health (biological, psychological, and social). The results of this study found that aspects of each domain are affected by screen time, but not all. For example, some aspects of biological health were affected but not all. A majority of injuries within the last 7 days occurred in the lower back (N = 43; or 25% of participants). This could be caused by the fact that participants are most likely using screens while sitting, causing tension in their lower back (Hakala, Rimpelä, Saarni, & Salminen, 2006).

Our results indicate that screen time at work has a negative relationship with sleep. It is possible that technology has blurred the lines of when the workday ends. Over one third of employees claim to check work email outside of typical work hours (Harter, 2014), suggesting that work screen time may overlap with recreational screen time as well. Though work screen time may not affect one's health directly, often the use of screens does not stop once an individual stops working. For example, finance is potentially a stressful career (UNI Global Union, 2013), possibly due to the large amount of time spent on screens. In our study, individuals working in finance spent an average of 35.79 (SD = 13.9) hours per week on computers alone. This could explain why some individuals reported not sleeping well – they spent a large portion of their workday on computers.

Total screen time was significantly related to some components of social support (specifically, significant others), but only for men – not women. This could be because women are more likely to use technology for social support, such as social media, whereas men are more likely to use screens for entertainment purposes such as video games (Boneva et al., 2001). Recreational screen time was significantly negatively correlated with social support in all capacities. This supports past research (Shaw & Gant, 2002) that screen time has a negative impact on social support; however, this contradicts recent research, suggesting there are positive effects of Internet on social support (Costigan et al., 2012). It is possible that excess amounts of recreational screen time have a negative impact on perceived social support and the purpose of the screens plays a role in health as well (e.g., for work or for fun). Overall, there were more negative effects for those who engage in more screen time as well as those who engage in an excess amount of recreational screen time, as compared to screen time limited to work settings. This is valuable because it suggests that using screens at work has little effect on a person's health, aside from the loss of sleep.

Work screen time often overlaps with recreational screen time, creating almost a continuous amount of time spent on screens. When added together, recreational and work screen time exceeded 168 hours

(the number of hours in a week) for some participants. Results indicate that 30 participants spent 100 or more hours a week using various devices. Individuals being on multiple screens at one time (e.g., watching TV and texting a friend) could explain these high numbers.

Limitations

There were a few limitations to this study. Recruitment was conducted online through MTurk and was survey-based. Because of how the study was conducted, some participants' answers could be dishonest, although past research has found that a majority of MTurk responses appear to be truthful (Rand, 2012). To increase the accuracy in this study, two individuals were removed because they failed both attention check questions (e.g., "Please respond agree"). Using an online survey to gather all measures also presented another limitation known as common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Another limitation to this study was the fact that the survey was only conducted at one point in time. Because the results are only at one time point, there is no way to infer causal relationships between screen time and health (e.g., screen time causes poor health).

Given the sample size in our study, it is possible that there was a higher risk of a Type II error. Ideally, researchers would like power > .80, which reduces the likelihood of accepting a false null hypothesis (Cohen, 1992). In our study, given the sample size (N = 170), it is possible our hypotheses were not supported due to not having enough power to detect a small to medium effect.

In this study, biological health was defined as BMI, better sleep quality, and low pain experienced in the last seven days. However, we did not measure physical fitness, which is a common method of measuring biological health. Psychological health was defined as low anxiety, low stress levels, a positive mood, and an optimistic outlook on life. It is possible that any other definitions of psychological health such as depression or self-esteem could have affected the results.

Finally, social health was measured as a function of one's perceived support from friends, family, and a significant other. Perceived support is not necessarily an accurate reflection of one's social support network. For example, an individual in a romantic relationship may believe they are behaving in a supportive manner though it may not be perceived as supportive by the other person involved.

Future Research

In future research, it would be beneficial to look at other measures of biological health such as activity levels and physical fitness. It would also be helpful to have participants come into the laboratory and take physical measurements such as blood pressure, weight, and height to offset the common method variance bias (Podsakoff et al., 2003).

Another point of this study that would be interesting to focus on in future research would be social health. Given previous research on the mixed effects of screen on social health, it would be valuable to understand exactly why women appear to benefit more from screen time than men. For example, if women are reaching out for support in times of crisis, it may be valuable to use Facebook and other Internet applications for intervention purposes. By observing different stressors in participants' lives and their screen use, it may be possible to understand why individuals are using screens. Asking participants' friends and family members about their support would also be a valuable way to reduce the effects of common method variance.

It would be beneficial to examine in-depth the relationship between screen time at work and sleep reported. Because of advances in technology, typical work hours no longer exist because people can still work from home (Harter, 2014). It would be interesting to determine exactly what causes this negative relationship between work screen time sleep, and if working at home is a factor.

Finally, it would be valuable to conduct a similar study using a longitudinal time frame to determine if screen time truly does cause poor physical health. For example, a diary study that measures screen time over the period of one week while also measuring biopsychosocial health would be a valuable method of determining the causal effects of screen time on well-being.

References

Anderson, K. J. (2001). Internet use among college students: An exploratory study. *Journal of American College Health*, *50*(1), 21-26. doi:10.1080/07448480109595707

Anderson, S. E., Economos, C. D., & Must, A. (2008). Active play and screen time in US children aged 4 to 11 years in relation to sociodemographic and weight status characteristics: a nationally representative cross-sectional analysis. *BMC Public Health*, *8*(1), 1-13. doi:10.1186/1471-2458-8366

Andrasik, F., Goodie, J. L., & Peterson, A. L. (Eds.). (2014). *Biopsychosocial assessment in clinical health psychology*. New York, NY: Guilford Publications.

Boneva, B., Kraut, R., & Frohlich, D. (2001). Using e-mail for personal relationships the difference gender makes. *American Behavioral Scientist*, *45*(3), 530-549. doi:10.1177/00027640121957204

Burke, K. L., Joyner, A. B., Czech, D. R., & Wilson, M. J. (2000). An investigation of concurrent validity between two optimism/pessimism questionnaires: The life orientation test-revised and the optimism/pessimism scale. *Current Psychology*, *19*(2), 129-136.

Center for Disease Control and Prevention [CDC]. (2015). Body mass index (BMI). Retrieved from https://www.cdc.gov/healthyweight/assessing/bmi/ on 10/15/2019

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385-396.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155-159.

