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Editors: Sharo Shafaie & Deborah G. Wooldridge



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## Editors' Note

We are delighted to present to you the 2019 Spring Issue of our journal. The *IAFOR Journal of Psychology & the Behavioral Sciences* covers a variety of empirical studies about applications of psychological theories in educational and mental health settings. Moreover, the journal showcases studies that examine topics regarding human development, psychological outreach services, family studies, as well as articles addressing the needs of at-risk children, youth and families, and vulnerable populations.

The *IAFOR Journal of Psychology & the Behavioral Sciences* is a peer-reviewed, editorially independent, and interdisciplinary journal associated with the The International Academic Forum's (IAFOR) Conferences on Psychology & the Behavioral Sciences. This issue is devoted to several interdisciplinary studies which represent diverse topics, cultures, and disciplines in the fields of psychology and the behavioral sciences. All papers published in the journal have been subjected to the rigorous and accepted processes of academic peer review. The articles are original, and some are significantly revised versions of previously presented papers at IAFOR conferences.

We want to express our sincere gratitude to all reviewers for taking time from their busy schedules to review each assigned manuscript and offer their professional expertise, and recommendations for improvement of these published papers. Also, we would like to take this opportunity to acknowledge the hard work of the support staff at IAFOR who were involved with the publication of this issue.

Please note that we are seeking manuscripts for our upcoming Autumn 2019 issue. Below is the link to the journal's web page for your attention; please review this page to become familiar with the journal's objectives and the submission guidelines for authors <https://iafor.org/journal/iafor-journal-of-psychology-and-the-behavioral-sciences/>.

If you have any questions, please do not hesitate to contact us, otherwise please send your manuscript to the journal's editors below or through the manuscript submission system: <https://iafor.org/journal/iafor-journal-of-psychology-and-the-behavioral-sciences/manuscript-submission-form/>. Thank you for considering this invitation, and we look forward to hearing from you soon.

Best regards,

Journal Editors

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**The *IAFOR Journal of Psychology & the Behavioral Sciences***

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## **The Lifelong Learning Experience**

Cristina Gordon, Northwestern Oklahoma State University, USA

### **Abstract**

Rooted on the theories of Experiential and Transformative Learning, the Lifelong Learning Experience complements the Experiential Learning Cycle, Transformative Learning and Accelerated Learning by combining their strengths and moving beyond life in the college classroom. The Lifelong Learning Experience explores the impact of classroom events on lifelong learning, an area rarely addressed within learning theories. An explanation of the Lifelong Learning Experience, the impact teachers have on future learning as well as the theoretical influences for the Experience are discussed.

*Keywords:* lifelong learning, experiential learning, transformative learning, accelerated learning

## Introduction

The Experiential Learning Cycle discussed by Kolb (1984) has been explored in length by several authors (Boud & Walker, 1992; Moon, 2004). However, the idea of lifelong learning as a continuous experience is rarely addressed as part of the learning process. The Lifelong Learning Experience goes beyond the learning cycle and speaks to a neglected process when we discuss learning. What is lifelong learning, really? What role does the teacher play in lifelong learning in the classroom?

When people think about their most memorable experience in college, most describe eventful encounters, not course content as memorable. With that in mind, looking at learning as an eventful encounter has the potential of making it memorable long after graduation, when lifelong learning is at its prime. The role of the teacher is to make learning extraordinary in a way that students are able to make connections between the memorable experiences of learning and the rest of their lives.

The Lifelong Learning Experience process explains the role of the teacher on the future of lifelong learning for students. The Experience focuses on the Transformative Learning concept of Reflection (Mezirow, 1990) as it prepares students to face the world beyond the safety of the classroom. The Lifelong Learning Experience is rooted in the Experiential Learning and Transformative Learning theories as it explores the influence of classroom events on lifelong learning after college.

## Theoretical Influences

David Kolb's Experiential Learning Cycle has its foundation in Dewey, Lewis and Piaget's theories on learning. Kolb contented that experiential learning is the foundation for students' connections with the real world of work and lifelong learning (Kolb, 2015). The cycle included Concrete Experience (CE); Reflective Observation (RO); Abstract Conceptualization (AC) and Active Experimentation (AE). According to Kolb in Sternberg's and Zhang's Perspective on Thinking, Learning and Cognitive Styles (2001), the experiential model described two modes of seizing experience (CE and AC) and two modes of transforming experience (RO and AE). Kolb (2015) summarized the importance of these modes: "Lifelong learning is often conceived as a process of learning from direct experiences that is controlled by the individual (p. xix)". For Kolb (1984), learning was a process guided by experience that is viewed as continuous.

Kolb's model was explored in length and modified by authors such as Moon, and Boud and Walker. Boud and Walker (1992) took Kolb's experiential process into a series of stages that included not only Kolb's experimentation and reflection, but also the intention of a student to learn. A student must prepare for experimentation and reflection utilizing his or her own experiences (Boud & Walker, 1992). Jennifer Moon (2004) focused on internal and external experiences and their influence on learning. Moon (2004) discussed the nature of experience as individual but also social, since our external experiences are rooted in our social surroundings. Both authors agreed with Kolb's assertion that experience is at the center of the learning process.

The Experiential Learning Theory described in detail what types of experiences students use for learning that are directly related to their experiential learning styles: Diverging, Assimilating, Converging, and Accommodating (Kolb, 2015). Kolb (2015) suggested that

experiential learning provides a deeper form of learning, especially for non-traditional students, which offers a strong foundation for lifelong learning.

Although the Experiential Learning Theory was detailed and well-supported as to its process in the classroom and potential for development of students beyond school, it skirted around the discussion of lifelong learning and the role of teaching in the development of these experiences after students leave the college classroom. The Lifelong Learning Experience fills this gap in the discussion of experiential learning.

In addition to experiential learning, a more recent discussion has been reignited around the concept of Transformative Learning. Jack Mezirow (1997) took a step beyond experiential learning to attach meaning to experience through each individual's frame of reference. The frame of reference added to the experiences of each individual's cognitive, conative and emotional components and how they transform the experience (Mezirow, 1997). Complementary to Mezirow's perspective and expanding on Moon's (2004) ideas, the social-emancipatory view, grounded in Paulo Freire's work, added to the frame of reference the concepts of context and social change (Taylor, 2008). Both Transformative Learning Theory and the social-emancipatory perspective inched closer to the concept of lifelong learning but did not really explore it. Taylor and Canton (2012) discussed the need for more forward-thinking ideas on transformative learning that encompass other areas beyond the transformative pedagogy explored in different settings. The Lifelong Learning Experience takes a step beyond the pedagogy and provides a look into how the experiences, reflection and frame of reference connect to what happens in life after college.

Experiential and Transformative Learning focused on the reflective and personal part of the learning process. The concept of Accelerated Learning focused on techniques to explore this process and reflections in the classroom. The concept provided a system to enhance the design of the classroom delivery, thus enhancing learning (Meier, 2000). The focus of Accelerated Learning was experimental learning. The designs suggested by the concept were rooted in experimentation, collaboration and the environment with seven guiding principles: 1) Learning involves the whole mind and body; 2) Learning is creation, not consumption; 3) Collaboration aids learning; 4) Learning takes place on many levels simultaneously; 5) Learning comes from doing the work itself (with feedback); 6) Positive emotions greatly improve learning; 7) The image brain absorbs information instantly and automatically (Meier, 2000). These principles asserted that learning is a hands-on process that involves the entire body and mind. It is not linear, and content is better absorbed through images.

The Lifelong Learning Experience combines experience, reflection and design exploring the influences they have on life beyond the college classroom.

### **The Lifelong Learning Experience**

Based on the concepts of experiential learning, reflection, and content delivery design the Lifelong Learning Experience complements the Experiential Learning Cycle, Transformative Learning and Accelerated Learning by combining their strengths and moving beyond life in the college classroom. The concept of reflection has been extensively examined and took different shapes for different authors. Kolb, Boyatzis and Mainemelis (1999) believed reflection creates abstract concepts that can later be used to guide new experiences. A deeper meaning was attached to reflection by Mezirow (1990), explaining reflection as a challenge to presuppositions on prior experiences. Meier (2000) included reflection in design by

alternating it with activity. The Lifelong Learning Experience looks at reflection as part of the entire process; however, the focus really lies on the individual efforts once the students leave the safety of a classroom into the next step in their lives. Reflection is the core tool for making connections of past experiences with present events and future decisions.

Additionally, emotions are a guiding force on the importance of experiences for each individual. They play a pivotal role on if, and how, students utilize reflection in the Lifelong Learning Experience. As expressed by Meier (2000), positive emotions greatly improve learning. Pekrun (2014) outlines four types of academic emotions experienced by students: 1) Achievement emotions; 2) Epistemic emotions; 3) Topic emotions; 4) Social emotions. The author contended that these emotions can be positive or negative and have a strong impact on learning. In a more scientific view, Christianson (2014) described emotions as a by-product of the pursuit of biological motives. The author agreed that emotional reactions can influence the outcome of one's goals.

Focusing on the importance of self-regulation in learning, the Lifelong Learning experience empowers students to develop self-generated thoughts, feelings and behaviors that lead to self-directed learning through life beyond school (Zimmerman, 2002). The Lifelong Learning Experience (Fig. 1) explores the process of learning in the classroom and ways in which it provides the necessary tools for students to endeavor in a meaningful and fulfilled life through lifelong learning. The process is not static or cyclical, but dynamic. Each class, opportunity and student group will determine the order in which the Experience occurs. The Experience in the classroom leads to enriched life experiences.



Figure 1: The Lifelong Learning Experience

The Information portion of the Experience is where students are exposed to concepts, ideas or topics for discussion. Here, students receive the basics needed to walk the Experience. To maximize this portion, the teacher should present information in small chunks and check for understanding often. The exposure to information should be interesting and engaging, with personal examples so students can connect to the topic. This portion may be combined with Awareness through inductive teaching and learning, where the information given is more specific than general. Through analyzing this information, preferably in a cooperative manner, students generate the need for more facts and concepts. At this time, they are either presented with what they need or led to discover it themselves (Prince & Felder, 2006).

Awareness is then the understanding of the information. Here students make sense of the information they received or discovered and are able to explain it to others. In this portion of the Experience, students should work cooperatively and be given activities that require them to explain what they have learned. Working cooperatively involves working in teams on projects or assignments based on criteria provided by the teacher (Feldner & Brent, 2009). Cooperation provides opportunities for manipulation of information and thus further understanding, which is the goal of the Awareness portion of the Experience. Reflection is also an important part of Awareness. Reflecting on concepts and their validity and purpose based on individual frame of reference contributes to the student's perception of the content, leading to the Attitude portion of the Experience. Reflection also prepares students for application, which takes place in Action.

The Attitude portion addresses the emotions connected to the content being explored. Students' feelings about the content learned are often related to engagement with the content. Engagement is frequently tied to relevance of the content for the student. Relevance is perceiving something as interesting and worth knowing (Roberson, 2013). This two-part definition gives teachers two angles to pursue in making content relevant and engaging: Interest and worthiness. If a student thinks something is uninteresting, it may still be worth knowing. The connection between Awareness and Awakening lies on these two pieces of relevance. According to Roberson (2013), merely creating games and action when delivering content does not make something interesting or worth knowing. Substantive content can create the perception of worth and interest, thus generating positive emotions towards it. Content that is viewed as relevant and/or worth knowing generally leads to a positive attitude.

Action is where application happens, thus it should take a considerable amount of time in relation to the other portions. Here is where students apply the concepts they have learned in many different approaches. In essence, Action Learning is being utilized here by having students work together to solve real problems (World Institute for Action Learning, 2018). Students experience the concepts in real life scenarios, reflecting on the meaning of the topic and what it does for themselves and others, how it can be utilized and its relevance. Working collaboratively in this portion to apply what was learned and reflect on its merits with others can lead to insights that students may not reach alone. This type of learning becomes self-sustained, giving students a sense of independence and the ability to develop interdependent relationships in the classroom (Yang, 2015). It is important, however, to remember that an activity in itself is not enough to promote deep learning. Interactive reflection must take place to enable a deeper understanding and connections with the content (Lizzio & Wilson, 2004).

Finally, Awakening. Awakening is composed of different areas on which, now former students, work simultaneously. Here is where all the efforts made by teachers and students culminate and the learning acquired through the Experience makes a difference in each of the

different areas. Awakening is the result of how well teachers were able to lead students through each part of the Experience and awaken in students the ability to reflect and make lifelong connections. Teachers may initiate this part of the Experience by providing opportunities for further reflection and service work to student, but it is up to the student to take it beyond the safety of the school. Some institutions support this effort by providing senior capstone projects in which students integrate learning across disciplines and reflect on how it can aid in life beyond college (Henscheid, 2008).

Awakening is a continuous process in which every choice will lead to new information, which then takes the person through the Lifelong Learning Experience again and again on their own. Herein lies the importance of walking the Experience with the students in a way that prepares them to be able to walk it on their own long after they graduate. Denson et al. (2017) found that college experiences have direct effects on post college abilities to discuss sensitive and difficult issues, which suggests that the engagement created in the Lifelong Learning Experience has lasting effects after college.

### **Dimensions of Awakening**

The personal dimension is where individuals utilize their experiences learned during the process in higher education to make decisions about their personal lives. The goal is to live a personally fulfilling and healthy life. The dimension of community allows individuals to make connections between what they have learned and their community. Making decisions on how and how much to contribute to the community of which they are a part. The social dimension is directly related to what students experienced in the Action part of the Experience. Here they make social connections and practice leadership as part of their social role, expanding to work and leisure. Finally, global dimension allows individuals to utilize the reflective skills they learned during the Experience they walked with the teacher in school to expand their interests globally.

### **Role of the Teacher**

The role of the teacher in the Lifelong Learning Experience is to be a facilitator of learning and to promote self-directed learning. Determining the appropriate instructional strategies to promote self-directed learning is imperative, so students can utilize what they have learned in the classroom to continue learning beyond the school (Merriam, 2001). That means staying away from transmissive teaching, which reduces student's independence and the ability to make connections, needed in Awakening (Yang, 2015). On the other hand, as facilitators of learning, teachers cannot underestimate the demands action learning imposes on students and remember that reflection and independence are accomplished overtime (Lizzio & Wilson, 2004).

It is important to utilize all parts of the Lifelong Learning Experience as scaffolding to Awakening. Lifelong learning is more than just continuing education and further training, it provides opportunities for application of knowledge and exploration of concepts in a number of different settings (Fischer, 2000). Castillo-Montoya (2018) explained academic rigor as how deeply students engage with their learning. Teachers should want to see rigor in their classes, as it is imperative for a fulfilling Lifelong Learning Experience. Knowing to connect deeply with the learning that occurs in the classroom is key to navigating Awakening. However, for this type of rigor to occur, it needs to be facilitated (Castillo-Montoya, 2018), which is part of the teacher's role in the Lifelong Learning Experience. Some suggestions to facilitate rigor are making space for students' knowledge to appear and notice them; value



and incorporate students' experiences in subject matter learning (Castillo-Montoya, 2018). Most importantly, rigor must not leave behind relevancy and engagement.

## **Conclusion**

In an era when higher education is facing so many challenges, such as maintaining excellence, accessibility and affordability (Pazzanese, 2016), learning is still at the heart of colleges and universities. As many have explored and offered ways to improve learning that happens in the classroom, learning that happens beyond the classroom is seldom explored. It is imperative to understand what happens when the classroom teacher and classmates are no longer there to help solve problems and create solutions. College teachers prepare students to the real world or work and life, and how they influence decision-making and creative solutions is most likely how students will lead their lives after college. The Lifelong Learning Experience provides a glimpse of how classroom encounters influence learning and connections later in life. Felten, Gardner, Schroeder, Lambert, and Barefoot (2016) provided a great example of this as they discussed higher education organizations as learning organizations. This meant that not only students, but staff, faculty and administration are always striving to “question assumptions, inquire into the effectiveness of their work, partner with peers to solve problems, and make evidence-informed decisions” (p. 5). The tools to accomplish this are acquired in the classroom and built upon while one continues their Experience in Awakening. Felten et al.'s (2016) idea of the learning organization encompassed each member walking through their own Experiences to complete each task they must accomplish to continue learning.

As most college and university missions encompass preparation of students for work and life, it is surprising that how this preparation actually unfolds beyond the classroom is rarely explored. The Lifelong Learning Experience focuses on this forgotten area. As the Experience is further explored, more and more connections between the college classroom and life beyond it will be discovered and discussed. Acknowledging that this is an area worth exploring is the goal of this document.

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## **Probing the Efficacy of Relaxation Techniques of Primary Insomnia in a Non-Randomized Sample of University Students**

Moses Victor, Ahmadu Bello University, Nigeria

### **Abstract**

Insomnia is a common sleep complaint that could affect students' academic activities, and if not mitigated, it may give way to the development of other disorders. This study investigates the efficacy of relaxation techniques on insomnia among university students with mild depression. A non-randomized design involving pretest posttest experimental/control group was used. Twenty-four students (treatment = 12; control = 12), with a mean age of 24.6, voluntarily participated in the study. Participants were pretested, and post tested after six weeks of exposure to relaxation technique components, and the data collected was statistically analyzed using JMP 13.2. After adjusting for the covariate, finding suggests a significant effect of relaxation technique  $F(1, 21) = 22.416, p = .000$ , in reducing insomnia among university students. Participants exposed to relaxation technique for insomnia achieved an average of 46% remission compared to 9% for the control group. The study did not find significant differential effect of relaxation technique,  $F(1, 9) = .369, p = .559$ , in reducing insomnia of male compared to female university students. Based on these findings, we conclude that relaxation technique for insomnia is effective in helping students manage their sleep difficulty and this effectiveness is without gender bias.

*Keywords:* insomnia, relaxation techniques, sleep difficulty, sleep hygiene, impairment in functioning

## Introduction

Insomnia is characterized by complaints of difficulty initiating or maintaining sleep, or nonrestorative sleep, which endure for some period and cause significant distress or impairment in functioning. Primary insomnia is characterized by unsatisfactory quantity and/or quality of sleep, which persists for a considerable period and is not a result of a comorbid medical, psychiatric condition or other sleep disorders. Sleep deprivation has short and long-term physiological and psychological consequences, which include decreased quality of life, reduced immunity, impaired cognitive and functional status (Chen, Yu, & Yang, 2008). Estimates of insomnia among students, ranges from approximately 11% to 60% (Gureje, Oladeji, Abiona, Makanjuola, & Esan, 2011; Hicks & Pellegrini, 2001; Lund, Reider, Whiting, & Prichard, 2009), with reports of poor sleep at school lasting for up to 3.5 years (Walsh, Benca, & Bonnet, 1999). Among students diagnosed with insomnia, about 6.8 – 11.4% used medication (either prescription or over the counter) and alcohol as sleep aid to help them sleep (Taylor & Bramoweth, 2010).