Costigan, S. A., Barnett, L., Plotnikoff, R. C., & Lubans, D. R. (2012). The health indicators associated with screen-based sedentary behavior among adolescent girls: A systematic review. *Journal of Adolescent Health*, *52*(4), 382-392. doi:10.1016/j.jadohealth.2012.07.018

Davies, C. A., Vandelanotte, C., Duncan, M. J., & van Uffelen, J. G. (2012). Associations of physical activity and screen-time on health related quality of life in adults. *Preventive Medicine*, *55*(1), 46-49. doi:10.1016/j.ypmed.2012.05.003

Eisenmann, J. C., Bartee, R. T., & Wang, M. Q. (2002). Physical activity, TV viewing and weight in U.S. youth: 1999 youth risk behavior survey. *Obesity, 10*(5), 379-385. doi.10.1038/oby.2002.52

Fogel, J., & Nehmad, E. (2009). Internet social network communities: Risk taking, trust, and privacy concerns. *Computers in Human Behavior*, *25*(1), 153-160. doi:10.1016/j.chb.2008.08.006

Friedman, H. S. (2011). *The Oxford handbook of health psychology*. Oxford: Oxford University Press.

Hakala, P. T., Rimpelä, A. H., Saarni, L. A., & Salminen, J. J. (2006). Frequent computer-related activities increase the risk of neck-shoulder and low back pain in adolescents. *European Journal of Public Health*, *16*(5), 536-541. doi:10.1093/eurpub/ckl025

Hale, L., & Guan, S. (2015). Screen time and sleep among school-aged children and adolescents: A systematic literature review. *Sleep Medicine Reviews*, *21*(1), 50-58. doi:10.1016/j.smrv.2014.07.007

Hamer, M., Stamatakis, E., & Mishra, G. D. (2010). Television-and screen-based activity and mental well-being in adults. *American Journal of Preventative Medicine, 38*(4), 375-380. doi:10.1016/j.amepre.2009.12.030

Harter, J. (2014, September 9). Should employers ban email after work hours? Retrieved from http://www.gallup.com/businessjournal/175670/employers-ban-email-work-hours.aspx on 10/15/2019

Healy, G. N., Wijndaele, K., Dunstan, D. W., Shaw, J. E., Salmon, J., Zimmet, P. Z., & Owen, N. (2008). Objectively measured sedentary time, physical activity, and metabolic risk: The Australian diabetes, obesity and lifestyle study (AusDiab). *Diabetes Care*, *31*(2), 369-371. doi:10.1016/S0168-8227(02)00025-6

Jenaro, C., Flores, N., Gómez-Vela, M., González-Gil, F., & Caballo, C. (2007). Problematic internet and cell-phone use: Psychological, behavioral, and health correlates. *Addiction Research & Theory*, *15*(3), 309-320. doi:10.1080/16066350701350247

Johns, M. W. (1993). Daytime sleepiness, snoring, and obstructive sleep apnea: The Epworth Sleepiness Scale. *Chest*, *103*(1), 30-36.

Krause, E., & Sawhill, I. V. (2016, September 13). How free time became screen time. *The Brookings Institution*. Retrieved from https://www.brookings.edu/blog/social-mobility-memos/2016/09/13/how-free-time-became-screen-time/ on 10/15/2019

Kraut, R., Luundmark, V., Patterson, M., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist*, *53*(9), 1017-1031.

Kremer, P., Elshaug, C., Leslie, E., Toumbourou, J. W., Patton, G. C., & Williams, J. (2014). Physical activity, leisure-time screen use and depression among children and young adolescents. *Journal of Science and Medicine in Sport*, *17*(2), 183-187. doi:10.1016/j.jsams.2013.03.012

Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sorensen, F., Andersson, G., & Jørgensen, K. (1987). Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied Ergonomics*, *18*(3), 233-237.

Maher, C., Olds, T. S., Eisenmann, J. C., & Dollman, J. (2012). Screen time is more strongly associated than physical activity with overweight and obesity in 9-to 16-year-old Australians. *Acta Paediatrica*, *101*(11), 1170-1174. doi:10.1111/j.1651-2227.2012.02804.x

Mark, A. E., & Janssen, I. (2008). Relationship between screen time and metabolic syndrome in adolescents. *Journal of Public Health*, *30*(2), 153-160. doi:10.1093/pubmed/fdn022

Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger state—trait anxiety inventory (STAI). *British Journal of Clinical Psychology*, *31*(3), 301-306.

Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality & Social Psychoylogy*, *55*(1), 102-111.

Mikkonen, J., (2016, February 7). 5 ways the internet of things will change your business. *Naked Approach.* Retrieved from http://nakedapproach.fi/2016/02/07/5-ways-the-internet-of-things-will-change-your-business/ on 10/15/2019

Perrin, A., & Kumar, M. (2019). About three-in-ten U.S. adults say they are 'almost constantly' online. *Pew Research Center*. Retrieved from https://www.pewresearch.org/fact-tank/2019/07/25/americans-going-online-almost-constantly/ on 10/15/2019.

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903. doi:10.1037/0021-9010.88.5.879

Pronk, N.P., Katz, A.S., Lowry, M., Payfer, J.R. (2012). Reducing occupational sitting time and improving worker health: The Take-a-Stand Project, 2011. *Preventing Chronic Disease, 9,* 110323. doi:10.5888.pcd9.110323.

Rand, D. G. (2012). The promise of Mechanical Turk: How online labor markets can help theorists run behavioral experiments. *Journal of Theoretical Biology, 299*, 172-179. doi:10.1016/j.jtbi.2011.03.004

Sarafino, E. P., & Smith, T. W. (2014). *Health psychology: Biopsychosocial interactions*. Hoboken, NJ: John Wiley & Sons Inc.

Screen Time and Children (2016 August 1). U.S. National Library of Medicine. *A.D.A.M Health Solutions*. Retrieved from https://medlineplus.gov/ency/patientinstructions/000355.htm on 10/15/2019

Shaw, L. H., & Gant, L. M. (2002). In defense of the Internet: The relationship between Internet communication and depression, loneliness, self-esteem, and perceived social support. *Cyberpsychology & Behavior*, *5*(2), 157-171.

Shields, M., & Tremblay, M. S. (2008). Screen time among Canadian adults: A profile. *Health Reports*, *19*(2), 31-43.

Tabachnick, B.G. & Fidell, L.S. (2007). *Using multivariate statistics (5th Edition)*. Needham Height, MA: Ally & Bacon.

UNI Global Union (2013, October 16). Seven 'symptoms' of global health crisis in the banking sector. Retrieved from https://www.uniglobalunion.org/news/seven-symptoms-a-global-health-crisis-banking-sector on 10/15/2019

Warren, T. Y., Barry, V., Hooker, S. P., Sui, X., Church, T. S., & Blair, S. N. (2010). Sedentary behaviors increase risk of cardiovascular disease mortality in men. *Medicine and Science in Sports and Exercise*, *42*(5), 879-885. doi:10.1249/MSS.0b013e3181c3aa7e

Weiser, E. B. (2000). Gender differences in Internet use patterns and Internet application preferences: A two-sample comparison. *Cyberpsychology and Behavior*, *3*(2), 167-178.

World Health Organization [WHO] (1948). Definition of health. Retrieved from https://www.who.int/about/who-we-are/constitution on 10/15/2019

Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., Khunti, K., Yates, T., & Biddle, S. J. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: Systematic review and meta-analysis. *Diabetologia*, *55*, 2895-2905. doi:10.1007/s00125-012-2677-z

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal Personality Assessment*, *52*(1), 30-41.

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 42-44

Special Features

Dramatic

PRE-ADOLESCENCE IN "THE SIXTH SENSE": ATTACHMENT THEORY AND INDUSTRY VERSUS INFERIORITY

SAM LOERTS AND WIND GOODFRIEND

BUENA VISTA UNIVERSITY

Abstract – In the popular film *The Sixth Sense*, Cole Sear is a child with a special gift: He can see the ghosts of dead people. While this gift provides him with extraordinary powers, it also provides both natural and supernatural problems. Cole's experiences and perspectives can be analyzed from both attachment theory and from Erikson's developmental stages. Cole appears to have a fearful-avoidant attachment style, possibly driven by abandonment from his father and a troubled relationship with his mother. This attachment style leads to problems with his classmates and reluctance to open up to his counselor. Cole's character can also be analyzed through the lens of Erikson's developmental stages. At the beginning of the film he appears stuck in the fourth stage of Industry versus Inferiority, feeling a low self-esteem and lack of confidence. However, Cole is shown slowly evolving such that by the end of the film he has achieved industry feelings, allowing him to move on to the next stage of development. The character of Cole Sear gives audience members insight into these two psychological theories in both an academic and entertaining way.

Keywords: attachment, adolescence, industry, inferiority

As the second highest-grossing movie of 1999, *The Sixth Sense* (Marshall & Shyamalan, 1999) was an extremely popular psychological thriller (IMDB.com). The film follows the story of Cole Sear (played by Haley Joel Osment), a nine-year-old boy who can communicate with the dead, and Dr. Malcome Crowe (Bruce Willis), a child psychologist who helps him. Cole is uniquely gifted because he can see and talk with ghosts, but this gift leads to anxiety and social isolation. Using psychological concepts to analyze movie characters provides a better understanding of their perspectives and mental states. This paper applies attachment theory and Erikson's theory of psychosocial development to the character of Cole Sear to achieve a more comprehensive understanding of his psyche.

When Cole first appears in the movie, the audience quickly learn that he is socially isolated. In his debuting scene, he is sitting in an empty cathedral, solitarily playing with toy action figures. Dr. Crowe approaches Cole, meeting him for the first time. Crowe apologizes for missing their appointment and gently asks him questions. Cole is hesitant to answer and avoids making eye contact with him. After a few moments of exchanging words, Cole leaves. This scene displays his social seclusion because a vacant cathedral is not a typical setting for a nine-year-old boy.

A few scenes later, the audience gets another glimpse of Cole's isolation. After leaving his house to walk to school, he meets up with his classmate, Tommy. Tommy does not like Cole and degrades him by calling him a freak. The reason why they walk to school together is because Cole's mother set them up, hoping they'd become friends. While at school, Cole faces degradation from his classmates and his teacher. In history class, his teacher asks the students if they knew what their school was used for in the past. Cole answers honestly by saying that lawmakers used to hang people there. He knows this because he can see the dead bodies that were hanged.

This disturbs everyone in the room; they turn to look at Cole with disgusted faces. Cole is embarrassed and retaliates by calling his teacher a "Stuttering Stanley." Cole's teacher was bullied for his stutter growing up, and Cole knows this because he can communicate with the dead. This insult evokes bad memories in his teacher, and he retaliates by calling Cole a freak.

Throughout the remainder of the movie, there are several examples of how Cole's ability to communicate with the dead leads to his social isolation. However, as the movie progresses, Cole's trust in Crowe builds and he confesses to him that he can see dead people. Sharing his secret with Crowe significantly benefits Cole, as Crowe is then able to offer better help. Once Crowe understands that Cole's anxiety and fear are because of his visions and not exclusively because of his past, low self-esteem, or troubled peer relationships, Crowe can help build Cole's communication abilities and social competence. Cole can finally talk with his mother about why he is different, and he can embrace his uniqueness instead of fearing it. Cole eventually learns how to cope with his unique ability and reaches a place of social acceptance.

Attachment theory can be applied to this film to better understand Cole Sear (Bowlby, 1988; Ainsworth & Bowlby, 1991). The theory suggests that our first relationships, as infants with our primary caregiver(s), will form implicit or unconscious templates for all future relationships. Further, there are several typical attachment "styles," or patterns of behavior within relationships. There is strong evidence that Cole has a fearful-avoidant attachment style. Individuals tend to form this type of attachment if their parents were abusive, absent, or simply emotionally unavailable. While it is unknown whether Cole suffered abuse, it is known that he did not (and does not) receive proper care and attention. Cole's father abandoned him at a young age which forced his mother to be the sole provider. This made it very hard for his mother to adequately nurture him, despite her clear love for him. This absence of a supportive and consistent caregiver led Cole to feel relatively inept in forming other relationships.

People with fearful-avoidant attachment tend to be very guarded and cautious (Bartholomew & Horowitz, 1991). They live in ambivalent states of being both too close or too distant from others. This pattern is definitely consistent with Cole's behavior. He has a strong desire to have friends and form close relationships, but simultaneously avoids people because he thinks they will persecute him. Fearful-avoidant people also tend to rely on others to maintain positive views of themselves. In other words, their self-worth is dependent on how others perceive them. This trait is definitely present in Cole, as he constantly worries about what others think of him. An example of this preoccupation occurs when he is sitting at a kitchen table while his mother is making him breakfast. His mother leaves for a few seconds and returns to see all the cabinets and drawers wide open, which startles her. Cole, knowing a ghost opened them, does not tell his mother. This leaves her frightened and confused. Cole notices the worry on her face, which upsets him because he does not want her to be afraid of him or lose her love. In search of affirmation from her, Cole asks his mother if she thinks negatively of him. His mother reassures him. When Crowe asks Cole why he does not tell his mother about his ability, Cole confesses that he cannot tell his mother because she does not see him like everyone else. She loves him and does not think he's a "freak." If Cole tells her, he believes that she will also see him negatively. Therefore, his self-worth is dependent on how his mother views him.