Due to uneasiness over the serious negative side effects of sleep medications, considerable research effort has been directed into the search for alternative, nondrug interventions capable of alleviating insomnia. Behavioral strategies such as progressive relaxation, deep breathing exercise, mindfulness, guided visualization meditation, yoga; biofeedback, stimulus control, and paradoxical intention among others are some type of relaxation intervention that have produced promising results. An explanation for the success of such treatment has been provided by Murtagh and Greenwood (1995) who demonstrated that poor sleepers are more physiologically aroused prior to and during sleep than are good sleepers. Studies designed to reduce such arousal through relaxation and desensitization of bedtime-related activity has been reported (Lundh, 2005; Morin, 2002; Alexandru, Robert, Viorel, & Vasile, 2009).

In one study, which attempted to identify more clearly the effect of behavioral strategies, Ahmed and Younis (2014) examined the effect of relaxation techniques on quality of sleep for patients with end-stage renal failure undergoing hemodialysis. The researcher used a convenient sample of 20 adult patients, with one group, before and after intervention. Two tools were used for data collection, which includes socio-demographic data assessment and Pittsburgh Sleep Quality Index that measures the sleep quality. Patients were exposed to four weeks' treatment sessions using progressive muscle relaxation, deep breathing exercise and guided visualization. The main result showed that the relaxation technique improved the total score of sleep quality and its dimensions in hemodialysis patients. It showed that the mean score of total Pittsburgh Sleep Quality Index decreased significantly after demonstration of relaxation techniques compared with the mean score of total Pittsburgh Sleep Quality Index one month before application of relaxation techniques. Ahmed and Younis (2014) recommended that periodic clinical assessment of sleep complaints should become routine for dialysis patients. In addition, non-pharmacological methods such as relaxation techniques should be used for the treatment of sleep problems in hemodialysis patients.

In another study, Deora and Anthony (2013) evaluate the effectiveness of relaxation training and sleep hygiene education for insomnia of depressed patients. The basic study objective was to evaluate whether relaxation training and sleep hygiene education intervention can be effective for female patients who experience major depressive disorder and insomnia. Therefore, a convenience sample of 10 female participants was recruited from an outpatient psychiatric private practice. Participants attended four consecutive, weekly outpatient sessions lasting approximately 1 hour. The initial session consisted of conducting a

psychiatric evaluation and administration of the Pittsburgh Sleep Quality Index to measure rating of sleep quantity and quality. Principles of sleep hygiene and relaxation exercises were introduced during the initial session. Subsequent sessions focused on reinforcement of the principles of sleep hygiene and relaxation training. Results showed that sleep hygiene education and relaxation training were effective in treating insomnia of depressed patients. Deora and Anthony (2013) concluded that Implementation of sleep hygiene education and relaxation training would provide nurses with evidence-based treatment alternatives or complements to pharmacotherapy in depressed patients.

Sleep problems are common concerns for students. Compromised sleep among students can lead to negative personal, social and functional consequences. Students with prolonged sleep problems may report higher levels of anxiety, depressed mood, physical pain and discomfort, poor academic performance and cognitive deficiencies. The condition may also be associated with long-term health consequences, including increased morbidity if left unattended. With its 25% prevalence rate among students in Nigeria, there is the need to address the problem (Gureje et al., 2011). This study sought to assess the efficacy of relaxation technique of insomnia; a behavioural method in treating primary insomnia among male and female students domiciled on the university campus. The long-term benefits were to improve their sleep quality, academic engagement and performance and avoid the risk of dependency and addiction through pharmaceutical approaches.

## **Methods**

### **Research Design**

The study used quasi-experimental design involving pretest posttest control group. This is because the design is useful in study where intervening variables are difficult to control and it enables the researcher to select the desired sample of the study on purpose or based on established criteria or presence of a condition of interest.

### **Participants**

Twenty-four students (Male = 12; female = 12) of Ahmadu Bello University, Zaria, Nigeria who were identified with primary insomnia condition were selected and used for the study. The students were volunteers who have agreed to participate in the study after they were identified with the primary insomnia condition.

### **Outcome Measure**

The primary outcome measure used was Insomnia Severity Index developed by Bastien, Vallieres and Morin (2001), to assess students' insomnia condition before and after intervention. The Insomnia Severity Index (ISI) was designed to be both an identification tool of insomnia severity and an outcome measure for use in insomnia intervention research (Bastien, et al. 2001). The ISI measured subjective insomnia severity during the previous weeks and the measure is relevant for the entire age range (Edinger et al, 2015). The measure included seven questions bothering on sleep onset, sleep maintenance, and consequences. The scores ranged from 0 to 28, and total scores are categorized into "absence of insomnia" (0–7), "sub threshold insomnia" (8–14), "moderate insomnia" (15–21) and "severe insomnia" (22–28). Consistent with Bastien et al. recommendation, a cutoff of  $\geq 8$  (Gellis, Arigo & Elliott, 2013) serves as threshold for participation in the study. Three experts in psychology and counselling department, Ahmadu Bello University, Zaria, established the face validity of the instrument. Morin et al. (2011) reported a reliability index of 0.90 for Insomnia severity index. ISI has also demonstrated 80% sensitivity and specificity (Bastien et al., 2001).

Insomnia research experts, Buysse, Ancoli-Israel, Edinger, Lichstein, and Morin (2006), recommended ISI as a tool for assessment of insomnia.

### **Treatment Regimen**

The treatment regimen was discussed in three phases.

**Pretreatment phase (week 1).** Before administration of instrument, the researcher introduced himself to the research participants and exchange pleasantries to create good rapport. The venue for the weekly intervention was around student's hostel accommodation. After that, the students were briefed on the essence of the study. Consent was obtained from them after which, they filled questionnaire that was used to assess their insomnia severity. Consistent with Bastien et al. recommendation (Gellis et al., 2013), only students who scored  $\geq 8$  on the Insomnia Severity Index (ISI), and showed absence of a sleep disruptive medical/psychiatric condition, substance abuse disorder, and/or other sleep disorder participated in the study. Insomnia Screening Checklist (Alberta Health and Wellness, 2007) was used to assess for absence or presence of comorbid condition. These criteria are consistent with elements of a Diagnostic and Statistics Manual of Mental Disorders (DSM-4 and DSM-5) algorithm for diagnosis of primary insomnia (Lichstein, Durrence, Taylor, & Riedel, 2003; Morin & Espie, 2003; American Psychiatric Association, 2000, 2013; American Academy of Sleep Medicine, 2005). Data collected at this point served as baseline or pretest data, and bases for inclusion. Participants were taught how to fill the instruments, after which arrangements were made regarding further meetings.

**Treatment phase (week 2–5).** Relaxation intervention was applied to the treatment group during this period. The treatments were delivered on Saturdays and intervention sessions which took place during first semester, 2016 lasted for six-weeks. The average time per session was 48 minutes and the ranges were between 30 minutes and 1 hour. The Relaxation Techniques used were based on Ethan (2008), and National Sleep Foundation (2015), recommendations for reducing insomnia respectively.

<b>Week</b>	<b>Relaxation technique</b>	<b>Brief description</b>
2	Deep breathing exercise	It is encouraged such that individual can have a controlled breath that can release tension, worries and control heart rate
3	Progressive relaxation techniques	It involves exercise aimed at inducing a state of deep muscular relaxation as well as helping one to learn the difference between tension and relaxation
4	Guided visualization meditation	GVM was instructed by encouraging positive feelings of peacefulness. The idea in this exercise is to focus your attention on a pleasant image or story, so that your mind can let go of worries or thoughts that keep you awake.
5	Mindfulness technique	It is instructed so that individual can't stop thinking too much once they've gone to bed, and it will help them to learn to calm their mind and do away with racing thoughts and worries.
6	Posttest	Post-test and revision & termination

Table 1: Brief description of treatment administered



After each week of intervention, participants were given handout containing treatment recommendations, to serve as a guide during practice. All treatments instructions were delivered around the participants' hostel at an agreed time and sometimes at a serene location for convenience. To reduce interaction effect, participants in the treatment group and control group came from different hostels. All the interventions were administered with the help of a female research assistant who was briefed on the study protocol. As seen in Table 1, each intervention differs in specific content but, all sessions center around the following main activities: finding out about progress, ascertaining problems in home practice, encouraging level of adherence, and introducing new intervention. The interventions used are those that have been shown efficacious in prior researches and have been recommended by the American Academy of Sleep Medicine for the treatment of insomnia (Morgenthaler, et al. 2006).

**Post-treatment phase (week 6).** During this phase, a post intervention test using the Insomnia Severity Index was administered. This was used to compare with pretest data to examine changes that occurred over the course of the intervention. At the last count, attrition rate from both groups was found to be 0% as all participants who participated in the study also, completed it. The reasons for this might not be unconnected to the fact that intervention took place around the participant's hostel and their sustained interest in the study. However, before termination, the researcher informed the participants on what to do when there is a relapse (fall back to the treatment handout). Finally, the participants were made to understand that longitudinal data suggests that treatment gains are extremely durable with time. They are most often maintained or improved over time and that relapse rates will be small provided they continue good habits (abstain from things that precipitate and perpetuate the condition in the first place).

For ethical reason, participants in the control group were given the treatment handout containing systematic implementation of the intervention for self-help at the completion of the study. The reason is to ensure that they also benefit from the treatment, and not being used and dumped to keep suffering from the problem. This method of self-help using relaxation technique has been shown to produce considerable benefits for insomnia sufferers.

## Results

The data collected were statistically analyzed using a computer software: JMP ver. 13.2. The study used ANCOVA to test for treatment effects. ANCOVA is applicable when two or more groups are subjected to pre-test and post-test while the pre-test is treated as a covariate to "control" for pre-existing differences between the groups (Stevens, 1996; Tabachnick & Fidell, 2013). However, prior to testing the treatment effects, a test of assumption of homogeneity of regression slope was carried out [see figure 1]. A .05 criterion of statistical significance was used in testing the treatment effect.

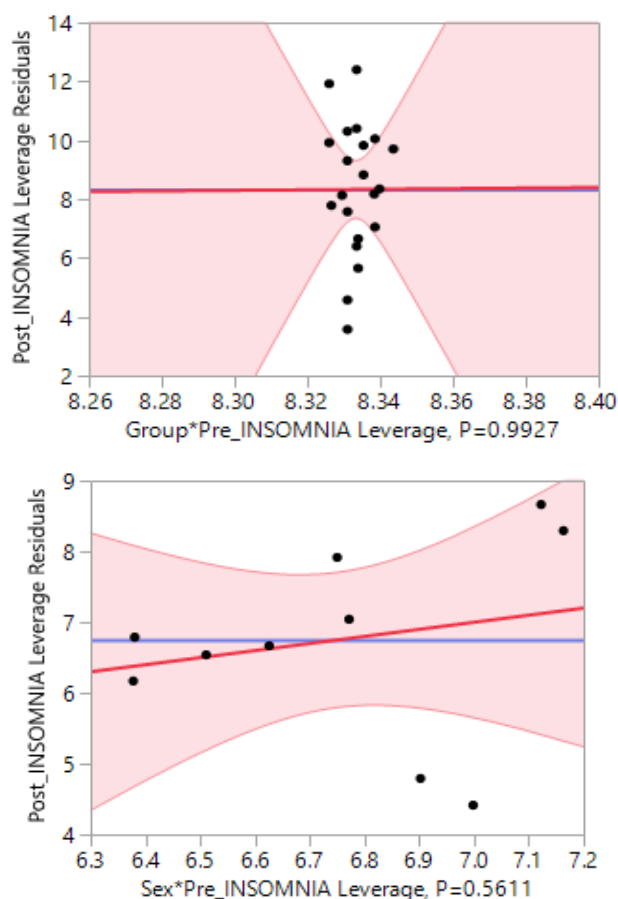


Figure 1: Leverage plot for Pre\_insomnia\*Group and Pre\_insomnia\*Sex testing the homogeneity of regression slope assumption

Figure 1 showed the analysis of covariance (ANCOVA) assumption test, which requires that, the relationship between the covariate and dependent variable for each of the groups is the same. Usually, similar slopes on the regression line for each group indicate this. Unequal slopes would indicate that there is an interaction between the covariate and the group. If there is an interaction then the results of ANCOVA could be misleading (Stevens, 1996; Tabachnick & Fidell, 2013). In this study, the interaction of Pre\_insomnia\*Group is not significant,  $p = .9927$ . The interaction of Pre\_insomnia\*Sex is also not significant,  $p = .5611$ . The results therefore support the appropriateness of the use of ANCOVA in analyzing the data for the study.

Level		<i>Least Sq Mean</i>	<i>Std Error</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Pre-insomnia	Treatment Group	12.416	0.679	11.007	13.825
	Control Group	10.916	0.679	9.5078	12.325
Post-insomnia	Treatment Group	6.750	0.643	5.416	8.083
	Control Group	9.916	0.643	8.583	11.250

N (RE) = 12; N (CTL) =12

Table 2: Pre and post mean response of treatment Group and Control Group

Table 2 shows the pretest and posttest mean scores of participants in the intervention group and control group. It reveals that at pretest, students assigned to receive relaxation technique for insomnia had a higher mean score ( $12.42 \pm 0.679$ ; 95%CI = 11.007 – 13.825) when compared to students in the control group ( $10.92 \pm 0.679$ ; 95%CI = 9.5078 – 12.325). However, after treatment, students in the intervention group had a mean score lower ( $6.75 \pm 0.643$ ; 95%CI = 5.416 – 8.083) than control group ( $9.92 \pm 0.643$ ; 95%CI = 8.583 – 11.250). This outcome suggests that the intervention has an effect with treatment group having a better within group average remission rate of 45.6% when compared to 9.2% for the control group.

<i>Source</i>	<i>Sum of Squares</i>	<i>Df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Model	63.844 <sup>a</sup>	2	31.922	6.355	.007*
Error	105.489	21	5.023		
C Total	169.333	23			

*a. R Squared = .377 (Adjusted R Squared = .318)*

Table 3: One-way analysis of covariance showing model effects

Table 3 shows a one-way analysis of covariance (ANCOVA) which was used to compare the effectiveness of relaxation technique designed to reduce participants' insomnia condition against a control group. The test was carried out with participants' pretest scores on Insomnia Severity Index used as the covariate. The model was found to be statistically significant,  $F(2, 21) = 6.355$ ,  $p = 0.007$ ; RMSE = 2.241, implying differential effects of relaxation technique in reducing insomnia between the two groups. The overall model was found to explain 37.7% variance.

<i>Term</i>	<i>Estimate</i>	<i>Std Error</i>	<i>t Ratio</i>	<i>Prob&gt; t </i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	6.306	2.413	2.61	0.016*	1.289	11.324
Group [RE]	-1.714	0.482	-3.55	0.002*	-2.716	-0.711
Group [CTL]	1.714	0.482	3.55	0.002*	0.711	2.716
Pre_INSOMNIA	0.174	0.203	0.86	0.402	-0.248	0.596

Table 4: Expanded Estimates Nominal factors expanded to all levels [treatment vs control]

Table 4 showed the expanded estimates nominal factors expanded to all levels. It showed that pretreatment outcome did not significantly influence the later outcome of the study,  $\beta = 0.174$  [95%CI = -0.248 - 0.596],  $t = 0.86$ ,  $p = 0.402$ . The relaxation intervention was significantly effective for the participants in the treatment group,  $\beta = -1.714$  [95%CI = -2.716 – -0.711],  $t = -3.55$ ,  $p < .001$  compared to those in the control group,  $\beta = 1.714$  [95%CI = 0.711 – 2.716],  $t = 3.55$ ,  $p < .001$ . Participants in the treatment group had higher reduction in their insomnia condition than did those in the control group. To have a graphical view of the differential effects of the intervention after six weeks, a leverage plot for group was presented [see figure 2].

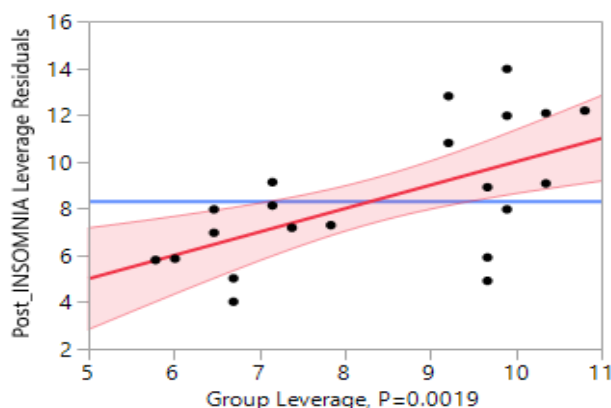


Figure 2: A Leverage Plot for Group showing graphical view of the differential effects of the relaxation techniques of insomnia among undergraduate students

Level		Least Sq Mean	Std Error	Lower 95%	Upper 95%
Pre-insomnia	Male	14.000	0.883	12.031	15.968
	Female	10.833	0.883	8.864	12.801
Post-insomnia	Male	6.833	0.579	5.541	8.125
	Female	6.666	0.579	5.374	7.958

N (M) = 6; N (F) = 6

Table 5. Pre and post mean response of male and female participants in the treatment Group

Table 5 shows the pre-intervention and post intervention mean scores of male and female participants exposed to relaxation technique for insomnia. It reveals that at pretreatment stage, male subjects assigned to receive relaxation technique for insomnia had a higher mean score ( $14.00 \pm 0.883$ ; 95%CI = 12.031 – 15.968) when compared to female subjects ( $10.83 \pm 0.883$ ; 95%CI = 8.864 – 12.801). However, after treatment, male subjects exposed to relaxation technique for insomnia had a mean score higher ( $6.83 \pm 0.579$ ; 95%CI = 5.541 – 8.125) than their female counterpart ( $6.67 \pm 0.579$ ; 95%CI = 5.374 – 7.958). This outcome suggests a better average remission rate of 51.2% for the male subjects when compared to 38.4% for female subjects.

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2.989	2	1.495	0.779	0.487
Error	17.260	9	1.918		
Corrected Total	20.250	11			

a.  $R^2 = .148$  (Adjusted  $R^2 = -.042$ )

Table 6: One-way analysis of covariance showing model effects by sex

Table 6 shows a one-way between-group analysis of covariance test, which sought to compare the responsiveness between male and female participants exposed to relaxation technique for insomnia. After adjusting for the pretest scores, the result of the analysis suggests there was no statistically significant variation between male and female students'

responsiveness to relaxation technique intervention for insomnia,  $F(2, 9) = .779$ ,  $p = 0.487$ ,  $RMSE = 1.384$ . The R Squared value of .148 indicates that only 14.8% of the variance in post intervention scores can be explained by gender after adjusting for covariate. The non-significant between group outcomes suggests that male and female responsiveness to relaxation technique for insomnia was the same as both groups show good level of improvements after intervention.