Another psychological concept that helps us more deeply understand Cole is Erik Erikson's theory of psychosocial development (Erikson, 1950, 1968). Erikson suggests that everyone goes through a series of "crises" or decisions that determine their personality. Specifically relevant to Cole is Erikson's fourth stage, which he calls Industry vs. Inferiority. Children typically enter this stage between the ages of five to twelve (Cole's age). Here, elementary-school children experience academic and social failure or success. They either achieve a sense of competence and confidence (industry) or a sense of inadequacy (inferiority). Peers, teachers, and parents all contribute to the path of children as they attempt to demonstrate skills that are valued by their social network.

Also already described, Cole does not receive the support of either his teacher or his peers. They explicitly bully him, call him names, and exclude him from their social groups. For much of the film, Cole's inability to make friendships or win the respect of others results in feelings of shame, depression, and inferiority. Because the only support he receives is from his mother, he hides aspects of his true self from her, which ironically creates tension and lack of trust from her.

By the end of the movie, however, Cole successfully passes through this stage and moves closer to the healthy path of industry. Perhaps due to guilt for how Cole has been treated, his teacher assigns him the lead role in the school play. He does a fantastic job, and his classmates rush to him afterward to give him a warm embrace. In this scene, Cole displays social competence which earns him peer approval. This significantly boosts

his self-esteem and gives him the confidence to finally open up to his mother about his secret. His mother responds in a very warm and understanding way. The scene ends by the two exchanging a few heartfelt words and giving each other tight, emotional hugs. Cole's authenticity and trust in her is rewarded by a stronger and more supportive bond.

The Sixth Sense is a thought-provoking psychological thriller. In particular, the character of Cole Sear is enigmatic and difficult to understand. However, through the application of attachment theory and Erikson's theory of psychosocial development, one gains a deeper understanding of him. Cole starts with a fearful-avoidant attachment style and appears to be fixed in the inferiority side of the Industry-Inferiority stage. As the film progresses and he is able to speak with a trained counselor about his unique problems, he is slowly able to overcome these challenges as he grows in social competence and communication skills. His movement away from fearful-avoidant attachment and toward a sense of industry allow him to become a healthier, more complete individual.

Author Note
Correspondence may be addressed to: Wind Goodfriend, Ph.D., Psychology Department, 610 W. 4th Street, Buena Vista University, Storm Lake, IA 50588, Email goodfriend@bvu.edu, Phone 712-749-2108.

References

Ainsworth, M. D. S., & Bowlby, J. (1991). An ethological approach to personality development. *American Psychologist, 46*(4), 333-341.

Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology, 61*(2), 226-244.

Bowlby, J. (1988). *A secure base*. New York, NY: Basic Books.

Erikson, E. H. (1950). *Childhood and society*. New York, NY: Norton.

Erikson, E. H. (1968). *Identity: Youth and crisis*. New York, NY: Norton.

IMDB.com (2019). Feature film, released between 1999-01-01 and 1999-12-31 (sorted by US box office descending). Retrieved on October 2, 2019 from https://www.imdb.com/search/title/?title_type=feature&year=1999&sort=boxoffice_gross_us,desc

Marshall, F. (Producer), & Shyamalan, M. K. (Director). (1999). *The Sixth Sense* [Motion Picture]. United States: Hollywood Pictures.

Journal of Psychological Inquiry
2020, Vol.24, No. 1, pp. 45-52

Special Features:

Psychologically Speaking

CONNECTING WITH OTHERS: AN INTERVIEW WITH NATHAN DEWALL

TAISSA CARVALHO[1], NATHANIEL MARINO[2], ALEX HINRICHSEN[3],

*AND RICHARD L. MILLER[2]**

[1] FORT HAYS STATE UNIVERSITY

[2] TEXAS A&M UNIVERSITY-KINGSVILLE

[3] UNIVERSITY OF NEBRASKA AT KEARNEY

Nathan DeWall is professor of psychology and director of the social psychology lab at the University of Kentucky. He received his bachelor's degree from St. Olaf College, a master's degree in social science from the University of Chicago, and a master's degree and Ph.D. in social psychology from Florida State University. Dr. DeWall conducts research on close relationships, self-control, and aggression. With funding from the National Institutes of Health and the National Science Foundation, he has published over 170 scientific articles and chapters. Dr. DeWall's has received several awards for his research including the SAGE Young Scholars Award from the Foundation for Personality and Social Psychology, the Young Investigator Award from the International Society for Research on Aggression, the Early Career Award from the International Society for Self and Identity. In 2011, the Association for Psychological Science identified him as a "Rising Star" for his significant contributions to psychological science. Dr. DeWall is also an outstanding teacher, recipient of the University of Kentucky's College of Arts and Sciences Outstanding Teaching Award and co-author with David G. Myers of the popular introductory psychology textbook, which reaches several million students. When not writing, teaching, and conducting research, Dr. Dewall runs ultramarathons.

Miller: The Journal of Psychological Inquiry is primarily a journal of undergraduate research papers, although we also have a special features section. In this section, we publish interviews with well-known psychologists. We have selected three interviewers from three different schools to conduct this interview. They will take turns asking questions that they have prepared. Once we finish with this interview, Dr. DeWall will have a chance to review it and correct any mis-statements. Let's get started by introducing the interviewers. Taissa Carvalho is a student at Fort Hays State University. She is a member of Epsilon Mu sorority, a junior officer in the FHSU Psychology club and the recipient of the Psychology club scholarship. Taissa is originally from Rio de Janeiro, Brazil but grew up in Senegal before coming to Kansas. Nathanial Marino graduated with honors from Texas A&M University-Kingsville with a double major: psychology and philosophy. While an undergraduate, he received several awards for his research on moral decision-making. He is now enrolled in a graduate program at Rutgers University. After graduation from North Platte High School, Alex Hinrichsen enrolled at the

University of Nebraska at Kearney where he majored in psychology. He enjoys swimming and biking. After several semesters on the Dean's list, he graduated with honors in May, 2016. I will now leave you in their capable hands.

Marino: Did you enter college with the intent of doing what you're doing now?

DeWall: Not at all. I did not enter college knowing exactly what I wanted to do. The relationship between what I did as a college student, to what I'm doing now is very different. I wanted to be a musician when I went to college. Both my parents were musicians. My dad was a music teacher for forty years, and my mom was a music teacher as well. So I went to college for that reason. I chose a college that had a good music program, and then to fill my schedule, I took introductory psychology, and I thought it was very interesting once I started reading about it. We used a book by a guy named David Myers. I took more psychology, and I got involved in doing psychology research . By the time I graduated, I had taken more psychology than anyone in the history of my college. I thought to myself, what else can I do with this? Nobody in my immediate family had ever gotten a PhD but my psychology professor had. So he said "You could get a PhD," and I said what is that? So that began my journey to go on, and get a PhD, and get interested in different areas in research and then to become a psychology professor, and later a psychology textbook author. But when I came to college, I did not have a clear set plan about what it was that I was going to do.