## Discussion

The findings of this study reveal that there is a significant positive effect of relaxation technique in reducing insomnia among university students in Nigeria. When compared to control group, the result suggests that subjects exposed to relaxation techniques show significant improvement with a higher between and within group remission rate. This outcome corroborates previous findings by Ahmed and Younis (2014), who reported that relaxation technique improved the total score of sleep quality. Their result showed that the mean score of total Pittsburgh Sleep Quality Index decreased significantly after demonstration of relaxation techniques compared with the mean scores of total Pittsburgh Sleep Quality Index one month before application of relaxation techniques. It also corroborates results presented by Deora and Anthony (2013), which showed that Sleep hygiene education (SHE) and relaxation training were effective in treating insomnia of depressed patients. Therefore, Deora and Anthony (2013) concluded that Implementation of sleep hygiene education and relaxation training would provide nurses with evidence-based treatment alternatives or complements to pharmacotherapy in depressed patients.

No significant differences between male and female university students in Zaria were found using relaxation techniques. The technique was as effective in improving insomnia condition for the male subjects as for the female subjects. The finding although agrees with Lami, et al. (2016), report in their study on “Gender Differences in Patients with Fibromyalgia Undergoing Cognitive-Behavioral Therapy for Insomnia”, that both groups showed significant improvements in sleep quality, and also other researchers (e.g., Edinger et al. 2001; 2009; Fornal-Pawłowska & Szelenerger, 2013) who reported significant improvement in all sleep parameters at post intervention for both male and female subjects exposed to cognitive behaviour technique, and relaxation exercise (Ahmed & Younis, 2014; Deora & Anthony, 2013), it differ with Lami et al. (2016) findings which reported a differential treatment response between sexes. Male group exhibited significant changes at post-treatment in sleep disturbances compared to the female. A claim this study could not establish. One reason could be the small sample size of six males and six females used. Usually, smaller sample have lower tendency or power of detecting significant effect. Other reasons could be severity of the insomnia condition of the participants. Most of them have subthreshold to moderately severe level of insomnia, which is quite different from the chronic or very severe insomniac participants used by Lami et al. (2016). In addition, while Lami et al. study was on comorbid insomnia, this study was conducted on students with primary sleep complain. Another reason could the use of a female trainer who was involved in delivering the treatment package. The study has several limitations. It relied on self-reported measures of insomnia from student participants instead of objective measure. In addition, the study did not question the participant’s employment status and family wellbeing, all of which may be related to having sleep difficulty. Using individual rather than group intervention may yield improved result since every participant would be given adequate attention. The fact that these factors were not taken care of is a limitation of this study. Based on these limitations, we therefore state categorically that causal connections implied by the conclusions of this study

should be interpreted and taken with carefulness. It is hope that continued research among university student sample will address the study limitations to reveal actual causal mechanisms and help researchers and policymakers to better understand the health risks of insomnia among students with a view to help students with sleep difficulties regain control over their sleep and consequently improve their learning outcome.

## **Conclusion**

Up to two-thirds of students in Nigerian universities have sleep problems (Victor & Abdulwahid, 2018). Without proper care, many may have severe insomnia that interferes with functioning. In addition, a significant number of them are reluctant to report their sleep difficulties without being prompted. School psychologists and counselors should ask students about sleep problems as part of routine attention. As suggested by the outcome of this study, when insomnia endures, the intervention of choice is relaxation technique. Six weeks intervention using relaxation techniques successfully leads to sleep improvements and reduces insomnia by 46% among university students' sample, without gender bias. Based on previous studies, this gain can be sustained by the patient long after the intervention terminates so long the patient maintains good habit.

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## **A Brief Review of Addictive Tendencies Related to Technology Use: Conceptualization, Treatment, and Future Directions**

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### **Abstract**

Addictive tendencies relating to technology use entail the overuse and misuse of physical and digital devices to the point of maladjustment. Such tendencies, which can arise from video game use, mobile phone use, Internet use, and media streaming/television use, have major implications regarding people's physiological and psychological states. Although prior research helped with the conceptual and empirical understanding of technology use, these had major limitations. Such limitations included inconsistent terminology (e.g., technology use disorder versus technological addictions), a lack of standardized criteria to diagnose or recognize addictive tendencies of technology use, differences in methodology (e.g., longitudinal studies, experimental studies, case studies, correlational studies), and construct proliferation (e.g., smartphone addiction, young adult attachment to phone). In addition, little research has been conducted regarding the effectiveness of treatments (e.g., psychopharmacological treatments) for tendencies of technology use. Studies regarding treatment efficacy have primarily been limited to case studies with small sample sizes. Ultimately, it is recommended that researchers form a unified front to address these addictive tendencies through consistent theoretical models, research, and criteria.

*Keywords:* technology use, video games, mobile phones, Internet, addictive behavior, mental health

## Introduction

Technology has long served as a vital aspect of human existence, from the invention of the wheel to the Industrial Revolution. In present times, technology exists in everyday life with video games, the Internet, and mobile phones used by millions (Kuss & Billieux, 2014). Although aspects of technology have noted benefits, such as increasing happiness, it can also be addictive and contribute to psychological maladjustment (Davis & Pimpleton-Gray, 2017). Recent theory and research have addressed addictive tendencies related to technology, once referred to as technological addictions (Griffiths, 1995). This is one type of non-substance-related addictive tendencies, occasionally featured in journals such as *Journal of Behavioral Addictions* and *Addictive Behaviors* (e.g., Kuss & Billieux, 2014; Young, 2013).

However, debates are ongoing regarding the degree to which addictive tendencies of technology use should be addressed. For example, the scientific community had mixed reactions when the American Psychiatric Association (APA, 2013) proposed Internet gaming disorder as a condition for further study in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). This was also the case for the scientific community and the gaming community when the World Health Organization (WHO, 2018) established gaming disorder as an official diagnosis for inclusion in its upcoming revision of the International Classification of Diseases (ICD-11). Much of the controversy addressed by both communities involve broad criteria, inconsistent data, and the risk of marginalizing gamers via misdiagnosing and excessively diagnosing (Aarseth et al., 2017; Chen, 2018; Sarkar, 2018). Such concerns were intended to raise awareness that not all instances of technology use are problematic. Additionally, little research has been conducted to observe the impact and effectiveness of treatments for addictive tendencies of technology use that warrant clinical concern; this is especially the case for psychotropic medications, with prior research primarily limited to a few case studies of individuals with addictive tendencies toward Internet use and video games (Huang, Li, & Tao, 2010).

The purpose of this conceptual paper is to provide a brief overview of prior research regarding the potential effects of technology use on people's psychological and physiological processes (e.g., addictive tendencies). It is also important to recognize the lack of consensus on methodological approaches, clinical treatments, and societal implications within the study of technology use. This discourages the use of a meta-analysis at this time. Instead, it is a critical time to ask important questions about this matter. Should one distinguish between addictive tendencies related to technology and a formal diagnosis of technology use disorder? Where should one draw the line between the two when considering "persistent and recurrent...behavior leading to clinically significant impairment or distress?" (APA, 2013, p. 585). What types of technology should be considered? What types of treatments would be of benefit to people with such tendencies? It is paramount to ask these questions while reflecting on prior theory and research related to addictive tendencies of technology use.

## Addiction, Addictive Behaviors, and Addictive Tendencies

Historically, the concept of addiction has been traditionally studied in the context of substance use (Glickstein, 2017). Although it has been referred to by different names (e.g., addiction, addictive behaviors, addictive tendencies), the phrase "addictive tendencies" will mostly be used in this conceptual paper. It has been described as creating emotional highs, misguided logic, and predictable behaviors that entail the avoidance of issues such as stress (Goeders, 2009; Nakken, 1996). Physiological features have also been researched, such as the

impact of substances (e.g., alcohol) on the brain (Crombag & Robinson, 2009). For example, such substances commonly share the characteristic of activating the brain's reward neural circuitry when excessively used (APA, 2013; Koob & Moal, 2005). The impact of withdrawal from said substances is also of great interest to researchers and clinicians (Baker, Japuntich, Hogle, McCarthy, & Curtin, 2009; Garb, 2010).

### **Substance Use Disorders and Non-Substance-Related Disorders**

In the context of clinical diagnoses, the DSM-5 recognizes 10 classes of substances (e.g., opioids) that can contribute to the presence of substance-related and addictive disorders; the APA intentionally refrained from using the word “addiction” due to its negative connotation (APA, 2013). The diagnostic criteria address issues related to “impaired control, social impairment, risky use, and pharmacological criteria” (APA, 2013, p. 483). With impaired control, people may spend a substantial amount of time obtaining a substance while also regretting it and attempting to refrain from it. With social impairment, people's obligations within society (e.g., work) and their miscellaneous activities may be unfulfilled and abandoned because of substance use. Likewise, their interpersonal relationships may be impeded by their substance use. With risky use, physiological and psychological issues may arise due to persistent substance use and dangerous ways in which a substance is used. With pharmacological criteria, issues related to tolerance and withdrawal may arise due to extended substance use (APA, 2013).

In contrast, the DSM-5 officially recognizes just one non-substance-related disorder because it deemed current data on the matter to be adequately consistent: gambling disorder (APA, 2013). It features certain diagnostic criteria comparable to that of substance use disorders; interpersonal relationships can be impeded (i.e., social impairment), and restlessness and irritability can arise when attempting to quit (i.e., impaired control). However, in contrast to requiring broad issues related to interpersonal relationships, gambling disorder includes criteria that specifically involves risking or losing relationships or jobs. Furthermore, it requires that gambling behaviors not be part of or better explained by a manic episode (APA, 2013).

### **Conceptualization of Addictive Tendencies Related to Technology Use**

Despite much progress being made within research on addictive tendencies, there is continued debate regarding its focus. This includes the focus of addictive tendencies beyond the scope of formal diagnoses (Ingersoll & Rak, 2016). In addition to non-clinical studies of gambling (Grant, Potenza, Weinstein, & Gorelick, 2010; Taormina & Chong, 2015), various academic journals feature research studies that address addictive behaviors not formally recognized as disorders. This includes within the context of technology use.

### **Clinical and Non-Clinical Paradigms**

In modern times, interest in research regarding the overuse and misuse of technology has increased. Broad umbrella phrases created by researchers have attempted to capture this concept. This includes technological addictions (Griffiths, 1995) and technology use disorders (Laboratory for Experimental Psychopathology, 2018). Broadly, addictive tendencies relating to technology use entail interacting with physical and digital devices in ways comparable to that of substance use and gambling. Such tendencies include salience,

euphoria, tolerance to excessive amounts of time with technology, and withdrawal when time cannot be spent using technology (Griffiths, 1995; Nakken, 1996).

It should be noted, however, that there is no formal recognition of technology use as an all-encompassing clinical diagnosis that addresses addictive tendencies relating to technology in general. Furthermore, not all instances of technology use are maladaptive and of clinical concern. Nonetheless, it may be of interest to broadly consider examples of how the substance-related and addictive disorders' diagnostic criteria (APA, 2013) may present within the context of maladaptive technology use. Impaired control could potentially contribute to individuals struggling to curb their technology-related spending (e.g., microtransactions in video games; King & Delfabbro, 2019), as well as struggling to be without such technology for extended periods of time (e.g., nomophobia; Yildirim & Correia, 2015). Social impairment may potentially contribute to individuals being unable to communicate with others in-person or ignoring those around them in favor of technology (e.g., phubbing; Balta, Emirtekin, Kircaburun, & Griffiths, 2018). Risky use may include using technology while in dangerous situations (e.g., playing on the mobile phone app *Pokémon GO* while driving; Faccio & McConnell, 2018). Finally, pharmacological concerns may contribute to increases in obesity and decreases in sleep as a result of keeping more food nearby during prolonged technology use (e.g., within children and adolescents; Robinson et al., 2017).

However, these relationships are limited in scope and may be more correlational than causal. Nonetheless, although the literature is still fairly new and exploratory in nature, possible demographic trends and potential predictors have been observed. For example, the results of one study suggested that addictive tendencies of Internet use (i.e., "Internet addiction") may present more often in people who report higher scores of external loci of control and shyness. This may also be the case for full-time college students, due to open access and time management issues (Chak & Leung, 2004). Furthermore, younger age and a male gender identity have been observed as potential demographic predictors of higher addictive tendencies of video game use (i.e., "Internet gaming disorder"). Higher tendencies of depression, social isolation, impulsivity, and attention problems may also relate, as do decreases in gray matter (Petry, Rehbein, Ko, & O'Brien, 2015). This is further supported in other research that has suggested addictive tendencies of video game use, Internet use, and mobile phone use all significantly predict decreases in social connectedness (Savci & Aysan, 2017). Lastly, various samples in different countries have been studied and have found comparable addictive tendencies (e.g., Shao et al., 2018). However, as mentioned previously, further research must be conducted.

## Types of Technology Use

Ultimately, there is an inadequate amount of consistent theory, research, and application regarding the topic of technology use. This has resulted in contentious debates about the matter (e.g., Aarseth et al., 2017). Despite such concerns, gaming disorder (i.e., addictive tendencies specifically relating to video game use) is an expected addition to the upcoming ICD-11 (WHO, 2018). Reflecting on different types of technology that have been subjected to the potential of addictive tendencies may help steer the dialogue within debates on the matter. Examples of potential sources that warrant consideration include video games, the Internet, mobile phones, and video streaming/television. Given the differences between these pieces of technology, it is important to examine theoretical backgrounds and empirical research relating to each.

## Video Game Use

Video games as a mainstream aspect of society emerged during the 1970s with the introduction of the game *Pong* on home video game consoles. Since then, video games have appeared in the homes and pockets of millions of people (Smithsonian Institute, n.d.). Anecdotally, gaming increasingly became accepted and valued by the public; in recent years, some parents have hired tutors to improve their children's game play in hope of increasing college scholarship and e-sport career opportunities (e.g., the video game *Fortnite*; Fagan, 2018). Video games have also inspired the creation of digital communities within media platforms (e.g., YouTube channels, Twitch livestreaming) that are dedicated to watching people play games (Bowles, 2018; Sjöblom & Hamari, 2017). Some people have even found love as a result of online game play (Smith, 2010).

Positive effects of gaming have also been empirically researched, although such research has been overshadowed in comparison to research on negative effects (Segev et al., 2016). For instance, prior research investigated whether playing video games correlate to increases in tendencies of hyperactivity/inattention and low self-esteem (Wartberg, Kriston, Zieglmeier, Lincoln, & Kammerl, 2018). Video games have also been studied in the context of aggression, with some researchers observing potential neural markers of desensitization to violence in video games (Engelhardt, Bartholow, Kerr, & Bushman, 2011). Aggression research shifted in this direction in an attempt to understand the psychology behind increased acts of violence which ensued at various schools throughout the United States (e.g., school shootings; Wofford, 2015). However, violent video game research is largely controversial and continues to be debated (Ferguson, 2015). Political biases have potentially impeded research in academia and debates regarding gun rights, prompting meta-analyses and public commentaries (Anderson, 2018; Ferguson, 2007; Lishner, Groves, & Chrobak, 2015; Segev et al., 2016).

Video games' addictive properties have been researched, as well. This includes the inability to control excessive gaming, fantasizing about gaming, irritability and restlessness about not being able to play, and the ignoring of biological needs in extreme cases (Király, Griffiths, & Demetrovics, 2015). Certain physiological effects have also been found among certain samples, including "poorer response-inhibition and emotion regulation, impaired prefrontal cortex (PFC) functioning and cognitive control, poorer working memory and decision-making capabilities, decreased visual and auditory functioning, and a deficiency in their neuronal reward system, similar to those found in individuals with substance-related addictions" (Kuss, Pontes, & Griffiths, 2018, n.p.). Within children, specifically, some research noted alterations to gray and white matter within the brain; comparably to substance use disorders, such alterations may contribute to reduced impulse control, motor control, perception, memory, and emotion regulation (Weinstein & Lejoyeux, 2015). Furthermore, prolonged use by children may correlate with cortical thickness and changes within the salience network of the brain, which can impact attention and decision making (Han, Kim, Bae, Renshaw, & Anderson, 2015; Kühn et al., 2014).

Despite advances in empirical knowledge related to video games and its potential addictive tendencies, the methodology used has been inconsistent. Although proposed criteria for gaming disorder exists within the DSM-5 (APA, 2013) and the upcoming ICD-11 (WHO, 2018), there is a notable lack of formal, established criteria on which researchers can base their studies (King & Delfabbro, 2014). The WHO (2018) noted that to receive such a diagnosis, "the behaviour pattern must be of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of

functioning and would normally have been evident for at least 12 months” (n.p.). In contrast, the DSM-5 detailed a blend of more detailed criteria from substance use disorders and non-substance-related disorders; this included withdrawal symptoms and tolerance, as well as social impairment and impaired control (APA, 2013). Furthermore, the APA (2013) mentioned that Internet use disorder and gaming disorder have been interchangeably used. This may not be a proper representation of the literature, given that video gaming can occur offline and that Internet use encompasses a variety of activities unrelated to gaming (e.g., accessing social media). Ultimately, as noted by Aarseth and company (2017), the data may be insufficient to warrant the creation of a clinical diagnosis at this time. However, it will be important to study such matters further by engaging in continuous, consistent research.

### **Mobile Phone Use**

Mainstream use of mobile phones emerged during the 1990s to 2000s, allowing people to call and text message people wherever they are at whatever time they want. This was a major shift for telecommunications, after decades of being restricted to landlines (Baym, 2016; Ray, 2015). Like with any technological device, though, pros and cons can be noted. In the context of addictive tendencies, the earliest of research suggested the potential for mobile phone use to become problematic to the extent of texting while driving, cyberbullying, and maladjustment (Bianchi & Phillips, 2005). However, conflicting results have emerged in other studies; one study found a lack of significant association between mobile phone overuse and tendencies of substance use (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007).

Telecommunications were once again revolutionized with the production of smartphones, such as the Apple iPhone (Ray, 2015). Since then, mobile phone use massively increased (Pew Research Center, 2018). Research regarding mobile phone use also increased, but a series of issues arose as a result. A lack of agreement regarding the focus and direction of research regarding addictive tendencies related to mobile phones created potential instances of construct proliferation (see Shaffer, DeGeest, & Li, 2016). In other words, multiple researchers have created different measures of what is ultimately the same concept: addictive tendencies relating to mobile phone use (Billieux, 2012). Examples include self-report surveys that measure smartphone addiction (Kwon et al., 2013; Lin et al., 2014), smartphone dependency (Chen, 2015), and young adult attachment to phone (Trub & Barbot, 2016). Additionally, different scales have been created for different subjects, such as the Problematic Mobile Phone Use Scale for Turkish adolescents (Güzeller & Coşguner, 2012) and the Mobile Phone Use Scale for university students (Pamuk & Altı, 2016).