Carvalho: When did you first know that you wanted to become a psychologist?

DeWall: It was late in my sophomore year; I sort of bounced around; I don't know if you guys did that. I went from class to class, just kind of thinking "what am I interested in, what do I want to do. " Really, what happened is another happy accident. I think life is filled with these wonderful accidents where you reach a fork in the road, and you can go this way or this other way. What happened was, my sister also attended the same college that I did. I was a sophomore and she was a senior. She had taken a social psychology class where they used five different books, and so I took that class because she had taken it, so I wouldn't have to buy the books. I took social psychology and I read all this fascinating material about how we can understand ourselves and other people in different ways, and why we have conflicts and prejudice and stereotypes, all of these sorts of things. So by the end of the semester I said "I really want to do more of this" and that is when I started getting more involved in research. I had no idea what research was, but that was the first moment I realized that this was really what I wanted to do.

Hinrichsen: Who influenced your decision to become a psychologist and were there any significant teachers who played a role?

DeWall: Yes, I would say three people. The first was David Myers, who wrote my psychology textbook. If it hadn't been for him writing that book you would probably be interviewing someone else, because there was just something about it that really captured my attention. The second person was a guy name Bill Altermatt. He was the person that I did psychology research with for the first time. He was the person that taught me what it was, and he had just gotten his PHD. He was a very defined, and eager student so he found me. The third person is a person called Chuck Huff; Chuck was my first social psychology instructor. He was basically the guy who showed me how to get into graduate school, and he helped me get into graduate school. So those are probably the three people, and I'm still friends with all of them.

Marino: What was the reaction of your family and friends to you choosing psychology as a career?

DeWall: What a great question! So what did my family think of all that? I think my memory is that their reaction was similar to how they reacted to most things, which was, "We want you to have meaning in your life, we want you to follow what you're really passionate about and a career path where you think you can serve other people. Whether that be as a psychologist, as a professor, as a custodian, as a carpenter, it doesn't matter to us. We just want you to find that, and once you find that we want you to do as well at it as you possibly can, because we know that's what you want to do. We want you to get the most meaning out of what you like". I'm so grateful that they had that response to it. They could have said anything, or they could have said many different things. But they just said we're proud of you for really finding something you're passionate about. And for me it just happened to be psychology. For one of my other sisters it was Shakespeare and renaissance literature, and now she is a Shakespeare professor. For my other sister, it was becoming an elementary school teacher. She was very passionate about that. We're all teachers, but we're all teaching different things. At no point were my parents

talking to me about dollars and cents and how you need to go to college to get a skill, that's not what college is about.

Carvalho: Why did you decide to become a professor, and what is your favorite part about being a psychology professor?

DeWall: You know for me, I knew that I wanted to do research. I got experience teaching when I was a PhD student, and the place you do these things together is at a university, a big university. I knew that I wanted to work at a big school where I could teach undergraduates and graduates students, and have people apply to work with me as PhD students. I could mentor them, and then they could go on and mentor other students. So for me it was an easy choice.

What do I like the most about it? It's that it always changes. A lot of times people will change careers during their life. I can have the same career my whole life but I can do different things, and I get to decide when I do different things. Very early on in my career I did some work on gender stereotyping and attitude, I don't do any of that anymore. Then I got interested in relationships, and self-regulation, so I did a lot of work on those topics. Then I became even more interested in aggressive behavior, and violence in different contexts. Then I got my PhD and decided "what about the brain? The brain is kind of cool". I have always been fascinated about it, so why don't I spend ten years learning more about the brain. And why don't I start doing neuroscience research, relating it to social psychology, social neuroscience? I had some ideas, and tested them so I've been doing that for about ten years. So what I like is all of these things. I'm sort of growing tired of looking at images of the brain. But what it did was, it inspired me to look at other ways I could study things that I'm curious about. So no question is off limits, and there are very few jobs where I think that's true. I wake up every day, and I think of something. I can be interested in something, and then make it my life for the next 1, 2,10, 30 years or for as long as I want to. So there's nothing better, but if you don't like it, there aren't many things that are worse.

Hinrichsen: What motivated you to get involved in scholarship and research?

DeWall: It was another accident getting involved in scholarship and research. I didn't know how stuff got into textbooks. I thought that ideas fell out of the cloud. How do you do this sort of stuff? It was really just a professor taking an interest in me, and saying, "you know you could get involved in research" and I didn't know what that really meant. It's about getting involved in as much research as you can, then you'll figure out what you like. So that's really what it was--being mentored, but not just mentored though. I had to play an active role in it. I had to go to a professor's office and be vulnerable, and say, "I don't know what to do, but I really like this, I just don't know what's next." Then having a professor say, "you can do this and I can help you," so that's how it happened.

Marino: What were your early research interests?

DeWall: To say that I had interests would assume that I knew what I was doing, but I didn't. I think my interest was social psychology, or just psychology in general. Then I just got really interested in social psychology. So my interests were those of the people I worked with. So the guy that I worked with initially was really interested in stereotyping, so I became interested in that. Another person I worked with was interested in moral psychology. Then I started working with another woman who was interested in attitudes and persuasion, how you can shift people from saying I like this to I don't like this. Some things were interesting for me for a while, but then as I said, I evolved. I changed and I started working on other problems. Early on if you had asked me, I would have said, this is great, this is the coolest thing ever, I'm thinking about it when I don't have to think about it; I'm not falling asleep in the lab, I want to read extra stuff about this. This wasn't true about the other classes I was taking. I didn't' realize that I was just learning the tools of research, instead of being in a place where I knew what it was that I really wanted to do for an extended period of time. So don't worry if you feel you really don't know what you want to do or worry that you might run out of ideas"

Hinrichsen: Even when people ask me what area of psychology I'm working on, I hate saying just environmental because I feel like I'm limiting myself by having to narrow myself down to a subject

DeWall: You might be. Especially early on, think of it as a road that you're going down. You're in charge of how many lanes you get. So do you want one of these back country Nebraska roads that are made out of gravel, or do you want one of these monstrosities that you see in Los Angeles. I'm interested in the environment, I'm interested in morality, I'm interested in eating disorders, why some people have relationships with food that other

people don't and can't understand. So those are broad topics but also there are very specific questions within them.

Carvalho: Much of your research focuses on social rejection, and I can't help but assume that your interest was sparked by the media's coverage of reducing bullying since the early 2000's. Was this your initial influence or did you have other interests leading you to that topic. How if at all have you involved undergraduate students in your research.