These constructs share consistent themes related to anxiety about being away from mobile phones, dependency and attachment, and maladjustment in people’s everyday lives. This is supported within the literature; for example, one study by Ching and Tak (2017) found significant relationships between parenting style, attachment style, self-regulation, and addictive tendencies relating to smartphone use within a sample of university students in Hong Kong. Via structural equation modeling, the parenting style perceivably received by participants (e.g., authoritative style) positively correlated with participants’ attachment style (e.g., secure attachment), which positively correlated with their tendencies of self-regulation (e.g., impulse control). Tendencies of self-regulation, meanwhile, negatively correlated with addictive tendencies of smartphone use (e.g., overuse; Ching and Tak, 2017). Nonetheless, the literature remains largely inconclusive. Researchers should be conscious of presently existing conceptual models (e.g., biomedical versus biopsychosocial) and inconsistent methods of measurement when conducting future research (Kuss & Billieux, 2016).



## **Internet Use**

The Internet reached mainstream usage in the 1990s, setting the stage for worldwide connectivity (Baym, 2016; Leiner et al., 1997). Although it can contribute to positive feelings, the Internet can be a digital platform on which psychological maladjustment develops among its users (Davis & Pimpleton-Gray, 2017). As people increasingly began to use computers and the Internet, concern about addictive behaviors emerged (Griffiths, 1995). One significant component of Internet use in modern day is social media, allowing for people to digitally connect with one another; it can reconnect people who have not encountered one another in years, and it can bring together people who have never met and never will (Van Dijck, 2013). The rise of social media has prompted a continuing debate regarding its impact on people's lives (Marino, 2018; Twenge, Joiner, Martin, & Rogers, 2018).

Addictive tendencies of Internet use have been empirically investigated in a variety of contexts. Various samples have been studied, including medical students (Zhang, Lim, Lee, & Ho, 2017), college students in China (Shao et al., 2018), and adolescents in South Korea (Choi, Chun, Lee, Han, & Park, 2018). Past research indicated that as tendencies of shyness increase, addictive tendencies of Internet use increase to reduce feelings of loneliness (Ang, Chan, & Lee, 2017). Additionally, in comparison to other types of non-substance-related addictive tendencies, possible relationships exist between fatigue, impulse control, and addictive tendencies of Internet use (Bener et al., 2018; Othman, Lee, & Kueh, 2017).

Comparably to research on addictive tendencies of video game use and mobile phone use, research on Internet use has been limited. Although Internet use disorder was considered for inclusion as a behavioral addiction in the DSM-5 (APA, 2013), the research was ultimately deemed inconclusive and was therefore excluded (Huang et al., 2010; Kuss & Billieux, 2016). Comparable to research about mobile phones, construct proliferation is present in the form of different but similar constructs. Such constructs include Internet addiction, pathological Internet use, and problematic Internet use. Sampling and assessment methods have also greatly varied (Huang et al., 2010). Ultimately, further research is warranted to determine whether addictive tendencies related to Internet use can eventually be classified formally.

## **Media Streaming and Television Use**

Comparable to the welcoming of video game consoles into the home, humanity welcomed the projection of pre-recorded media in the form of television. This small screen revolution engrossed people, having previously experienced entertainment by attending theaters and by listening to their radios. Regularly, people follow the lives of fictional characters and real-life celebrities through television series plots and (theoretically) unscripted activities (Thompson & Allen, 2017). This was further revolutionized by media streaming, in which people could access such media on even smaller screens (e.g., mobile phones). With the introduction of media streaming services such as Netflix, people no longer had to wait for regularly scheduled broadcasting (Kang, 2015). Instead, they could access media at their convenience whenever and wherever; this introduced the phenomenon of binge-watching, in which episodes (and even seasons) of shows are watched consecutively; given the negative connotations, media streaming services have attempted to distance themselves from such terminology (Lynch, 2018).

Although it is less researched in terms of addictive tendencies, media streaming and television use should briefly be recognized as another possible source of future directions in research. Limited previously to anecdotal support, the topic expanded in the 1990s. It has

since covered biological, psychological, and sociological correlates (McIlwraith, 1998). A review of the literature found potential correlations with social biases, academic impairment, insomnia, lower life satisfaction, and obesity. In addition, potential relationships were found between television use/media streaming and addictive tendencies related to alcohol use, gambling, and Internet use (Sussman & Moran, 2013).

It is apparent that addictive tendencies related to technology use have been empirically investigated in multiple ways and using multiple constructs. Theoretically, any given piece of technology can contribute to addictive behaviors, and prior research has attempted to encompass as much as possible. This is comparable to the DSM-5 featuring multiple substances within its substance use disorders (APA, 2013). If a substantial amount of research were to support the creation of technology use disorders as a non-substance-related disorder, disorders such as Internet use disorder and gaming disorder could eventually be recognized as formal clinical diagnoses. As the WHO (2018) noted, only a small amount of the population would classify as having gaming disorder. However, debates remain ongoing regarding the risk of misdiagnosing and excessively diagnosing such a disorder (Aarseth et al., 2017).

The informal recognition of addictive tendencies relating to technology use also warrants further research. Internet use and gaming are commonplace in the lives of millions, so its potential non-clinical effects and correlates are just as important. For instance, consideration regarding whether certain terminology should encompass various pieces of technology. Sussman and Moran (2013), in a footnote, mentioned “screen addiction” as a theoretical encompassing of video game use, social networking, and texting; they, however, acknowledge that this was hypothetical and beyond the scope of their literature review at the time. A thorough meta-analysis may help enlighten the field, after an adequate amount of research is conducted.

### **Treatment of Addictive Tendencies Related to Technology Use**

In addition to the need for broader research on technology use, the need for research on potential treatments is notable given that many people seek clinical treatment for having these tendencies (King, Delfabbro, & Griffiths, 2012). Research on addictive tendencies related to technology use is in its infancy (Griffiths, 1995), and research on potential treatments is even newer. Studies about addictive tendencies like gambling have suggested neurobiological changes in the brain comparable to that of people who are addicted to substances (Kuss & Billieux, 2016). Likewise, there are comparable behavioral and psychological properties between the two (Nakken, 1996). As a result, some research suggests the possibility that treatments for substance use may be successful in cases of non-substance-related addictive tendencies; this includes technology use (Kuss & Billieux, 2016). Examples of treatments include psychotropic medications (King et al., 2012) and therapy (Young, 2007).

Although there are instances of empirical support for using psychopharmacological treatments, there are noteworthy limitations due to the lack of studies about their effectiveness in the context of technology use. Such research has primarily been conducted as case studies of individuals with addictive tendencies of Internet use and gaming disorder. These case studies provided exploratory support of selective serotonin reuptake inhibitors (SSRIs) and naltrexone (i.e., Vivitrol) helping alleviate such tendencies (Huang et al., 2010). This is particularly enlightening, since naltrexone is traditionally used to treat alcohol use and opioid use (Substance Abuse and Mental Health Services Administration, 2016). Studies that

used bupropion (i.e., Wellbutrin) and methylphenidate (i.e., Ritalin) for treatment of gaming disorder, meanwhile, yielded conflicting results. In one study, no significant differences were found between the success of treatment using psychotropics versus therapy (King & Delfabbro, 2014); in contrast, Weinstein and Lojoyeux (2015) found that their sample not only saw improvements in their mood but also saw significant reductions in the amount of time they played video games.

These contradictory results should be of little surprise, given the methodological limitations present within the studies. Few studies have been conducted up to this point regarding psychotropic treatments (Huang et al., 2010). Also, sample sizes were too small within those studies to adequately reflect the intended population of interest (King et al., 2012). Additionally, it could be argued that the population of interest is presently unknown. Without clear and consistent criteria for different types of technology use, establishing treatments for those with addictive tendencies may remain challenging (Kuss & Billieux, 2016).

Therapeutic treatments have also been researched but with similar limitations to that of research on psychopharmacological treatments. In a case study by Graham (2014), narrative therapy was implemented during sessions with an academically advanced teenage boy who presented with social anxiety and excessive video game use. He increasingly fell behind in schoolwork and lacked confidence in the real world, whereas he was able to recognize his strengths in the gaming world. Using narrative therapy, the counselor and the client were able to craft the story of the client and his perceptions of lacking control socially. He was able to tell a story about a time in which he felt a sense of control and confidence in his abilities during game play, and through ongoing sessions, he was able to eventually shift those strengths into his real life. This approach avoided the portrayal of video game use as a problem and instead built upon the client's positive traits that were underutilized in the real world but were fully utilized in the gaming world (Graham, 2014). Given the anecdotal support of successful treatment, future studies that utilized narrative therapy would be of benefit to observe whether this is the case with other adolescents.

Other studies have indicated support for cognitive behavioral therapy (CBT) as a treatment method for addictive tendencies related to Internet use. In one study, adults who received CBT were able to manage their Internet use after six sessions and were able to continue doing so six months after completing treatment (Young, 2007). From this research emerged a specialized form of CBT: cognitive behavioral therapy for Internet addiction (CBT-IA). Comparable results were found, in which clients saw significant reductions in their addictive tendencies after twelve weeks and maintained their management of such usage six months after completing their sessions (Young, 2013). Ultimately, as with research on psychopharmacological treatments, more must be conducted. This should include research on treatments relating to other forms of technology use, as well as replication studies and studies using different types of samples.

### **Future Directions of Addictive Tendencies Related to Technology Use**

Researchers and clinicians have spent several decades studying addictive tendencies relating to technology use in a variety of manners, whether problematic or otherwise. This includes different types of studies, different types of focuses, and different types of samples. Certainly, researchers and clinicians should be commended for their contributions to the literature. Nonetheless, it is worth considering potential future directions to advance the literature even further. As mentioned previously, it is also recommended that meta-analyses be conducted

about technology use in general and types of treatments for technology use; this, of course, is after an adequate amount of research has been conducted. Although the purpose of the present manuscript was to provide a brief review of prior research, it was not done using empirical methods.

After more research is conducted, and after meta-analyses are conducted to observe potential commonalities among research studies, it will be important for researchers to form a unified front to thoroughly address the addictive side of technology use. Such addictive tendencies have the potential to create a serious health care problem and thus warrants better understanding (Pontes, Kuss, & Griffiths, 2015). Ideally, consistent criteria for diagnosing such addictive tendencies should eventually be established. More studies about treatments will also be paramount, potentially warranting additional training for researchers and clinicians.

Associations for clinicians and researchers in mental health-related fields promote ethical guidelines that require an appropriate understanding of issues that people experience (e.g., the American Psychological Association, the American Counseling Association, the National Association of Social Workers). This has included education and training about issues relating to diversity and social justice, and it should also include addictive tendencies related to technology use. As part of this ideal pursuit of knowledge, task forces and research grants should be established. By promoting a plethora of research that increases understanding and better training, the people that mental health professionals serve will benefit greatly in this digital era of human existence.

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## **Effects of Need for Cognitive Closure and Age on Medical-Related Beliefs of African Americans**

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### **Abstract**

Given the accessibility to medical resources in urban areas, one possible barrier to African Americans' participation in clinical research and medical services is their medical-related beliefs. Such beliefs may partially explain various health disparities in the African American community – including HIV. However, the dynamic of psychosocial and demographic factors underlying these beliefs are less understood. Forty-nine urban-residing African Americans completed the Need for Cognitive Closure Scale (NFCS), the Medical Mistrust Index (MMI), and a HIV conspiracy belief questionnaire to determine the differences among these factors. While there was no significant interaction between NFCC and age on medical mistrust towards healthcare organizations, there was a significant interaction between NFCC and age on HIV conspiracy beliefs. Results suggest there may be an association between NFCC and the level of endorsement in HIV conspiracy beliefs among young urban African Americans. Future studies should examine this relationship within a larger population to determine possible strategies for decreasing such beliefs among this vulnerable population.

*Keywords:* African Americans, need for cognitive closure, medical beliefs, medical mistrust, HIV

## Introduction

Despite advances in medicine and access to care, health disparities in the African American community still exist (Cunningham, Croft, Liu, Lu, Eke, & Giles, 2017). In particular, African Americans account for 43% of HIV diagnosis while only accounting for 13% of the population (Centers for Disease Control and Prevention [CDC], 2018a). Additionally, African American men who have sex with men and African American women have the highest rate of new HIV infection (CDC, 2018a). Traditional factors such as socioeconomic status and age have been associated with various health disparities. For instance, age can influence an individual's perception of health care interactions, which in turn can impact compliance to treatment and overall lifestyle choices (DeVoe, Wallace, & Fryer, 2009). However, it is important to consider that beliefs in institutional discrimination and increased levels of distrust regarding healthcare organizations (i.e. medical mistrust) may also account for the lack of minority representation in clinical research studies and lack of prevention/treatment seeking behavior. By and large, medical mistrust is often greater among African Americans as compared to Whites (Corbie-Smith, Thomas, & George, 2002). For example, African Americans are more likely to believe that their physicians would expose them to unnecessary risks, more likely to believe their physicians administered treatment as part of a study without their consent, and less likely to believe they could freely ask questions to their physicians (Corbie-Smith, Thomas & George, 2002). Greater medical mistrust among African Americans has also been associated with lower odds of seeking HIV testing (Ford, Wallace, Newman, Lee, & Cunningham, 2013) and reduced HIV treatment adherence when compared to other racial/ethnic groups (Bogart, Wagner, Green, Mutchler, Klein, McDavitt, Lawrence, & Hillard, 2016).

In addition, research has shown an association between medical mistrust and conspiracy beliefs due to years of societal and institutional discrimination (Bird & Bogart, 2005; Kramer, 1999). Therefore, it is likely African Americans who have experienced such discrimination in healthcare are more likely to support medical-related conspiracy beliefs. Studies have shown that African Americans perceive the US healthcare system as racist or discriminatory (Fowler-Brown, Ashkin, Corbie-Smith, Thaker, & Pathman, 2005; Hausmann, Jeong, Bost, & Ibrahim, 2008; Lillie-Blanton, Brodie, Rowland, Altman, & McIntosh, 2000). With regard to HIV specifically, studies have revealed that a significant number of African Americans endorse conspiracy beliefs such as, "HIV/AIDS is being used to intentionally kill and control the African American population" (Bird & Bogart, 2005). Given the significant percentage of African Americans who hold such negative medical-related beliefs, it is a considerable challenge for healthcare to gain trust from the African American community.

## The Need for Cognitive Closure

It is evident that African Americans' perceptions and attitudes can be attributed to historical interpersonal and institutional discrimination in the United States. Such beliefs (e.g. "Healthcare providers can't be trusted") and subsequent behaviors (e.g., Avoids going to see a physician because of mistrust.) may be exacerbated by the need for cognitive closure, or NFCC. The need for cognitive closure identifies a desire for a certain view involving preference for order and structure, closed mindedness, as well as discomfort with ambiguity (Webster & Kruglanski, 1994). The NFCC has been shown to be a consistent and measurable trait among individuals such that some individuals have a generally higher or lower NFCC (Webster & Kruglanski, 1994). A high level of NFCC produces a reliance on confirmation heuristics that results in a strengthening of existing beliefs (De Dreu, Koole, & Oldersma,

1999). For example, when an individual believes their personal control is threatened, one method to preserve that control and sense of order is through conspiracy beliefs (Kay, Whitson, Gaucher, & Galinsky, 2009). As such, conspiracy beliefs may provide the cognitive closure African Americans need to explain HIV and other health disparities as well as strengthen the medical mistrust already present by reinforcing their attitudes about institutional racism and discrimination in the United States.

### **Age**

Findings on the connection between age, medical mistrust and conspiracy beliefs are somewhat mixed. For example, while some research has shown a negative relationship between age and medical mistrust (Boulware, Cooper, Ratner, LaVeist, & Powe, 2003; Galliford & Furnham, 2017), other studies have found a positive relationship (Hammond, 2010) – with most studies adjusting for age. In addition to medical mistrust, age may also have a significant effect on conspiracy beliefs (Douglas, Sutton, Callan, Dawtry & Harvey, 2016). For instance, research has shown a relationship between age and HIV conspiracy beliefs (Bogart, Wagner, Galvan, & Banks, 2010; Bohnert & Latkin, 2009; Ross, Essien, & Torres, 2006), while other studies regarding conspiracy beliefs have either controlled for age or showed no significant effect when analyzed as an independent covariate (Douglas et al., 2016; Klonoff & Landrine, 1999). Due to this lack of consistent findings, it is important to examine age and its potential influence in connection with the NFCC on medical-related beliefs.

### **Purpose of the Study**

Despite progress, African Americans are still disproportionally affected by HIV which may be a result of their medical-related beliefs. Thus, the purpose of the study is to examine how medical mistrust and beliefs in HIV/AIDS conspiracies may differ based on the NFCC and how those differences may be influenced by age among urban African Americans. It is believed there is an effect of NFCC and age on medical mistrust as well as HIV conspiracy beliefs given the known implications of psychosocial and demographic factors in prevention and treatment-seeking behaviors among African Americans. Therefore, by examining these factors, we may begin to better address African Americans' concerns about the medical community and, in turn, take a more comprehensive approach in our clinical and research initiatives.

### **Method**

#### **Participants**

Sixty-one African Americans were recruited from the psychology department of a university, community health fairs and local churches within the Washington D.C. Metropolitan Area. Participants has to be currently living in the Washington, D.C. Metropolitan Area and be of Black/African descent. The participants completed pen-and-paper surveys, with data from 11 participants excluded from analysis because their lie scores on the Need for Cognitive Closure Scale (NFCS; Webster, & Kuglanski, 1994) were greater than six. Six additional participants were excluded from partial or full analysis due to incomplete data. The mean age of the sample was 30.4 years, with the majority of the sample women (80%). A total of 64% of participants reported having had a prior HIV testing (22% preferred not to disclose). Participants recruited from undergraduate psychology courses received extra credit after completing the surveys with all other participants receiving no compensation for the study.

## Materials and Measures

### Medical Mistrust

Medical mistrust was assessed using the Medical Mistrust Index (MMI) (LaVeist, Arthur, Morgan, Rubinstein, Kinder, Kinney, & Plantholt, 2003) which measures the degree to which an individual has mistrust in healthcare organizations. The MMI is a 17-item scale on a four-point scale ranging from “strongly disagree” to “strongly agree” (e.g. “You’d better be cautious when dealing with healthcare organizations.”) The MMI has good reliability (Cronbach  $\alpha$  =.76), scale construct validity [The Trust in Physicians Scale (corr=-0.232,  $p$ <.0001)] and has been shown to be a strong predictor of underutilization of health services (LaVeist, Issac, & Williams, 2009). Six items were reverse-coded and a mean score was computed. Higher scores on the MMI indicated greater levels of medical mistrust.

### HIV-Related Conspiracy Beliefs

Participants’ HIV-related conspiracy beliefs were examined using a survey from a study on treatment adherence and HIV conspiracy beliefs (Clark, Mayben, Hartman, Kallen & Giordano, 2008). Responses to the five statements were noted using a six-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (6) with higher mean scores indicating higher levels of conspiracy belief (e.g., “The government has a cure for HIV but will not release it.”). The survey has a standardized Cronbach  $\alpha$  of .90 (Clark et al., 2008) with the total score for each participant used for analysis.

### Need for Cognitive Closure Scale

The NFCC was assessed by the shortened-version NFCS, consisting of 14 items rated on a six-point scale (with an additional two lie scale items) from “strongly disagree” to “strongly agree” (e.g. “In case of uncertainty, I prefer to make an immediate decision, whatever it may be”). This scale was scored according to the authors’ instructions to yield a single overall measure (Cronbach’s  $\alpha$  =0.73), with higher scores indicating higher need for closure.

### Procedure & Data Analysis

The study was approved by the University’s Institutional Review Board (IRB). At the time of consent, participants were informed of the purpose of the study and the anonymity and confidentiality of their responses (each survey was given a unique code). Participants were then asked to complete a sociodemographic questionnaire, the MMI, the HIV conspiracy survey and the NFCS within a larger set of surveys regarding cultural mistrust and attitudes towards HIV testing in random order. Completion of the surveys took approximately 30 minutes. Data was analyzed using SPSS 22. A two-way analysis of variance was conducted to determine the effects of NFCC and age on both medical mistrust and HIV-related conspiracy beliefs.

## Results

Two-way ANOVAs were conducted to determine whether or not there were differences across NFCC levels (low, neutral, high) and age (young adult, adult, older adult) regarding participants’ medical mistrust and HIV conspiracy beliefs, independently. The NFCC levels were based on the top and bottom quartiles of the participants’ scores, 50 (high) and 35 (low). For the age groups, participants ages 18–22 were assigned to the young adult group. The adult group comprised of adults ranging from 23–39, while the older adult group was comprised of adults 40 years of age and above (oldest participant was 62). Age group cutoffs

were chosen in a manner to best capture possible age effects based on generational differences as well as historical prejudices that may play a role in medical-related beliefs.

Means and standard deviations are outlined in Tables 1 and 2. Results of the two-way ANOVAs are depicted in Figures 1 and 2. The two-way analysis of variance for medical mistrust yielded no significant interaction effect,  $F(4, 40) = .273, p = .894$ , between the two variables. Therefore, an analysis of the main effect for NFCC and age was performed. However, neither NFCC,  $F(2, 40) = .196, p = .823$ , nor age,  $F(2, 40) = 1.532, p = .229$ , were found to be significant.

For HIV conspiracy beliefs, there was a significant interaction effect,  $F(4, 35) = 2.652, p = .049$ , indicating the effect of NFCC on participants' HIV conspiracy beliefs were contingent upon age. Therefore, an analysis of simple main effects for age was conducted. There was a statistically significant difference in mean HIV conspiracy beliefs for low NFCC to either young adults, adults, or older adults,  $F(2, 35) = 3.845, p = .031$ , but not for mid NFCC,  $F(2, 35) = 2.484, p = .098$ , or high NFCC,  $F(2, 35) = .402, p = .672$ . Additionally, there was no statistically significant simple main effect for NFCC in mean HIV conspiracy beliefs for young adults,  $F(2, 35) = 1.872, p = .169$ , adults  $F(2, 35) = 3.221, p = .052$ , or older adults,  $F(2, 35) = .403, p = .671$ .

Age Group	NFCC Level	<i>n</i>	Medical Mistrust Scores	
			<i>M</i>	<i>SD</i>
Young Adults (18–22)	Low NFCC	5	42	6.86
	Neutral NFCC	6	45.17	7.08
	High NFCC	7	42.86	2.27
	Total	18	43.39	5.42
Adults (23–39)	Low NFCC	3	45.67	2.89
	Neutral NFCC	11	48.09	6.07
	High NFCC	7	47.29	4.92
	Total	21	47.48	5.22
Older Adults (40–62)	Low NFCC	5	46	10.17
	Neutral NFCC	4	44	5.66
	High NFCC	1	43	--*
	Total	10	44.38	7.62

*Note.* \*Only one participant in the older adult group endorsed high NFCC

Table 1: Means and Standard Deviations of Medical Mistrust as a Function of Age and NFCC Level

Age Group	NFCC Level	<i>n</i>	Medical Mistrust Scores	
			<i>M</i>	<i>SD</i>
Young Adults (18–22)	Low NFCC	4	24	6.16
	Neutral NFCC	6	15.5	7.31
	High NFCC	4	16.25	5.67
	Total	14	18.14	7.19
Adults (23–39)	Low NFCC	3	10.33	2.89
	Neutral NFCC	11	22.18	6.46
	High NFCC	6	20.33	9.46
	Total	20	19.85	7.99
Older Adults (40–62)	Low NFCC	5	13	8.97
	Neutral NFCC	4	14.75	7.19
	High NFCC	1	20	--*
	Total	10	14.4	7.74

*Note.* \*Only one participant in the older adult group endorsed high NFCC

Table 2: Means and Standard Deviations of HIV Conspiracy Beliefs as a Function of Age and NFCC Level

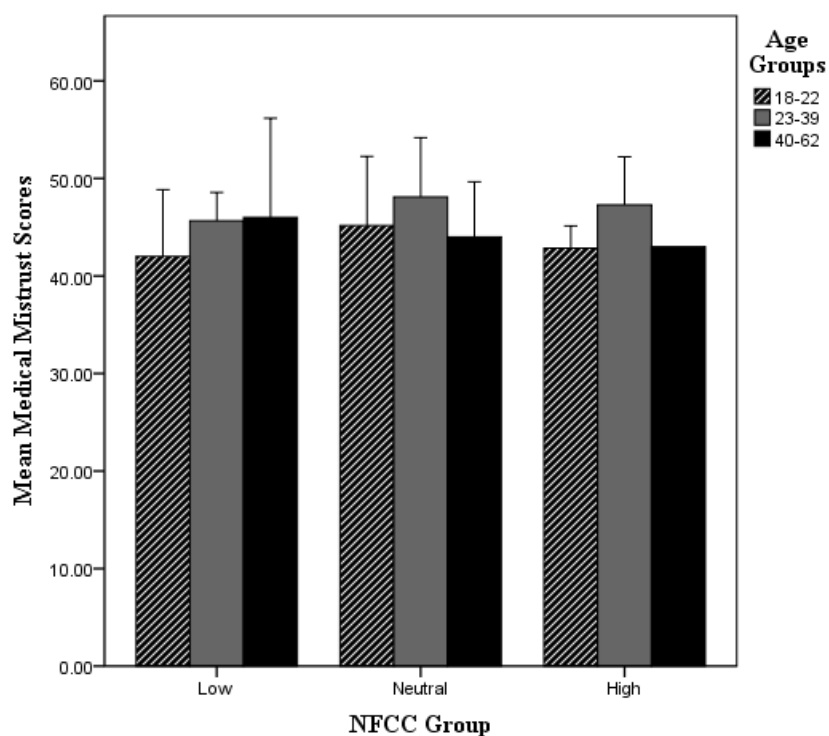


Figure 1: The Effect of NFCC and Age on Medical Mistrust



Note: Error bars are standard error measurement (SEM). Only one participant from the 40–62 age group endorsed high NFCC, therefore no error bar calculation was conducted.

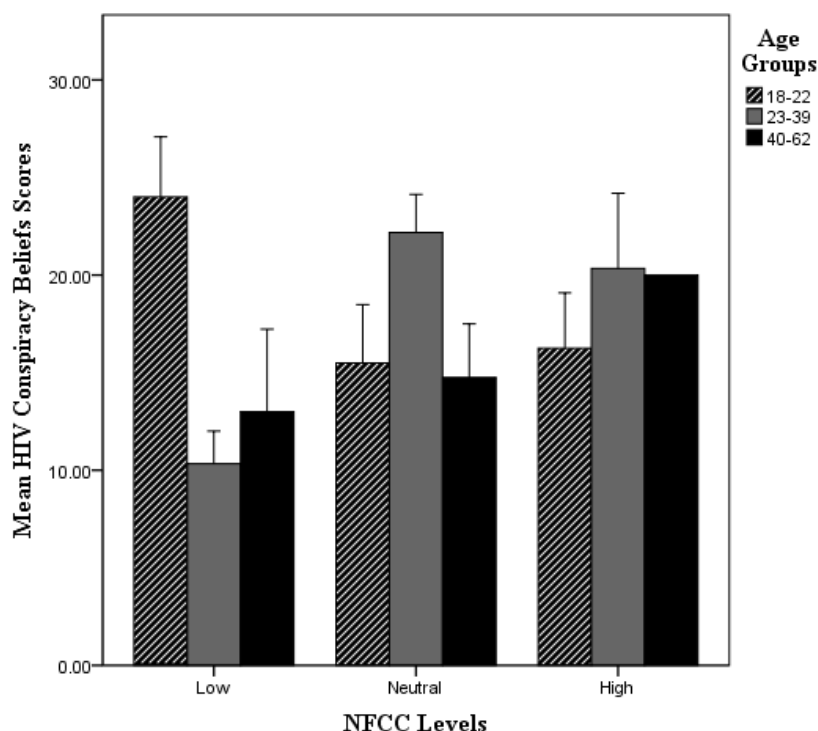


Figure 2: The Effect of NFCC and Age on HIV Conspiracy Beliefs

Note: Error bars are standard error measurement (SEM). Only one participant from the 40–62 age group endorsed high NFCC, therefore no error bar calculation was conducted.

## Discussion

Results from the study revealed mixed findings. Surprisingly, there was no significant effect of NFCC and age on medical mistrust. This may be a result of factors playing a more significant role in Africans Americans' level of medical mistrust. For example, research has shown that factors such as worse self-reported health and perceived racism are strongly associated with medical mistrust more so than age (Armstrong, Rose, Peters, Long, McMurphy, & Shea, 2006; Hammond, 2010). Thus, the interaction of NFCC or age with other factors may have yielded different results. Additionally, unbalanced groups sizes may have also impacted the results, warranting future studies to include a more robust sample size.

Secondly, as expected, there was a significant interaction between NFCC level and age groups regarding HIV conspiracy beliefs. This showed that NFCC levels are dependent on age when determining whether or not participants believed in HIV conspiracy beliefs. More specifically, differences were observed among participants with low NFCC with the young adults group endorsing stronger beliefs in HIV conspiracies than the adults or older adult groups. This supports previous studies that have found young adults are more likely to believe in conspiracy theories (Goertzel, 1994) as well as are less likely to seek or adhere to

medical treatment related to HIV/AIDS (Bazzi, Drainoni, Biancarelli, Hartman, Mimiaga, Mayer, & Biello, 2019).

From a psychosocial perspective, beliefs in conspiracy theories are often a result of lack of certainty, control or power due to an inability to affect change or feelings of insignificance in society (Bruder, Haffke, Neave, Nouripanah, & Imhoff, 2013; Kossowska & Bukowski, 2015) – which may explain why participants in the young adults group endorsed greater HIV conspiracy beliefs than the other age groups. In addition, while millennials lack life experience in the overall social system they have far more experience and exposure to the socio-technical system where pervasive conspiracy theories are readily available, shared, and agreed upon without the need for evidence (Bessi, Coletto, Davidescu, Scala, Caldarelli, & Quattrociocchi, 2015). This also may explain why significant differences were found among low NFCC as opposed to a high NFCC. As Leman and Cinnirella (2013) point out, individuals who are more opened to alternative explanations to events are less like to have a NFCC. In the case of the young adult group, social influence rather than scientific evidence may play a significant role in not only beliefs in conspiracies but how said beliefs can impact their behavior (Bessi et al, 2015). More disturbing, as 80% of new HIV diagnoses among the youth (13–24) occur in young people aged 20–24 and over half are African American (CDC, 2018b), this population is particularly vulnerable to the consequences of not seeking medical services and resources due to misinformation and beliefs.

## **Conclusion**

Although the study had a small sample size, this preliminary examination contributes to our current knowledge by introducing the need for cognitive closure as a potential factor of young urban African Americans' HIV conspiracy beliefs. Future studies should expand on this concept, given its possible impact on their participation in medical studies and services, with a larger more diverse sample. Other factors such as socioeconomic status and race-based medical mistrust should also be considered to expand upon these initial findings. With an emphasis on young adults, additional research is needed to develop more appropriate strategies (e.g., online debunking campaigns) tailored to the experiences and beliefs of African Americans.

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## **Development of Intervention Program Based on Grit and Psychological Well-Being to Alleviate Acculturative Stress among Foreign Students**

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### **Abstract**

Studying in higher educational institutions can be particularly stressful, even more so if one is in a foreign country away from familiar people and environment. Stress related to acculturation could develop into psychological illnesses if left unaddressed. This study aimed at proposing a psychological intervention program founded on grit and psychological well-being to alleviate acculturative stress among international students in the Philippines. Nineteen foreign students were selected as participants for the first phase of the study that confirmed that grit and psychological well-being have a strong positive correlation ( $r = 0.83$ ). Results further showed, however, that grit and psychological well-being both have a strong negative correlation with acculturative stress ( $r = -0.90$  and  $r = -0.80$ , respectively). Five participants from the original roster were randomly selected to join Phase 2 which involved a qualitative investigation of their experiences. The data were thematically analyzed and these results were utilized in the development of an intervention program for foreign students. Levels of the variables were tested post-intervention to measure its effectiveness.

*Keywords:* foreign students, acculturative stress, grit, psychological well-being

## Introduction

Rapid increase in movement for a borderless global community has caused many Philippine Higher Education Institutions to follow suit and set internationalization as a strategic priority. As an effect, student mobility was welcomed and the number of inbound foreign students in the country increased.

This influx did not come without challenges for the schools and the foreign students, such as those related to migration, racial discrimination, finances, climate, housing, language barrier, cultural adjustment, among others (Cheng, 2013). International students who travel and visit other countries for education may suffer from psychological illnesses due to separation from their families, difficulties in coping up and adapting to a new culture. Acculturative stress is one of the most common problems that occurs whenever a student experiences culture shock and separation anxiety. Berry, Phinney, Sam and Vedder (2016) defined it as a reduction in health status of individuals undergoing acculturation. This may affect the student's personal and academic life and hinder his or her stay in the host country.

Previous research claimed that among students, those who have higher grit (Guerrero, Dudovitz, Chung, Dosanjh, & Wong, 2015) and psychological well-being (Salles, Cohen & Mueller, 2014) are more likely to persevere, finish school, and achieve their goals. Grit and psychological well-being were found to be correlated – measuring grit is one way to recognize those who are at risk for low psychological well-being and identify those who can benefit from additional support, and vice versa. Vela, Smith, Whittenberg, Guardiola, and Savage (2018) and Schwartz et al. (2013), on the other hand, discussed the association of psychological grit and well-being to acculturation, respectively. They both mentioned acculturation positively influences the two variables. Understandably, acculturative stress has a negative relationship with grit and well-being (Revollo et al., 2010).

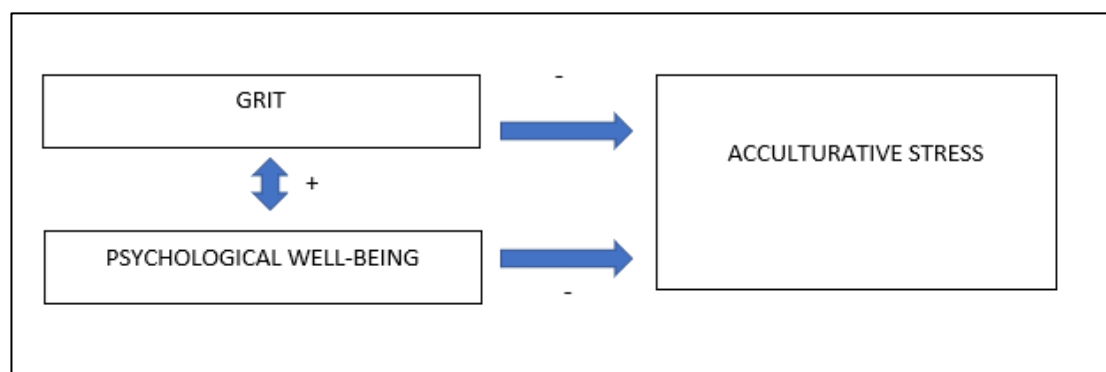


Figure 1: Relationships among the Variables

In this study, the researcher focused on proposing an intervention program grounded on grit and psychological well-being to alleviate acculturative stress among foreign students. Levels of their grit and psychological well-being were first measured then computed for any correlation. The results, alongside the qualitative data gathered during an interview, were used as bases for the proposed intervention program.



## Literature Review

Roga, Lapina and Muursepp (2015) attested that internationalization is becoming distinctly one of the primary needs of colleges in Europe, as well as around the world. True enough, McKenna and her colleagues (2017) stated that in 2012, there was a worldwide increase of more than five million students who travelled abroad for education, doubling the number in 2005. In 2016, the greatest number came from Asia, which was 53% of the foreign students' population.

Yang and Cheng (2018) said that there are several benefits of being international students such as cultural learning and personal growth through cross-cultural adjustment. The Culture Learning Theory conceptualizes that cross-cultural travelers have to learn culturally-relevant social skills in order to survive in their host country or culture (Zhou, Jindal-Snape, Topping, & Todman, 2017). It postulates that the factors affecting adjustment are knowledge about a new culture, cultural distance between home culture and host culture, language or communication competence. Foreign students leave their comfort zone and adjust to new challenges physically, culturally, and linguistically based on the location (Smith & Khawaja, 2011). Unfortunately, when foreign students cannot adapt to these differences, they experience isolation, depression, and culture or transition shock.

Another psychological concern experienced by foreign students is acculturative stress, a process whereby they deal with and integrate both cultures in their everyday lives (Nailevna, 2017). Berry (2005) described that this happened when individuals are affected emotionally and physiologically due to their reactions to a new environment that has unfamiliar cultural values, customs, and expectations. International students are more exposed to stressors than their native counterparts. Some of these are financial concerns (increasing tuition fees and living expenses), emotional stressors, and academic demands (Kosheleva, Amarnor & Chernobilsky, 2015). They need to develop bicultural competence that is to maintain their own values as they adjust to the challenges of their host country. The need to master another language to keep up with the academic and life demands can also be taxing as it is time bound. The climate difference can also contribute to their overall level of stress. All these they experience, away from the usual familial support.

Ray and Brown (2015) noted that grit is a soft skill necessary for academic success and is important to survive stressful situations. Salles et al. (2014) found it to be a predictor of later psychological well-being. In their study, they discovered that people who are persevering are also happy and with low chances of experiencing burnout. Meanwhile, those individuals who have low levels of well-being are at risk for burnout and are bound to leave their programs rather than complete them. That is why they must be identified as early as possible and given psychological support to ensure program success.

Vela et al. (2018), Schwartz et al. (2013) and Revollo et al. (2010) discussed the relationships among the variables. Grit is correlated with psychological well-being and are both positively influenced by acculturation. It was noted that if a student successfully acculturates, this has a positive effect on his or her grit and sense of well-being. On the other hand, if unsuccessful, the student may tend to question his or her capabilities and be unhappy. Grit and psychological well-being, moreover, have a negative correlation with acculturative stress.