DeWall: A lot of the work I do is on rejection. Was it because I was rejected as a child? No. Was it because I was bullied? No. Was it because of the bullying movement? No. That's the first time I've ever heard that. But who knows? No it didn't have anything to do with bullying, or being bullied as a child. It was that I was always interested in relationships, for a lot of different reasons. Honestly one initial thing that really fascinated me was that everyone seems to want relationships. And you can put two really serious people in a relationship and they'll start to act goofy. You guys probably know people like that--maybe some of your friends or family members. I started wondering, why is that? Why is it that we all want relationships, and that we'll do almost anything to get accepted? I find myself doing this. In school, college, you want to be accepted. All of us have this, we have this fundamental need for positive and lasting relationships and it makes sense for us to have this. We evolved this capacity and because it's such a strong motivation, what happens when you threaten it a little bit? Even with really minor instances of loneliness or of feelings of exclusion, you recognize how really powerful this motivation is. It's just like when you say that people need shelter, they need to have a sense of safety. Well how do you really know? The way that you know, is that you threaten it. You get people hungry, take away their food, you take away people's apartments, or in this case with the need to belong, you threaten their relationship a little bit, or at least you make them feel a little bit at risk of not having all of their relationship. And that's really how it started.

Marino: How do you involve undergraduate students in your research?

DeWall: How do I get undergrads involved in research? It's awesome, I mean every semester I work with lots and lots of undergraduates. It's another way that I teach students. I think universities do two things. One thing that they do very well that all of you have experienced is we give you information. We teach you about environmental issues, we teach you about philosophy and psychology and how they are mixed. And that's where most people stop, but then universities do this other thing. We have this other major job, which is we need to create new knowledge. So we do that through research, we do that through scholarship. What a cool way to have an undergraduate experience learning by being involved in both of those. It's kind of a big time buzz when you actually see what's going on behind this door. This is how we create new knowledge. So every semester I get students involved in different ways, most of the time I have them running actual experiments. So they expose people to rejection manipulation. They measure their aggressive behavior; they go to a brain imaging center and they help my PhD students take pictures of people's brains while we upset them. They give people drugs and see how it affects them. They give people opportunities to cheat us out of money, to steal from us. And we see how we can get students to do that and it's harder than you would think. Because students are afraid of getting caught, and they're nicer than you would think. I've worked with hundreds of research assistants and it's kind of exciting. Some of these research assistants go on in psychology, but most of them don't. But for the rest of their lives, they'll always at least know what it's like to be involved in research. Not just as somebody who reads about research, not someone who's been in a research study, but someone who has actually conducted a research study. And to be able to give someone that experience is a privilege. And that's something I do every semester. (23:37)

Marino: In your research on couples and glucose levels you found that there is evidence for people being hangry…

DeWall: Yes we did find evidence for individuals being hangry. I think that is the only psychology paper to date that actually uses the word hangry as a keyword. I didn't think we would get away with it but they let that one slip by. And it's like my big contribution to science, it's what will be on my gravestone. Do I think that increased sugar consumption is going to affect society? Of course it is going to. It will affect it in a few different ways--people will gain weight and that's not a good thing. One thing that we do know is it can add stress to your body, it can add stress to your life, being overweight you are at risk for all sorts physical disabilities and physical struggles, but also some mental struggles as well. and when I talk about the biological effect of being sugar deprived, and so that's, uh, so when

you are really hungry or really low on energy, in any way, um things are going to um be harder to do and so you can think of, you can almost think of it again like a car, um, what energy helps you do is it helps you apply the brakes right? But there are things you have to do to keep the brakes in the car, keep the brakes working, you need brake pads, you need all these other sorts of things, and um glucose, is uh fuel for the brain, and if you don't have enough of it you are going to struggle, you are going to rely on the automatic response instead of the response that requires the you know what I want to do this I probably should do something and so if I come home and my wife looks at me she says you really wore that, you really wore that to Kearney, like, did you want them to not like you? Ya know. You really want to wear that shirt? Ok so first off. My wife would never say that. And so um the emotional response and imagine I come home and I have all my energy I'm very well rested, I have eaten a nice dinner a nice healthy dinner, and I come home and she says that, compare my emotional response to that to if I come home I am exhausted I haven't had anything to eat, I skipped lunch, now it is dinner time and I haven't had anything in a long time and suddenly she says that to me. So the response might be a little bit different. And that is what we found um now do people eat a lot of sugar to compensate, they might, um what we do know is that stress levels have gone up over time, so if you ask and average high school or college student. How stressed are you right now? Students are more stressed out now than they have ever been, students are more depressed now than they have ever been, they are more anxious than they have ever been, and these are not good things, and so what do you try to do well you try to do stuff that is pleasant in that state, and you can do lots of different things when you are pleasant, an easy thing to do is to eat something, that is going to make you feel better. Oreos. But what I'm not saying is people should not go on an Oreo diet. People if they are going to have a special conversation with a partner or their friends wait until they have eaten something, and then also keep track of this food stuff, you know, always keep like a, cliff bar, and you would be surprised at how you can avoid these strong emotional responses, where you want to get the last word in because you are right, you know.

Marino: How have your world travels impacted your research?

DeWall: Oh a ton! And so growing up as a kid in Hastings Nebraska I thought that the biggest foreign land I would ever visit was Omaha and to be honest I didn't know what it would be like to travel to another country. Or what the value of that would be. I lived in a family that encouraged me to explore new places. We traveled around as a kid, we camped all over the United States, and those are some of my best childhood memories. But the idea of going to a foreign country and traveling internationally I just didn't know what it would be like. It was another fortunate situation that my graduate advisor traveled a ton, lots of the time internationally, and he introduced me to his friends. After I got my PhD I had opportunities to travel, and I learned a lot of different things. I learned about how you can understand what a psychological finding means, and it can mean something completely different in a different culture. So I had to be open to that. I also had to be open to the idea that there are differences in norms and customs that we should celebrate and we shouldn't be afraid of. But I think the biggest thing that I learned is that there are certain human universals that are true everywhere. That's the definition of a universal. For example, in the work that we've done on rejection I thought it would hurt a lot more in societies where people include others in their self-concept. I started collaborating with some professors in Asia, Hong Kong, and mainland China. We started rejecting people in mainland China and comparing them to the people we were rejecting in America. They look exactly the same. It hurts, they don't like it, and they become aggressive. They want new friends when they can. If there are no opportunities for new friends they get really lonely and down in the dumps. But they look just like the Americans do, no stronger and no weaker. So that was one thing that was a big light bulb experience for me, that a lot of the cultural psychology literature that I had fallen in love with was all about differences. Same thing with a lot of gender literature that I had been reading that was all about differences. When you actually look at it there are differences that are meaningful and that are important that we must know about, but we're more similar than we are different. That's one of the biggest things that I've learned from my international travels and international research.

Caravalho: Have you had any recent breakthroughs in your research? What topic do you plan to tackle next?