Thus, the purpose of this study is to propose an intervention program that could fight off stress brought about by acculturation, using the existing relationships among grit,

psychological well-being and acculturative stress. The levels of the foreign students' grit, psychological well-being and acculturative stress are also presented, alongside qualitative data on their experiences in the Philippines.

### **Statement of the Problem**

This paper aimed to answer the following research questions:

1. What are the levels of the participants?
  - a. grit,
  - b. psychological well-being, and
  - c. acculturative stress?
2. What is the relationship between
  - a. grit and psychological well-being?
  - b. grit and acculturative stress?
  - c. psychological well-being and acculturative stress?
3. What experiences do foreign students in the Philippines have in terms of living and studying in the country?
4. What design of intervention program can be proposed to alleviate acculturative stress among foreign students in the Philippines?

### **Methodology**

In this study, the mixed methods approach was used. Phase 1 involved a descriptive-correlational method to present the levels of grit, psychological well-being and acculturative stress of the participants. Phase 2 involved a qualitative method of interviewing the participants on their experiences as foreign students in the Philippines. The data were thematically analyzed and utilized in the development of the proposed intervention program.

### **Participants**

Nineteen foreign students who had completed at least a year of study in various universities in the National Capital Region and Region 4A of the Philippines participated in the study. They were chosen regardless of their gender, academic program, religion, and country of origin. The participants were contacted through schools' international students' associations and internationalization offices.

Ten male students and nine female students participated in the study (see Figure 2).

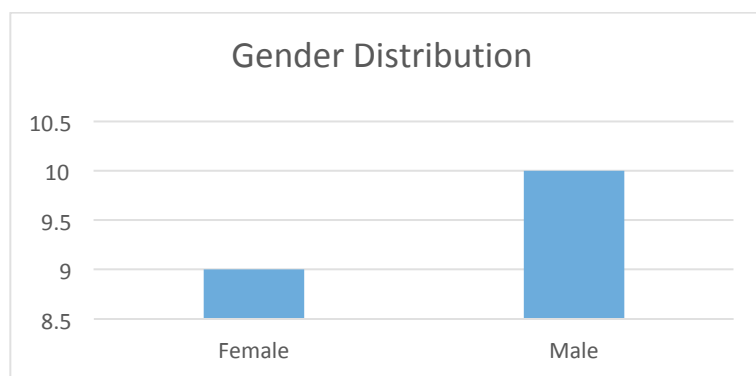


Figure 2: Gender Distribution of Participants

Of the participants, 58% were in Second Year College, 31% in Third Year, and the remaining 11% in their terminal year level. Majority of them at 42% were taking up pre-medicine, while engineering and business tied in second place at 26%. The rest were enrolled in hospitality courses.

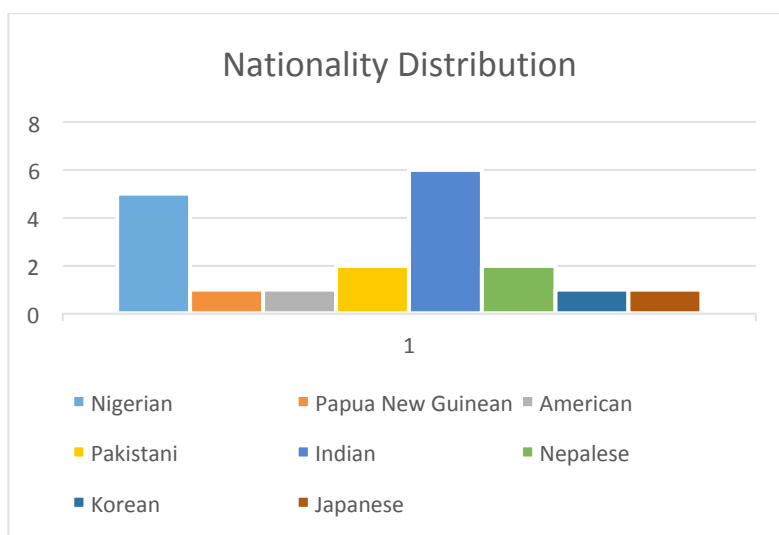


Figure 3: Nationality Distribution of Participants

Meanwhile, the countries represented were India (32%), Nigeria (26%), Pakistan (11%), Nepal (11%), Korea (5%), Japan (5%), United States of America (5%), and Papua New Guinea (5%).

### Instrumentations

For Phase 1, the 12-item Grit Scale, 42-item Ryff's Psychological Well-Being Scale, and the 36-item Acculturative Stress Scale for International Students were used.

**Grit scale.** Angela Duckworth (Kim, 2015) developed the Grit Scale which has several variations: the 12-item and 17-item versions. Both versions are rated by assigning the following points: 5 = Very much like me, 4 = Mostly like me, 3 = Somewhat like me, 2 = Not much like me, 1 = Not like me at all; or for the reverse scored: 1= Very much like me, 2= Mostly like me, 3= Somewhat like me, 4= Mostly like me, and 5= Not like me at all. In the shorter version, the following items are scored as 5 = Very much like me, 4 = Mostly like me,

3 = Somewhat like me, 2 = Not much like me, 1 = Not like me at all: 1, 4, 6, 9, and 12. Meanwhile, the reverse scored items are 2, 3, 5, 7, 8, 10, and 11. The points should be added up and divided by 12. The maximum score on this scale is 5 (extremely gritty), and the lowest is 1 (not at all gritty).

**Ryff's Psychological Well-Being (RPWB) scale.** The RPWB (Ryff & Keyes, 1995) was created by Carol Ryff. It has 42 items that have six dimensions namely self-acceptance, environmental mastery, positive relations with others, personal growth, purpose in life, and autonomy. Subscales with their respective item numbers are as follows: autonomy (1, 7, 13, 19, 25, 31, 37), environmental mastery (2,8,14,20,26,32,38), personal growth (3, 9, 15, 21, 27, 33,39), positive relation with others (4,10,16,22, 28, 34, 40), purpose in life (5,11,17,23,29,35,41), and self-acceptance (6, 12, 18, 24, 30, 36, 42). Participants are asked to rate statements on a six-point scale, with 1 indicating strong disagreement and 6 indicating strong agreement. Half of the items in this test are reversed scored: 3, 5, 10, 13,14,15,16, 17, 18, 19, 23, 26, 27, 30, 31, 32, 34, 36, 39, and 41. High scores indicate well-being in that aspect in the participant's life. On the other hand, low scores indicate that the participant experiences difficulty in that area of his/her life. This scale has a high internal consistency with a coefficient ranging from .86 to .95, and its purpose is to check an individual's psychological well-being (whether it is high or low).

High scorers in Self-Acceptance are said to possess a positive attitude toward the self and accepts one's positive and negative qualities. Low scorers are disappointed with what has occurred in their past life. As for the dimension Positive Relations with Others, high scorers have satisfying relationships with others, while low scorers are isolated and frustrated in interpersonal relationships. Autonomy high scorers evaluate self by personal standards; low scorers are concerned about the expectations and evaluations of others. High scores in Environmental Mastery mean a sense of competence in managing his or her environment. Low scorers in this dimension have difficulty managing everyday affairs. Purpose in Life high scorers have reasons for living while those who score low lack a sense of direction. Personal Growth high scores indicate a sense of continued development; low scores, on the other hand, mean a sense of personal stagnation (Ryff & Keyes, 1995).

**Acculturative Stress Scale for International Students (ASSIS).** The ASSIS is a five-point Likert scale that was designed to assess the acculturative stress of international students such as guilt, perceived discrimination, perceived hatred, homesickness, fear, and stress due to change. This was developed by Sandhu (1994) and can be rated as follows: 1=Strongly Disagree, 2=Disagree, 3=Not Sure, 4=Agree, and 5=Strongly Agree.

**Interview Guide.** For Phase 2 – interviews – an interview guide was designed to probe the experiences of foreign students in studying and living in the Philippines. The 10-item guide was validated by three experts in psychology and language before being used. The questions centered on the students' challenges when they arrived, and strategies employed to alleviate the hardships. The roles of families, friends, schools, etc. were also dealt with.

### **Data Gathering Procedures**

Letters of request were sent to schools and international students' organizations to solicit participation. Once the volunteer participants were identified, they were each requested to sign the consent form and oriented as to the design of the study. The researcher first conducted a pilot test before proceeding to the actual phases. Their demographics were taken note of for reporting. For Phase 1, three scales were administered namely, Grit Scale, RPWB

Scale, and ASSIS. The scores were computed and interpreted, and later statistically analyzed for correlations. For Phase 2, the researcher randomly chose participants for the interview, taking into consideration their scores in the ASSIS. The data collected during the interview were transcribed and initial ideas and thoughts were also noted down. After reading and re-reading, which important part to immerse in the data, the transcriptions were presented to the participants for their validation.

## Data Analysis

Weighted means were used to assess the participants' levels of grit, psychological well-being and acculturative stress. To measure the correlations, Pearson Product Moment Correlation Coefficient or Pearson R Correlation was used. This test determines the relationship between two continuous variables or at least one of the two variables. If proven to have significant relationship with the use of the probability value or significant value (strength of relationship), the Pearson  $r$  value will test the direction of the relationship, either direct or inverse relationship.

The validated transcription of the interview was re-read to ensure the researcher's closeness with the data. It was then subjected to the coding phase. The codes were generated based on their relevance to the research question. The next stage involved combining similar codes into themes. Any theme that did not have enough supporting data was discarded. Once the themes were established, the researcher underwent coding again to ensure that no code was missed. When the themes all fitted together, they were named and accompanied by detailed analysis. The final part involved choosing examples of lines from the transcription to illustrate the themes.

## Results and Discussion

### Phase 1

It was found that majority of the participants are Somewhat Gritty (47.37%), while 42.11% are Mostly Gritty and 10.53% are Seldom Gritty. Nobody fared as Extremely Gritty or Not at All Gritty. The average grit score of all the participants is 3.72 which could be interpreted as Somewhat Gritty-Mostly Gritty.

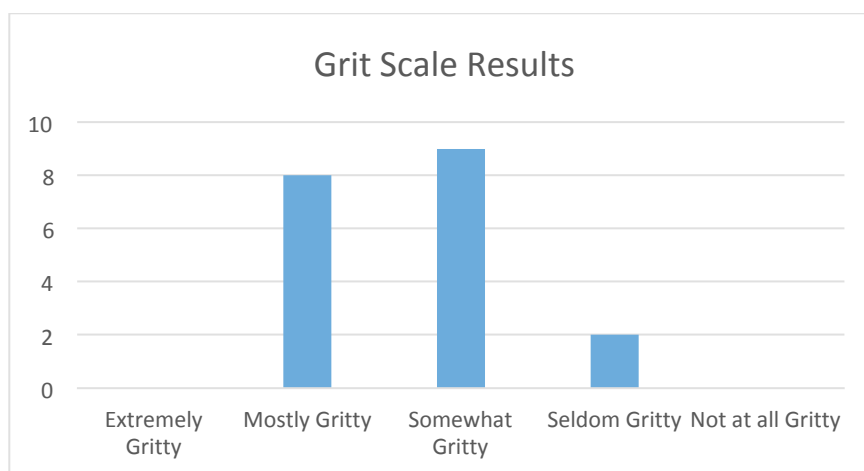


Figure 4: Grit Scale Results

Meanwhile, the average Psychological Well-Being score of the participants is 28.41 out of 42 (High PWB). Of the PWB dimensions, more participants scored highest in autonomy and positive relations with others, at 31.58% each. This was followed by purpose in life (15.79%), then self-acceptance and environmental mastery at 10.53%. Personal growth ranked lowest at 5.27%. The dimension that received the highest mean is purpose in life with 30.37 (high).

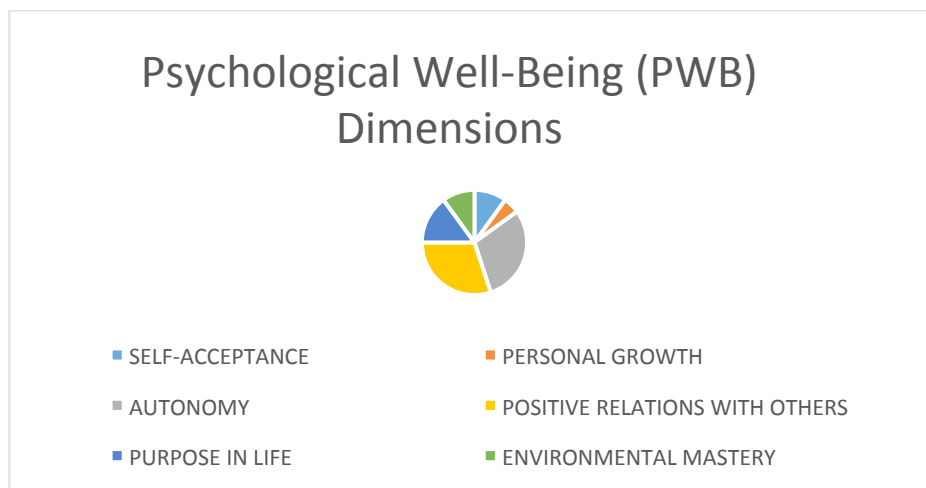


Figure 5: Ryff's PWB Scale Results – PWB Dimensions

Based from the results from the ASSIS, 47.37% of the participants scored high in acculturative stress. The rest had medium to low levels (52.63%). Mean score was 109.21 out of 180.

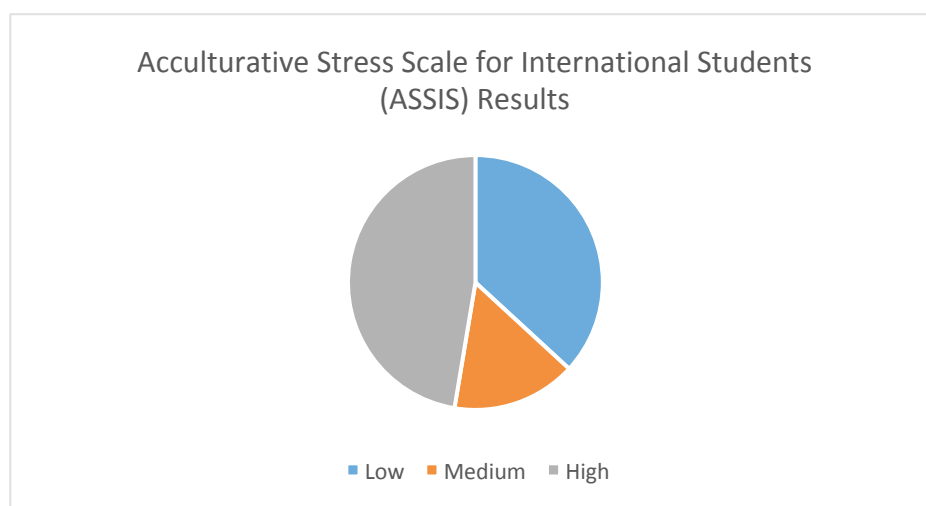


Figure 6: ASSIS Results

Upon statistical treatment, it confirmed the findings of Salles et al. (2014) that grit and psychological well-being have a strong positive correlation ( $r = 0.83$ ). This means that as an individual's level of grit increases, we can expect his or her psychological well-being to do the same, and vice versa. This also suggests that individuals whose goal is to intensify their grit level, may work on improving their psychological well-being. The same is true if one

wants to improve his or her PWB. In a nutshell, individuals who are well and happy (PWB) may also be persevering to achieve long term goals (grit), and vice versa.

Meanwhile, it was found that grit and psychological well-being are both negatively correlated to acculturative stress. The values generated from their scores were  $r = -0.90$  for grit-acculturative stress and  $r = -0.80$  for PWB-acculturative stress. This states that if a student has high grit and PWB levels, his or her acculturative stress could be low. Or, if a student has high acculturative stress, his or her grit and PWB may be affected badly.

## Phase 2

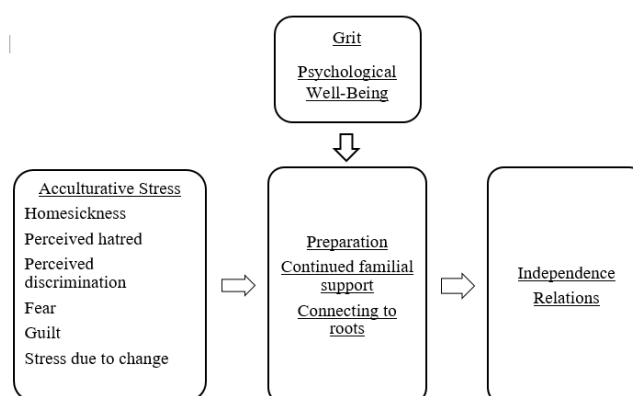


Figure 7: Emerging Themes from Interview

Based on the analysis of data obtained, this investigation noted the experiences of foreign students in the Philippines. It was found there are four major themes that could determine the impact of acculturative stress on foreign students and that they may also use to lessen its ill-effects. These are preparation, continued familial support, and connecting to roots, and are believed to work with grit and psychological well-being to produce positive results in the lives of foreign students.

“Preparation” encompasses not only the series of activities the international student had to do before leaving for the host country but also the sustained self-orientation before arriving in the Philippines. The former covers: researching in the Internet and books typically about what to expect from the country and its people, checking the website of future school to get familiar with its history and services, actually calling school officials to get more information and even visiting the country and school to have a tour.

“My dad even accompanied me to the Philippines to check on the school I would study in. We spoke with the school officials and I think that was helpful in preparing myself.” (Participant 14)

Others take advantage that friends and fellow countrymen have experience in studying and living in the Philippines, and they ask for first-hand information.

“It was helpful I have some former schoolmates who were here in the Philippines ahead of me. They provided me with much information enough to guide me even before I learn things directly.” (Participant 17)

“I also asked some of my friends who are already there to give me first-hand information.” (Participant 11)

Failing to prepare, as the old saying goes, has its own detriments.

“The preparations I made were mostly academics. Looking at it right now, I should have prepared even more by reading carefully about the new country and the school. I kept on asking myself if I am the right fit for the Philippines. I could have avoided that if I came a little more prepared.” (Participant 8)

As reported, they can continue this preparation by familiarizing themselves to the culture by asking and interviewing natives even after arrival.

“I ask. I'm very vocal when I do not know something.” (Participant 17)

Academic advising and sustained orientation activities can also help avoid future problems. The focus may not only be on expected academic performance but also on cultural assimilation. Workshops on the local dialect can be given to those having language troubles or anyone interested. Free and Kriz (2016) even proposed helping students with access to supplies, technology and practical help (e.g., leading them to markets or restaurants).

The next theme is “Continued Familial Support”. Prior to the technological era, international students reported familial support as one of their motivations for academic success. Fortunately, this time-calling and video-chatting is just one click away and this familial support can extend “virtually” regardless of distance.