DeWall: We've got some stuff that seems interesting. One thing that we've done that I like is we're trying to understand why people fail to control their impulses when they feel upset. Some people, when these things happen, really get upset and they make decisions they regret later. They are more likely to have unprotected sex, they drink alcohol, all sorts of things.

We ask them later, "Why did you do this?" They say, "Because I was upset." So what I wanted to do was understand 1) why do these people get so upset and 2) how can we help them. And so what we did was a neuroimaging study. So we brought people into that lab, with some really high on this negative impulsivity and others really low on it. We got them upset by having them do a difficult task while looking at images that were really unpleasant. After the initial event, we followed up with them by giving them questionnaire a year later. In the questionnaire we asked them how much they were drinking alcohol. We then correlated what was going on in their brain when they were getting upset to how much alcohol they were drinking a year later. Since it was a very small amount of time we had them in the brain scanner, could you actually use five or ten minutes of brain activation to predict how much a 19 year old is drinking a year later? You can, but the biggest thing that we found it really bust this myth about why people do things like this.

A lot of times when people struggle with alcohol or other sorts of unwanted behaviors, their friends will say "just stop it," or "you're lazy," or "you're morally weak." What we found was completely opposite to that. When these people get upset they try so hard to control their emotions. It hurts so bad that it gets worn out and because they don't know how to manage how they cope with what is happening. They try too hard to cope when they are upset, and it leaves them completely exhausted. They end up doing things that they will later regret. It's not that they completely give up its just that they try way too much. I think it's an important discovery and what we can do now is use that to try and teach them skills to deal with the inevitable bad feedback when they get the unwelcome news. We can help people not have as many problems with alcohol consumption and other things that might trouble them.

Hinrichsen: How did your early undergraduate experiences shape the way you deal with undergraduates now?

DeWall: I went to a very small school, St Olaf College in Minnesota with 3000 students in the whole place. You get a lot of contact with people at a college that small. You know your professors and they know you. Sometimes you go to their houses, they have parties, they know you. You take a lot of classes from them and you have lots of class discussion. I teach at a place that has 30000 students. That's a lot more. How my undergraduate experience shaped my current teaching, despite the differences in the two situations, is that I try to use a lot of that earlier experience to give my students a similar situation by providing them with lots of attention. I challenge them a lot. I give them opportunities to get involved in research like I was. I take them to coffee. I give them lots of my time. I take them to lunch and I have them over to my house. I have a bunch of students I'm working with right now all of whom are first year students. I had them over to my house and we had pizza and watched a documentary. So that's the sort of experience that I want to give students.

Marino: How has your teaching experience evolved over the years?

DeWall: It went from terrified, to not terrified. I think that one thing I try to do is grow as an instructor. One thing that has changed is that I'm using my understanding of research about teaching and about how students learn to teach them better. For example, I give students quizzes a lot. When I tell my colleagues this they say, "What are you trying to do? Are you trying to make all your students hate you?" What I find is that the students do better in class. They keep up with the material a lot better, and then at the end of the semester I ask them what was your favorite part of the semester and they say I love that you have the quizzes, they keep me on task. They let me know how I'm doing in the class, and I felt like I was doing better. I'm always trying to use new things. I'm also open to things not working. I think early on you just want to get everything right. Some things are not going to work and you have to be flexible and be able to ask how can I deal with this and how can I improve on this, instead of saying, "I found something that works and I'm never going to change." I always want to be changing and because of that some stuff is just not going to work. But I'll learn what does work and I'll get rid of the stuff that doesn't.

Caravalho: Which college courses do think are most important for undergraduate students? Do you feel there was anything you did as an undergraduate that helped push you into the program you wanted to get into as a graduate student?

DeWall: The real turning point for me was when I started taking statistics. I didn't understand why they made us do that. It was very scary for me but it was something I really wanted to do. It was very hard and a lot of it didn't make sense. I had to work and work and work in that class. I had to get a tutor and go to all the tutoring sessions. I eked out an A-. I was so happy about that and what that taught me was that I actually could do this. I needed to learn about how to think of psychology

using these sorts of techniques. So I think learning about how to do research are the classes that I would encourage students to take. Take a stats class, take an advanced stats class, take research methods classes, and then take an advanced one that's applied to something you're really interested in. Take any class that makes you ask "What's the first study I want to do?" A PhD program is a research program. You have to do research to get a PhD. That's a requirement. Unless you really want to do research you should not go into a PhD program. When I interview students I ask them, "What's the first research study you want to do? What's the first thing you want to study when you get here? There's a white board design it out for me." I want to know if they can do it. It's saying, this is what I'm interested in and all I'm saying is show me. Because this is how we do the work. It's not, I had this great experience over spring break and over summer I took this trip to India and learned about meditation. I learned about mindfulness. I think I want to do mindfulness research. I say, "Great tell me about the study you want to do."

Hinrichsen: How did it feel to win the outstanding teacher award from the University of Kentucky's College of Arts and Sciences and to be named a rising star in psychological research by the Association of Psychological Science?

DeWall: It was a big surprise. I said, wait a minute, me? In the case of the outstanding teaching award the chair of my department told me he was going to nominate me for it and they nominated me for it in a cool way. They said one big reason why we're nominating you is how you interact with undergraduates inside and outside the classroom, including all of the work that you're doing with them in your laboratory. I thought that was pretty neat. The rising star thing, that was a surprise, but that was pretty neat as well. They said they wanted to do a one page in a magazine where you talk about yourself. And I said being from the mid-west we don't talk about ourselves. We're just sort of quiet people who just sit there and work hard. I actually was going to say no, could we not do the interview. And I told a couple of my colleagues about it and they said this is a good thing, you need to do this. So what happened was they sent me questions similar to the ones you're asking me. I wrote my responses, sent them in and the response went into the magazine. They had about four of us that they had picked from psychology. Then what happened was David Meyers, the author of that introductory psychology textbook I mentioned earlier, read the interview and he wrote to me in Hong Kong, where I was doing some research. He said, "How would you like to communicate our science to a broader audience?" I said, That's a dream. I love to write and I love to teach and I love to teach through writing." What I didn't know at the time was that he was asking me if I wanted to be considered to be the new co-author on his textbook series. And now I'm the co-author on the textbook series. We're doing our fourth book together and its Meyers and Dewall. It came out of that award. It was very unexpected but I was in the right place at the right time.

Marino: We know that you do long distance running as a hobby. How much self-control does it take to run a marathon?

DeWall: A marathon is 26.2 miles. It takes a lot of self-control to do that. It takes more self-control to run 50 kilometers, which is 31 miles. It takes some more self-control to run 50 miles. And then I like to run a hundred miles, and it takes a bit more self-control to do that. It's a common theme that you'll run into throughout your lives: it seems harder than it really is once you get into it. Maybe you had this experience when you were applying to college. Oh my gosh this is going to be so hard. And then you get there and you think I can't do this. You look around and everyone else knows what they're doing and you don't. It's kind of the same thing with long-distance running. It sounds really hard and it is believe me it's hard. You just never quit, you never give up and when you get scared you just keep doing it. A few weeks ago I was in the everglades in Florida. I was running 50 miles through the swamps. I was about 35 miles into it and suddenly I heard right next to me this commotion on the trail. I was wearing my headphones, so I took one headphone out and suddenly I heard a really laud growl. And there was a panther right next to me. Another thing about this race is because there are panthers and alligators and other critters around, they require you to run with a bright orange whistle. If you see any of these critters you blow it as hard as you can and they have rangers all around the trails. So I blew it as hard as I could ten times and I just kept going. I had another 15 miles to run. You just do it. It was fun. I ran a 100 mile race and 20 miles into it suddenly a storm overtook the forest I was in. It sucked all of the tents out of the ground. The tornado siren was going off. The temperature was really hot, then it was really cold. It was blowing all the trees around and suddenly a branch broke off and it fell and it hit me right in the head and knocked me to the ground. I opened my eyes and I was just bleary eyed and they said, "We need to get you out of here." And I ran another 80 miles to finish it. It wasn't my fastest one, in

fact it was my slowest one, but that's fine I finished. This year I'm really excited about a new challenge. So I've done a bunch of hundreds now and now I'm doing longer races. I'm doing one that's 314 miles across 5 states non-stop. Then I'm doing a 205 mile race non-stop around Lake Tahoe in California.

Caravalho: Did having a child change your outlook as a scientist?

DeWall: It's taught me a lot of stuff. One thing is that you can do more than you think you can do. A lot of times I would hear people say when you have a kid your life ends. I don't think that's why we have kids. I don't think that's why people have the ability to have kids so that they can no longer have a life. I think the opposite. I think the reason I have kids is so I can give them opportunities so that they can make my life better. And that's been my experience. I learn every day especially since becoming a parent just how important family is. And how it's more important than anything I'll ever do at work, any paper I'll ever write. That's something I think I should be proud of instead of being afraid to talk to people about. I think that's the big thing that I've learned. Another thing I've learned is that most things are just not a big deal. I used to just get so wrapped up what are these people doing what are these people going to think. Where should I go, what should I be doing. Now it doesn't really matter. All I'm supposed to do is do a little bit better than I did yesterday, every single day. And if I do that, then I can't lose.

Hinrichsen: How do you balance your work and home life?

DeWall: I try my best. I don't feel like I do a great job at it. I think I do better at it than I used to. I have gotten all sorts of advice from all sorts of people about how to manage family and work. What I started to do was try and think of it differently. Instead of how am I managing work and my family, I started trying to think of them as the same thing. They're not the same thing but I try to think how I benefit my family by working. And how can I benefit my work in my family life. I don't keep track of hours as some people. You read in studies, how many hours are you spending doing housework, how many hours are you spending with your kids? For me, I want the best part of every day to be with other people. If it's ever something other than that I've got my priorities completely out of whack. For my ultra-marathons, I take my family with me. It's a family thing. My wife and I made an agreement as soon that as soon as these things stop being fun for us as a family I'm going to stop doing them. But as it turns out if I just say let's do this together, it becomes not only fun for me but it becomes something fun for her too. Then we meet people and we develop other friendships and it's kind of a cool deal.

Author Note
Correspondence may be addressed to: Wind Goodfriend, Ph.D., Psychology Department, 610 W. 4th Street, Buena Vista University, Storm Lake, IA 50588, Email goodfriend@bvu.edu, Phone 712-749-2108.

CALL FOR PAPERS

The *Journal of Psychological Inquiry* encourages undergraduate students to submit manuscripts for publication. Consider the following when you begin to write your manuscript.

- Manuscripts must have an undergraduate student as the primary author. Manuscripts written by anyone who has already graduated from college will be accepted if the work was completed while the primary author was still an undergraduate student. Graduate students or faculty may be co-authors, if their role was one of teacher or mentor versus equal collaborator.
- Include a sponsoring statement from a faculty supervisor. Faculty sponsors should confirm that they inspected the paper's content, method, adherence to APA style and ethics, grammar, and overall presentation. This sponsoring statement should be uploaded with the manuscript.
- For a manuscript to be considered for publication in JPI, the first author must meet one of the following conditions: a) the primary author has paid a one-time $30 processing fee, or b) the primary author is or was a student at an institution that has paid an annual $80 processing fee for unlimited submissions from students who attend that institution.
- Submit original manuscripts only. Do not submit manuscripts that have been accepted for publication or have been published elsewhere.
- All manuscripts should be formatted in accordance with the latest edition of the APA Publication Manual.
- To submit a manuscript, go to the submission portal at www.editorialmanager.com/jpi
- The reviewing process should ideally require 60 days between submitting a manuscript and receiving a reply from the action editor.
- If a manuscript requires revisions, the author or authors are responsible for making the necessary changes and resubmitting the manuscript to the journal. Manuscripts may need to be revised more than once before being accepted for publication.

The *Journal of Psychological Inquiry* publishes each of the following kinds of articles.

- 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.
    - Examples:
        - Developmental psychology: Does violence in the media have harmful effects on children?
        - Human sexuality: Is homosexuality incompatible with military service?
        - Cognitive psychology: Are repressed memories real?
    - 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 type of article is a psychological analysis of a television program or movie.
        - Select an episode from a popular, 30-60 minute television program, or a well-known feature-length film (typically between 90 and 120 minutes long).
            - Describe the salient behaviors, activities, and / or interactions of the main characters, and interpret them using psychological concepts and principles.
            - Use appropriate concepts and principles from the research literature.
            - The manuscript should identify the title of the show or film, and for television shows, the name of network and episode.
            - See the APA style guide to find out how to appropriately reference an episode of a television show or movie.

- Special features III: Conducting psychological analyses – Current events
    - This type of article analyzes a current event.
        - Select an event that has garnered widespread coverage in the national media.
        - Analyze the event from one or more areas of psychology.
        - Pay close attention to the people at the center of the event, and to the people who were affected, directly or indirectly, by the event.
            - What were their motivations, expectations, and reactions to the event?
- Special features IV: Teaching techniques
    - The student and faculty mentor should select a teaching technique used by the faculty member that the student found to be particularly helpful in promoting learning.
    - Describe the technique in sufficient detail so other faculty members can replicate the technique in their own teaching.
    - Provide reasons why the student thought the technique worked so well.
    - The faculty member should explain why they developed the technique, and what they hoped to accomplish in terms of learning outcomes.