“I talk to my parents back home and they constantly remind me that things will be fine...” (Participant 8)

“They are supportive and told me I should just focus on the goal... gives me advice, even until now. So I think that's helpful.” (Participant 14)

“I contact home frequently.” (Participant 17)

“...continued communication with family back home. They assure me that everything is well there and that gives me peace of mind being away. They tell me I can finish and that helps.” (Participant 2)

This supports a study cited by Furnham (2004), that relocating to another country for studies is not always stressful for students. They argued that stability and support in the family life can secure a child's well-being.

Since acculturation is a process that involves embracing another culture while rooted in the original culture, this regular contact back in country of origin is the chance to re-connect with the original culture and the familiar components it contains. This is related to the third theme that arose which is “Connecting to Roots.” This has two categories: connecting with people they have shared attributes with (e.g. fellow foreign student, fellow countryman) and talking about their origin.



“For some time, I was not eating well, and I looked forward to gatherings (with) fellow Nigerians every one or two weeks. That is when we cook our native dishes and we dance and bond.” (Participant 14)

“I talk with my fellow foreign students. It helps to know that I am not the only one who experiences this.” (Participant 2)

Furnham (2004) found that to maintain positive well-being of students, they have to maintain, in this particular order, a good network with fellow foreign students from the same country, host nationals, then other friends and acquaintances.

“(It helps that) I also have a best friend from the same country of origin, and we talk.” (Participant 17)

There must also be an emphasis on building up a socially strong school group that consists of international students coming from the same country, who can eventually mix with those from other countries, and then with domestic students. Group or individual counseling is an ideal activity to ensure early intervention for problems. International student associations may be institutionalized to provide an avenue for them to spearhead and participate in projects that can expose them to other people and the community that is hosting them. Nailevna (2017) attested to the role of including them in institutional and social activities in enhancing psychological adjustment.

It was a common report of the participants that remembering their roots and being given the opportunity to talk about it in their new environment can be “therapeutic” and stress-alleviating.

“...when they ask me to share about my country – it gives a different meaning to me being here. Taking versus giving.” (Participant 2)

“(The most fun thing about being a foreign student here) is sharing what we have back home.” (Participant 11)

International students arrive in the Philippines or any other host country with the “taking” mindset, that is, “take all the learnings,” “bring the diploma home,” “learn about their culture,” “speak their language,” among others. All these only add to the stress that they are already feeling because this requires either change or assimilation. This chance then to share about their own roots switches the “taking” mindset to a “giving” mindset and could lessen the stress they feel. Talking about one’s own country and practices can elicit a sense of pride and happiness.

A category under this is “symbiosis” wherein foreign students and Filipinos help each other to succeed. An example would be when a Korean student who had difficulty learning English partnered with a Filipino student who can and wants to be fluent in Hangul (Korean language). Another is an American participant who taught English to underprivileged children while in turn using the experience in the area to complete her social science research.

The two other themes fall under outcomes – “gaining independence” and “building relations.” If successful in overcoming acculturative stress, international students are able to enjoy the fruits of studying in another country, which are freedom and gaining new friends.

These two are the most commonly reported outcomes by the participants that they said they enjoy or look forward to.

“Gaining independence (is the most valuable learning). It proves I can do things without people's help all the time.”(Participant 11)

“Number one would be that I am able to prove to myself that I can stand on my own. The joys of testing myself and actually surviving. Also meeting new people and learning new things like culture and norms, etc.” (Participant 17)

“Independence. When I think about it, that's what I am gaining in return for all these. That makes me happy.” (Participant 14)

“Being able to prove that I can survive on my own makes me happy.”(Participant 2)

These findings support the Ryff's PWB Scale results of the participants where most of them scored highest in the dimensions Autonomy and Positive Relations with others (31.58%). Positive Relations with Others high scorers have satisfying relationships with others, while Autonomy high scorers evaluate self by personal standards and not concerned about the expectations and evaluations of others.

In conclusion, this study confirms the positive relationship between grit and psychological well-being, and the negative correlation they both have with acculturative stress. Further, the author unearthed themes that may help avoid or alleviate acculturative stress, as well as the positive outcomes that come from coping well with acculturation.

### **Intervention Program**

Given all these data, the following intervention program is proposed:

Effective Acculturative Stress Intervention Program for International Students Intervention Description: As the name suggests, this intervention program aims to assist foreign students in better acculturating in their host country and diminish the stress it brings about. This one-week program includes stress management exercises, relaxation techniques, visualizations, mentoring assignments to improve on grit, and anecdote writing focused on big and small achievements to develop PWB.

<b>Exercise</b>	<b>Objective/s</b>	<b>Duration</b>
Stress Management Relaxation Techniques Breathing Exercises Expressive Art Technique  ***Focus on alleviating stress***	To manage the biological and psychological symptoms of acculturative stress  To teach the participants techniques on how to control or even positively express the manifestations of stress  To reduce the harmful effects of stress to the mind and body	1 hour
Visualizations Positive Self-Talk	To effectively visualize the participants' Best Possible Foreign Student Selves  To facilitate goal setting of participants in relation to	1 hour

	studying and living in the host country	
	To heighten positive expectations for the future	
***Focus on PWB***	To develop a sense of personal ability and adequacy	
Mentoring Role playing Sharing of experiences Group discussion on respective origins	To improve the level of one's grit	1 hour
	To develop esteem by taking on important "roles" and playing them during sessions that will serve as practice	
	To develop empathy for other members	
***Focus on Grit***	To reconnect with origins, appreciate what they have back home as something to look forward to while living in the moment of being in the host country	
Anecdote writing Strengths vs Weaknesses All the Good Things	To reflect on and celebrate past achievements, especially upon arrival in host country	1 hour
	To remind participants of their efforts and successes	
***Overall***	To remind them that these successes can be repeated	

Table 1: Protocol of Developed Intervention Program

This was run for four days within one week and levels of grit, PWB and acculturative stress were tested again for any difference. Only 17 from the original 19 subjects participated and the following results were generated:

There is only a slight increase in the level of grit at 3.96 (Somewhat Gritty-Mostly Gritty), while a 2.62 increase in the average score of PWB was registered (maintained at High PWB). There was no significant difference in the levels of grit pre- and post-intervention ( $p = 0.1896$ ), but a significant difference was seen between PWB scores ( $p = 0.0024$ ). Acculturative stress decreased from 109.21 (average) to 85.65 (low). The two-tailed  $p$  value is  $< 0.0001$  (extremely statistically significant).

### Scope and Limitations

The study focused only on international undergraduate students who have completed at least one year of study in the Philippines. They were chosen regardless of gender, religion, country of origin, and academic program. The age bracket required was 18 to 25 years. The participants all came from private higher educational institutions. These demographics were simply recorded for reporting in this study and were not used in the correlations. It is recommended though by this author that for future research purposes, these demographic variables be utilized to provide a more grounded and comprehensive result. The researcher was aware that language could be a barrier in the collection of data since the participants of the study are of different nationalities and their language proficiency levels are varying. Nonetheless, all interactions were rendered in the English language.

Future researchers may increase the number of participants in the first phase of the study to also increase the significance level of the findings. Only one individual conducted all the

phases of the study. Involving experts and other practitioners in the future to conduct the intervention may be welcomed.

The intervention program was conducted in a group setting except for the final activities on anecdote writing and reflection.

## **Conclusion**

This paper supported earlier claims of researchers that there is a positive correlation between grit and psychological well-being, while they both have a negative correlation with acculturative stress.

Preparation, continued familial support, and connecting to roots can work together with grit and psychological well-being in order to adjust better to a certain culture. The fruits of a proper acculturation are independence and positive and new relations with others.

The intervention program is effective in alleviating acculturative stress among the foreign student participants and in increasing their PWB levels. However, grit was not significantly improved by the same, thus, the section addressing grit must be revisited.

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## **Age-Related Differences in Executive, Social and Creative Cognition in Neurologically Healthy Adults**

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### **Abstract**

Despite evidence of aging-related decline in frontal lobe and associated executive cognitive functions, findings in relation to social and creative cognition have been inconclusive. The present study examined executive, social and creative cognition, as well as crystallized and fluid intelligence, in a community sample of 88 neurologically healthy participants (61 females, 27 males) ranging in age from 25 to 85 years, with the goal of detecting aging-related differences in these cognitive domains. Social cognition was operationalized using a Theory of Mind task. Creative cognition was operationalized using verbal and non-verbal idea fluency tasks. Executive cognition was operationalized via the Stroop and Wisconsin Card Sorting tests. Although the indices of executive cognition and fluid intelligence showed expected age-related differences, creative cognition showed no relationship with age, and performance on the social cognition task appeared to be compensated for by age-related increase in crystallized intelligence. Despite the issue of cohort effects, results are consistent with the notion that compensatory processes may help maintain social and creative cognitive functioning in normal aging.

*Keywords:* cognition, aging, executive function, theory of mind, creativity

## Introduction

The process of aging involves facing many challenges such as physical ailments, social losses, psychological stress, increasing dependence on others and an increasing awareness of the transience of life. Despite these challenges many healthy older people remain well-adjusted mentally and emotionally into their later years. Further, the capacity for creativity has been demonstrated well into later life. Giuseppe Verdi wrote his last opera *Falstaff* in his 80s; William Butler Yates wrote a major completion to his life's work, *Under Ben Bulben*, at age 73; Johann Wolfgang von Goethe wrote one of his finest works, the *Marienbad Elegy*, at age 83; Pablo Picasso painted into his early 90s. Such examples may seem surprising given the abundant evidence of cognitive decline in normal aging. The present study examined the hypothesis that although some aspects of cognitive function clearly deteriorate with aging, other aspects are preserved.

## Executive Cognition and Normal Aging

A longstanding interpretation of aging-related cognitive decline is the frontal lobe hypothesis of aging, supported by a large body of evidence of aging-related decline in executive cognitive function (cognitive control processes such as planning, organizing, goal setting, inhibition of impulses, cognitive flexibility in problem solving, etc.) and fluid intelligence (the ability to solve new problems independent of acquired knowledge) as well as corresponding pathophysiological age-related changes in prefrontal cortex (PFC) morphology and processing (see reviews by Cabeza & Dennis, 2013; Kievit et al., 2014). Although several regions of the brain demonstrate aging-related changes, the PFC appears to be the first cerebral region to be affected in normal aging (Tisserand & Jolles, 2003), showing pronounced shrinkage (Gunning-Dixon & Raz, 2003). Neuroimaging of structural changes in white matter and grey matter suggest that the healthy adult brain matures into middle age followed by progressive volume loss, with the later maturing cortical regions such as the PFC being most vulnerable to aging-related decline. Neuropsychological evidence indicates that performance on PFC-dependent executive cognition tasks declines with normal aging, starting around the age of 60 (Treitz, Heyder, & Daum, 2007).

Successful performance of executive cognition tasks has long been known to depend on the functional integrity of the PFC. For example, negative correlations have been reported between perseverative errors on the Wisconsin Card Sorting Test (WCST) and PFC volume (Raz, Gunning-Dixon, Head, Dupuis & Acker, 1998) as well as myelination and integrity of prefrontal white matter (Valenzuela et al., 2000). There is an aging-related increase in PFC activation during executive cognition tasks, perhaps reflecting increased effort or other compensatory processes (Spreng, Wojtowicz, & Grady, 2010). The frontal lobes are the seat of conscious, deliberate, attentive, effortful control, outcomes of which include executive cognitive performance and fluid intelligence. This controlled processing has a limited capacity, however, which may become taxed as the frontal lobes decline with age. Automatic processing, by contrast, is not capacity limited; it is unconscious, involuntary, and responsive to environmental stimuli (Norman & Shallice, 2000). Decline in controlled processing with increasing age as the frontal lobes deteriorate may thus be compensated for to some degree by an increased reliance on access to previously stored information. As such, automatic processing recruits knowledge and memories acquired over a lifetime, and thus may support effective social and creative cognition in older adults even as the frontal lobes and their associated executive cognitive processes decline (Hedden & Gabrieli, 2004; Hedden, Lautenschlager & Park, 2005). There is strong support for the stability of implicit memory



with aging (Mitchell & Bruss, 2003), consistent with intact automatic processing. Implicit memory refers to knowledge that is not verbalized but which is nevertheless available as evidenced by changes in behavior, such as in classical conditioning or sensorimotor skill acquisition. Further, although episodic memory (memory for experienced life events) and working memory (holding a limited amount of information in consciousness temporarily to use or manipulate in problem-solving, etc.) show gradual declines with normal aging, semantic memory (abstract knowledge and word meanings) remains relatively stable (Churchill, Stanis, Press, Kushelev, & Greenough, 2003; Hedden & Gabrieli, 2004; Spaniol, Madden, & Voss, 2009; St-Laurent, Abdi, Burianová, & Grady, 2011). Thus in the present study, although performance on tests of executive cognition were expected to show aging-related declines, this was not expected for tasks tapping social and creative cognition due to age-related increase in reliance on automatic processing and acquired knowledge, which were theorized to offset the decline in executive cognition.

### **Social Cognition and Normal Aging**

The varying roles of automatic vs. controlled processing in different tasks may account for some of the differential findings on social cognition (how people acquire, store and use information about others) in relation to normal aging. Satpute and Lieberman (2006) pointed to an automatic component of social cognition, as opposed to the executive control involved in reflective processes. Social cognition tasks, such as Theory of Mind (ToM) tasks where participants must judge the mental states or intentions of others depicted in images (e.g., photos of eyes), activate both executive control and automatic processes (Adolphs, 2009). The conscious control aspects can involve declarative reasoning and reflective thinking; however, judgements are also made about people and their behaviors based on automatic schematic beliefs. Accessing schemas in the stored knowledge base is an example of crystallized intelligence (the general ability to access and use stored knowledge), which appears relatively impervious to decline in normal aging (Horn & Cattell, 1967; Salthouse, 2000; Sullivan & Ruffman, 2004).

Research on ToM as an example of social cognition in normal aging has yielded inconsistent findings. Some studies have indicated aging-related decline in ToM (Baena, Allen, Kaut, & Hall, 2010; Charlton, Barrick, Markus, & Morris, 2009; Maylor, Moulson, Muncer, & Taylor, 2002), whereas others found stability (Bottiroli, Cavallini, Ceccato, Vecchi, & Lecce, 2016; MacPherson, Phillips, & Sala, 2002; McKinnon & Moscovitch, 2007; Sullivan & Ruffman, 2004) or even advantage with increased age (Happé, Winner, & Brownell, 1998). Evidence of stability or improvement in performance of ToM or other social cognition tasks with normal aging may reflect increased reliance on compensatory strategies where conscious explicit reasoning is supported by automatic associations from implicit memory relevant to the particular task. For example, as lexical access to stored information does not decline with age (Fisk & Sharp, 2004), older adults may perform ToM tasks efficiently, despite decline in executive cognition, by relying on their greater cumulative experience with lexical processing (e.g., use of emotion words) than younger adults – reflecting older adults' increased reliance on automatic rather than conscious, deliberate control processes (Allen et al., 2002; Lien et al., 2006). Thus, in the present study, increased reliance on stored knowledge, or crystallized intelligence, was predicted to offset the aging-related decline in executive cognition in terms of ToM task performance.

## Creative Cognition and Normal Aging

Theoretical perspectives on creativity distinguish between the gifted creativity demonstrated by eminent artists, and everyday creativity where the cognitive processes that produce innovative ideas and responses contribute to everyday adaptation and survival (Richards, 2010). Creative cognition is generally agreed to involve two distinct qualities: novelty or innovation and usefulness (Sternberg & Lubart, 1999). Ward, Smith and Finke (1999) suggested that the creation of novel and useful ideas is achieved through complex interactions between generative processes and exploratory processes. These processes are often unconscious or automatic and triggered by external cues. More recently, the explicit-implicit interaction theory emphasizes incubation and insight, with creativity resulting from a combination of conscious explicit reasoning and the unconscious, automatic associations of implicit memory (Hélie & Sun, 2010). The latter is cued outside conscious awareness by environmental stimuli, involves minimal attentional focus or inhibition, and is involuntary and time efficient (Moors & De Houwer, 2006). Thus at least theoretically, the creation of novel and useful ideas or responses is an outcome of both explicit or controlled and automatic or implicit processing to varying degrees.

The focus of the present study was to explore everyday creativity, where the relevant cognitive processes are linked to gist representations rather than details, and spontaneous heuristic information is accessed to yield inventive and innovative ideas or solutions. Although the PFC and executive cognition are implicated given the role of working memory in creative cognition (Damasio, 2001), research has indicated that a slower processing speed, defocused attention and reduced response inhibition are important as well (Dorfman, Martindale, Gassimova, & Vartanian, 2008; Vartanian, Martindale, & Kwiatkowski, 2007), suggesting that creativity often involves a reduced reliance on executive control compared to other forms of cognition. Processes of creative “flow” (becoming completely absorbed in, or “one with,” an experience or activity) activate implicit memory and automatic processing, deactivate explicit reasoning, and utilize wide bilateral brain networks (Limb & Braun, 2008). Given such considerations, creative cognition might be expected to show stability or even improvement with normal aging. At the very least, the increased reliance on automatic processing and other compensatory aging-related changes such as more widespread patterns of brain activation (Cabeza & Dennis, 2013; Lighthall, Huettel & Cabeza, 2014) may help preserve creative cognition despite decline in other cognitive domains. The present study proposed that an aging-related increase in reliance on automatic processing would allow tasks of creative cognition to show stability across a wide age range in adults despite the aging-related decline in executive cognition.

The purpose of this study investigated was to investigate the performance on tests of executive, social and creative cognition in a sample of neurologically healthy adults aged 25 to 85 years. Based on the previous research and theory described earlier, the following research hypotheses were posed:

- H1: Aging-related differences is anticipated on tasks that tap executive cognitive functions of updating, shifting and inhibition (i.e., Wisconsin Card Sort and Stroop tasks) as well as working memory and fluid intelligence.
- H2: Aging-related increase in reliance on stored knowledge, or crystallized intelligence, was predicted to maintain stability of social cognition (ToM), as tested by mediation analysis.

H3: Independence of creative cognition from decline in executive cognition with normal aging is expected to be evident; that is, no age-related differences in creative cognition were anticipated, despite a decline in executive cognition.

## Method

### Participants

The initial sample consisted of 92 community-based volunteers, which was reduced to 88 after removal of two multivariate outliers and two who did not meet the inclusion criteria. The final sample consisted of 61 women and 27 men ranging in age from 25 to 85 years ( $M = 62.76$  years,  $SD = 15.36$ ) with a mean education of 12 years ( $SD = 2.79$ ). Education level was not significantly correlated with age in this sample, nor was there a relationship of age with gender. Participants were recruited as neurologically healthy volunteers from the general community and social clubs through advertisements and announcements. All participants possessed adequate vision and hearing. Individuals with minor physical abnormalities (e.g., diabetes with no serious complications, essential hypertension, mild hearing loss) were included in the study. Exclusion criteria included brain injury; cardiovascular disease; alcohol misuse; clinically significant cognitive impairment, anxiety or depression; or taking medication likely to affect cognitive function. Participants were screened for brain injury, cardiovascular disease and medications by means of yes-no questioning. Screening for alcohol use, cognitive impairment, anxiety and depression was via the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), the Mini Mental Status Examination – Second Edition, Brief Version (MMSE-2:BV; Folstein, Folstein, White, & Messer, 2010), and the Depression Anxiety and Stress Scales (DASS-21; Lovibond & Lovibond, 1995) respectively. Exclusion was based on accepted cut-off scores for the relevant instruments: an AUDIT score higher than 16, a score below 14 on the MMSE-2:BV, or a depression score higher than 11 or anxiety score higher than 8 on the DASS-21.

### Exclusion Criteria Measures

The following measures were used to determine whether volunteers met criteria for participation.

**Depression Anxiety and Stress Scales (DASS-21; Lovibond & Lovibond, 1995).** The DASS-21 measures three psychometrically distinct factors: Depression, Anxiety and Stress. The total scale is made up of 21 statements, with 7 for each factor. Responses are scored on a 4-point Likert scale from 0 = “did not apply to me at all” to 3 = “applied to me most of the time.” It has demonstrated satisfactory psychometrics and factor structure that have been substantiated by Lovibond and Lovibond (1995) and subsequent replication in clinical and non-clinical samples (Antony, Bieling, Cox, Enns, & Swinson, 1998; Clara, Cox, & Enns, 2001; Daza, Novy, Stanley, & Averill, 2002; Henry & Crawford, 2005; Sinclair et al., 2012). Reliability analysis in the present study replicated adequate internal consistency on all factors ( $\alpha = .89$ ,  $.65$ , and  $.81$  for Depression, Anxiety, and Stress respectively).

**Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993).** The widely used AUDIT contains 10 questions assessing quantity/frequency, dependence, and alcohol-related consequences or harm. Every AUDIT question is scored from 0 to 4, with an overall score ranging from 0–40. The cut-offs for Low Risk, Hazardous and Harmful drinking are 1–7, 8–15 and 16+ respectively. The alpha reliability coefficient was  $.78$  in the present sample.

**Mini Mental Status Examination – Second Edition, Brief Version** (MMSE-2: BV; Folstein et al., 2010). The MMSE-2 is designed for rapid assessment of global cognitive status and has been shown to be effective for screening purposes. The short form of the original test assesses three cognitive functions of the original MMSE: registration, orientation to time and place, and recall. Of the total 16 points, a score below 14 indicates cognitive impairment. Cross validation with the original MMSE found the short version to be as sensitive a test for screening for cognitive impairment (Schultz-Larsen, Lomholt, & Kreiner, 2007; Schultz-Larsen, Rahmanfard, Kreiner, Avlund, & Holst, 2008). The present study used the MMSE as a screening tool to ensure that only those with scores of 14 or higher were included in the sample.

### Primary Measures

**Demographic Questionnaire.** Participants were asked to complete demographic questions pertaining to age, gender, years of education, smoking and drug use levels, medical conditions (e.g., cardiac health, brain trauma) and medications.

**National Adult Reading Test** (NART; Nelson, 1982). The NART provides an estimate of crystallized intelligence in the form of accumulated verbal knowledge. The NART is an untimed measure consisting of 50 irregularly pronounced words (irregular grapheme–phoneme or stress patterns) which the subject is required to read aloud. Internal consistency has been found to be high, ranging from  $\alpha = .85$  to  $.94$  in repeated investigations (Kiely et al., 2010; Uttl, 2002). The alpha reliability coefficient was  $.85$  in the present sample.

**Matrices Test from the Kaufman Brief Intelligence Test, Second Edition** (KBIT-2; Kaufman & Kaufman, 2004). The KBIT-2 is a brief, individualized format for measuring verbal and nonverbal intelligence in children and adults from age 4 years, 0 months to 90 years, 11 months. The test consists of three subtests, two verbal and one non-verbal, the latter of which is a matrices test of visual processing and fluid intelligence. The matrices test, used for this study, consists of 46 multiple-choice type items based on abstract patterns. For items 10 to 46, the examinee must choose which of six patterns or pictures best completes a  $2 \times 2$ ,  $3 \times 3$  or  $3 \times 2$  matrix. There is no time limit or motor component in this test. Kaufman and Kaufman reported temporal stability of  $r = .80$  over a 2-month interval.

**Alternate Uses Task** (Wallach & Kogan, 1965). This widely used verbal measure of creative thinking (Cheung, Lau, Chan & Wu, 2004; Plucker & Renzulli, 1999) is an open-ended ideation fluency test that allows numerous responses. Subjects were presented with three common objects (brick, shoe and newspaper) and were asked to generate as many alternate uses as possible for each object, with no time limit imposed. The final scoring of ideation fluency was based on two measures: the number of categories and the rarity of the response.

**Figural Task from the Abbreviated Torrance Test for Adults** (ATTA; Goff & Torrance, 2002). The Figural Task is based on a nonverbal test of ideational fluency from the ATTA but extends the test so that it is composed of two pages of nine triangles rather than one. The subject is requested to use the triangle shapes to generate as many pictures or ideas as possible, with no time limit. Scoring based on total ideation output loads on an innovation/originality factor consistent with creativity and divergent thinking (Kim, Cramond, & Bandalos, 2006).

**Reading the Mind in the Eyes Test** (RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). The RMET is regarded by some as the prototypical task for the assessment of

affective ToM (Kemp, Després, Sellal, & Dufour, 2012; Moran, 2013; Pardini et al., 2013; Poletti, Enrici, & Adenzato, 2012). This task consists of 36 photographs of the ocular region of different human faces. Participants are required to choose between four options for the best descriptor of the individual's mental state. The RMET yields a total score resulting from the sum of correct responses on the 36 items. This score reflects a single factor substantiated through confirmatory factor analysis (Vellante et al., 2012). Temporal stability over one year was adequate at  $r = .63$  (Fernández-Abascal, Cabello, Fernández-Berrocal, & Baron-Cohen, 2013) and excellent over one month at  $r = .83$  (Vellante et al., 2012).

**Wisconsin Card Sorting Test (WCST)** (Heaton, Chelune, Talley, Kay, & Curtiss, 1993). The WCST assesses planning, cognitive flexibility, set maintenance, goal directed behavior and inhibition of impulsive responding (Chelune & Baer, 1986; Gamboz, Borella, & Brandimonte, 2009). A computerized version of the WCST 64 was administrated in the present study using the Psychological Experiment Building Language (PEBL) test battery version 0.12 (Fox, Mueller, Gray, Raber, & Piper, 2013). On each trial, the participant is presented with four reference cards and a response card and must decide which reference card to match the response card with, based on the stimulus characteristics of color, shape or number. After 10 correct sorts the sorting criterion changes and the participant must discover the new sorting criterion via feedback. Error scores were manually calculated according to the WCST 64 professional manual (Kongs, Thompson, Iverson, & Heaton, 2000). The measures of interest in the present study were total errors and perseverative errors (PE) as both are sensitive to PFC dysfunction (Barcelo & Knight, 2002).

**Stroop Test** (Stroop, 1935). The Stroop Test is widely used to measure response inhibition (Cothran & Larsen, 2008; Moering, Schinka, Mortimer, & Graves, 2004; Van der Elst, Van Boxtel, Van Breukelen & Jolles, 2006). The procedure tests the ability to inhibit an over-learned verbal response (i.e., the automatic inclination to read printed words) in order to generate a conflicting response of naming dissonant ink colors in which the words are printed. The test consists of three conditions: color naming, word reading and interference/inhibition. The participants are instructed to rapidly read or name colors from three stimulus cards, the first with squares or patches printed in colors, the second with color words printed in black ink on a white background and the third with color words printed in contrasting colors. The cards consist of two practice rows of five columns, followed by the test consisting of 50 elements in five rows and ten columns. The component tasks in this study were considered to be color naming and word reading. The higher-level task was the Inhibition task which asks the subject to ignore the word and name the color of the ink as quickly as possible and therefore demonstrate mental flexibility by inhibiting the natural response. The Stroop interference effect was calculated as the difference in response time (in seconds) for the inhibition task versus the average of the response time for both component tasks, for example: (reading words in black ink + naming colors of color-patch cards)/2.

## Procedure

After obtaining ethical clearance from the University Human Research Ethics Committee, recruitment of community participants was made possible through flyers posted on shopping center notice boards and at Endeavour College, visits to clubs (National Seniors, Lions clubs, University of the Third Age and RSL club), and word-of-mouth. Each participant was de-identified by assigning a number to their packets of questionnaires and performance tests. To minimize fatigue, questionnaire completion and testing were conducted in two sessions: one for the questionnaires and one for the performance tasks. Testing was conducted at a time and

location convenient to participants, either in the privacy of a psychology clinic or their own homes. Participants were requested to take regular breaks while completing the tasks to reduce fatigue. Time taken to complete testing in total ranged from one to two hours, with older participants generally taking more time. To maintain consistency, all testing was conducted by a single administrator. There was no incentive offered for participation.

## Results

Intercorrelations of measures are shown in Table 1. The NART index of crystallized intelligence was significantly positively correlated with age, suggesting accumulation of verbal knowledge across the lifespan, and with the RMET index of social cognition. On the other hand, the K-BIT Matrices index of non-verbal fluid intelligence was significantly negatively correlated with age, and the executive cognition indices of WCST total errors, WCST perseverative errors and Stroop interference were all significantly positively correlated with age, indicating worse performance with increasing age across the sample as expected based on the evidence that these tests are sensitive to PFC function. By contrast, none of the measures of social or creative cognition were significantly correlated with age, though they were intercorrelated with each other.

	Age	RMET	Uses	ATTA	NART	Stroop	WCST	PE
RMET	-.16							
USES	-.04	.26*						
ATTA	-.15	.21*	.51**					
NART	.29**	.34**	.17	.13				
Stroop	.36**	-.20	-.16	-.31**	-.21			
WCST	.45**	-.23*	-.10	-.30**	.01	.13		
PE	.35**	-.27*	-.07	-.13	.14	.08	.78**	
K-BIT	-.42**	.27*	.29**	.41**	.13	-.47**	-.45**	-.30**

\*\* $p < .01$

\* $p < .05$

Table 1: Intercorrelations among Age, Reading the Mind in the Eyes Test (RMET), verbal and non-verbal creativity tasks (Uses and ATTA), crystallized intelligence (NART), inhibition (Stroop), WCST total errors (WCST) and perseverative errors (PE), and nonverbal fluid intelligence as measured by Matrices (K-BIT).

## Mediation Analysis

Given the positive correlation of RMET performance – a ToM index of social cognition – with NART scores and of the latter with increasing age, we examined the hypothesis that the apparent preservation of RMET performance across age in the sample might be attributable to increasing age-related reliance on accumulated knowledge, or crystallized intelligence, for this task. Path analysis, using the SPSS bootstrap macro (Preacher & Hayes, 2004), assessed for the indirect effect of crystallized intelligence on the relationship between age and affective ToM as indexed by RMET. This nonparametric resampling method of estimating effect size does not impose the assumption of normality of the sampling distribution. In small to moderate sized samples where the total indirect effect is rarely normal, bootstrapping is recommended (Preacher & Hayes, 2008ab). It uses a random sampling-with-replacement technique generating a number of subsamples from the original sample to provide an empirical sample distribution of indirect effects. At least 1000 bootstrap samples are selected to compute confidence intervals (derived from the indirect effect estimates and their standard

errors); the 95% confidence intervals must exclude zero if a significant indirect effect is to be supported. There was a significant effect of aging on the RMET scores through the NART,  $b = 0.03$ , BCa CI [0.01, 0.08]. The relationship between affective ToM and aging was explained by the influence of crystallized intelligence (see Figure 1).

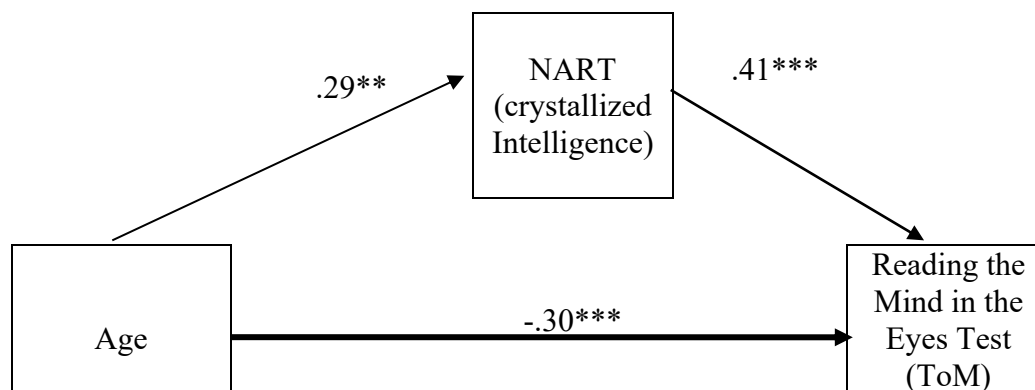


Figure 1: Age as a predictor of affective Theory of Mind (ToM), mediated by crystallized intelligence. The confidence interval for the indirect effect is bootstrapped based on 1000 samples. Standardized betas are shown for all paths.

The direct effect was negative and significant: increasing age was associated with a significant reduction in emotion recognition performance. The effect of age on NART was positive (increasing age, greater word recognition) and the effect of NART on emotion recognition was positive (improved word recognition, improved emotion recognition), resulting in a positive indirect effect. The magnitude of the direct effect ( $\beta = -.30$ ,  $p = .004$ ) was greater than the total effect ( $\beta = -.17$ ,  $p = .09$ ). This indicates suppression rather than mediation (MacKinnon, Krull, & Lockwood, 2000), such that the magnitude of age-related differences in social cognition was reduced by the influence of word recognition from the crystallized knowledge base, as predicted.

### Single Dissociation Design

To explore whether creative cognition is largely independent of the apparent age-related decline in executive cognition, a single dissociation design was used. The differences in magnitude of the correlations of age with verbal and non-verbal tasks of creativity compared with the magnitude of correlations of age with executive function indices of inhibition and perseveration were tested for significance using Fisher's  $r$  to  $z$  transformation. The correlation of age with the Alternative Uses Task for verbal creativity was found to be significantly smaller than the correlation of age with Stroop inhibition ( $z = -2.50$ ,  $p = 0.01$ ). The correlation of age with the ATTA for non-verbal creativity was also found to be significantly smaller than the correlation of age with Stroop inhibition ( $z = -3.24$ ,  $p = .001$ ). The correlation of age with verbal creativity was found to be significantly smaller than the correlation of age with WCST perseveration ( $z = -2.63$ ,  $p = .008$ ). The correlation of age with non-verbal creativity was also found to be significantly smaller than the correlation of age with perseveration ( $z = -3.37$ ,  $p = .0008$ ).

## Discussion

As predicted based on the frontal lobe hypothesis on aging – which claims that there is a characteristic aging-related decline in executive cognitive function and fluid intelligence due to deterioration of the PFC (Cardenas et al., 2011; Schretlen et al., 2000) – Stroop interference and WCST error scores increased with age in the present sample, and the K-BIT Matrices index of non-verbal fluid intelligence decreased with age. The increase in the Stroop interference effect with age is consistent with an aging-related decline in selective attention, response inhibition and/or processing speed (Davidson, Zacks, & Williams, 2003), whereas the aging-related increase in WCST errors signifies impaired cognitive flexibility and shifting (Miyake et al., 2000). The apparent age-related differences on K-BIT Matrices are consistent with declines in other PFC-related functions such as abstraction and working memory with aging.

The RMET index of ToM, an important aspect of social cognition, was not significantly correlated with age. The path analysis, however, indicated that the association between age and the ability to attribute complex mental states to pictures of eyes was mediated by crystallized intelligence. Age-related differences in performance of this social cognition task appeared to be suppressed by the influence of the crystallized knowledge base, suggesting an aging-related change in strategies used to perform this task. By utilizing the automatic component of social cognition, stability in performance may be maintained despite the decline in executive control processes. Automatic stimulus-induced activation of schemas constructed in stored knowledge – corresponding to crystallized intelligence – appears to remain resistant to decline in normal aging (Horn & Cattell, 1967; Salthouse, 2000; Sullivan & Ruffman, 2004). Furthermore, there was evidence of an apparent increase in crystallized intelligence (as indexed by NART) with increasing age across the sample. The ability to access an increasing store of knowledge derived from lifelong experience may provide a compensatory mechanism underlying the maintenance of stability in performance on those social cognition tasks that require automatic processing to a substantial degree.

Creative cognition tasks did not show variation in performance as a function of age in the present sample. The single dissociation was consistent with the hypothesis that processes involved in creative cognition are largely independent of age-related decline in executive cognition. Although dissociation designs are generally used to infer the existence of separate mental processes, in this research the use of single dissociation does not conclusively indicate that. The single dissociation was however consistent with the hypothesis that creative cognition is selectively preserved in aging and suggests a reduced reliance on controlled processing and an increased reliance on implicit memory and automatic processing with advanced age. The finding that the performance of creative cognition tasks was stable across age may reflect the use by older adults of different strategies and compensatory mechanisms to complete these tasks. An increase in task-related prefrontal activation with advancing age, as well as other compensatory changes, may contribute to the relative stability of creative cognition in older people (Spreng et al., 2010).

## Limitations

Limitations of the current study include the non-random sampling where participants were predominantly affiliated with community groups, which restricts generalizability of the findings to the general population; the operationalization of crystallized intelligence with the NART, a word recognition test that only taps one domain of crystallized intelligence; and



most importantly the cross-sectional design, where testing was conducted at a single point in time such that differences associated with aging may have been confounded by cohort effects (inter-generational differences that are not due to aging). The present findings thus can only be interpreted to show age-related differences in task performance rather than age-related decline.

### **Conclusions and Future Research**

Despite the limitations, this study does provide further evidence consistent with aging-related changes in executive cognition and in some aspects of social cognition. In addition, the present research provides evidence consistent with a possible shift in processing strategies to preserve some aspects of cognitive function and compensate for age-related decline. As social cognition and creative cognition rely on both controlled and automatic processing, such compensatory strategies may involve a relative increase in use of automatic processing from stored knowledge and implicit memory. The role of automatic processing in maintaining cognitive performance into old age might be investigated in future research by assessing the contribution of gist reasoning. Furthermore, future research on social or creative cognition should probably utilize a more comprehensive operationalization of crystallized intelligence than that provided by the NART. Finally, although difficult to accomplish, only a longitudinal approach can conclusively demonstrate age-related stability or decline in cognitive functioning across various domains, as such research avoids the vexing issue of potential cohort effects.

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