International Journal of Psychological Studies

CANADIAN CENTER OF SCIENCE AND EDUCATION

Editorial Board

Contents

Treating Public Speaking Anxiety: A Comparison of Exposure and Video Self-Modeling

Emily M. Bartholomay[1] & Daniel Houlihan[2]

[1] University of Southern Illinois, USA

[2] Center for Excellence in Scholarship and Research, Minnesota State University, Mankato, MN., USA

Correspondence: Daniel Houlihan, Center for Excellence in Scholarship and Research, Minnesota State University, Mankato, MN., USA

Abstract

The purpose of this study was to examine the relative effectiveness of video self-modeling (VSM) and exposure therapy in treating public speaking anxiety (PSA) in a college student. The study employed a single-subject A-B design with parametric variations. Two phases were utilized in this study: baseline (exposure therapy) and intervention (video self-modeling) with a one-month follow-up. Generalization probes were also employed to assess whether or not decreases in PSA would generalize to other settings. Results of this study indicate a significant decrease in self-report public speaking anxiety from both pre- to post-treatment as well as from baseline to exposure sessions. However, these results may be specific to public speaking anxiety, as other forms of anxiety (i.e., social anxiety) did not result in similar decreases. Results from a post-treatment survey indicated that the participant felt that the treatment was beneficial in reducing public speaking anxiety and increasing confidence, providing additional support for the treatment package.

Keywords: public speaking anxiety, exposure, video self-modeling, treatment, social anxiety

1. Introduction

1.1 Public Speaking Anxiety

Public speaking anxiety is a pervasive clinical issue, with approximately one in five people reporting an excessive degree of anxiety when speaking in public (Leary & Kowalski, 1995). In college student populations, this problem is particularly concerning with approximately one-third of people reporting at least a moderate need for intervention with public speaking anxiety (PSA; Bishop, Bauer, & Becker, 1998). These rates are even higher among individuals who have been diagnosed with Social Anxiety Disorder (SAD), with approximately 97 percent of people reporting feeling distressed by public speaking (Beidel & Turner, 2007). Social anxiety disorder (SAD) is one of the most common anxiety disorders, with approximately seven percent of the United States population reporting current social anxiety (American Psychiatric Association, 2013). Social anxiety disorder is characterized by an intense fear of social situations in which the individual may be judged by others (American Psychiatric Association, 2013). With the typical onset of social anxiety being during adolescence, many individuals may "grow out" of the disorder. However, for those who do not, the disorder tends to be chronic and causes pervasive impairment. This makes the college years a critical turning point for effectively treating the condition.

Although PSA and SAD have similar origins, research suggests that public speaking anxiety is distinct, in that individuals who are nervous about public speaking may exhibit significant PSA while failing to endorse any other symptoms of social anxiety (Blőte, Kint, Miers, & Westenberg, 2009). Further supporting this notion, in terms of overall anxiety, Blőte et al. (2009) found that individuals with PSA are more similar to non-anxious controls than to individuals with SAD. Although public speaking anxiety is more commonly experienced by individuals with social anxiety disorder than non-anxious individuals, individuals who are only experiencing impairment due to PSA are less likely to seek treatment (Blőte et al., 2009). This may be because impairment related to speech anxiety is less widespread than the numerous levels of impairment experienced by individuals with SAD.

There are many factors that may influence speech-anxious individuals that do not necessarily impact the general public in the same way. For example, research suggests that individuals with high levels of public speaking anxiety are more sensitive to the facial expressions of others than individuals with lower levels of PSA (Dimberg &

Thunberg, 2007). This finding is especially important when implementing an exposure-based intervention for speech anxiety. In order to reduce as much audience influence as possible, members should maintain neutral facial expressions in order to avoid influencing the performer.

Measuring public speaking anxiety without the use of self-report measures can be complex. Although there are some tools that measure physiological aspects of PSA, these methods are often too expensive and complex for outpatient or school settings (Antony, Orsillo, & Roemer, 2001). Additionally, there are few well-established means for measuring behavioral manifestations of anxiety. Speech dysfluencies are common behavioral representations of social anxiety, and they can be measured through direct observation. Anxious individuals are more likely to stutter, repeat themselves, make less eye contact, use verbal crutches (i.e., "um," "uh"), implement unnecessary pauses, and have overall poorer communication skills than non-anxious individuals (Leary & Kowalski, 1995). By using direct observation to measure speech dysfluencies, researchers can better understand and track treatment outcomes.

1.2 Treatments of PSA

The treatment of PSA has been thoroughly addressed in the literature. Although a large proportion of the population reports speech anxiety as a concern, most people do not seek treatment (Leary & Kowalski, 1995). However, there are serious implications for not treating PSA, specifically in the college community. For example, many universities require students to take specific classes to develop their speech skills, and many upper-level courses require presentations. Individuals suffering from speech anxiety may face negative consequences including, but not limited to, poorer grades, embarrassment, and challenges in job interview situations when joining the workforce (APA, 2013). Therefore, treating PSA is vital, and doing so earlier in the lifespan can help prevent the negative outcomes often associated with this condition.

Many of the treatments for PSA are similar to those common of social anxiety disorder. Specifically, behavior therapy and cognitive-behavior therapy are among the most common interventions. Exposure, a form of behavioral therapy is generally quite effective at reducing anxiety, even when this treatment stands alone (i.e., without any cognitive restructuring; Richman, 1995). In order to extend the effects of treatment, Tsao and Craske (2000) suggest expanding the treatment schedule. This involves scheduling sessions further apart (e.g., 5 days, 7 days, 10 days, etc.) in order to reduce spontaneous recovery of speech anxiety.

Social impact theory posits that speech anxiety can be explained by both social desirability and audience size (Beatty & Payne, 1983). For example, individuals are more likely to experience elevated speech anxiety in the presence of a large audience. Furthermore, an individual who desires approval from the audience is at risk of having higher PSA levels (Beatty & Payne, 1983). Although an individual's desire for social approval cannot be directly adjusted as an independent variable, audience size can be modified in order to diminish anxiety levels.

Although there is some discord among researchers as to which type of therapy is most effective in treating PSA, Sefchick, (1987) found that cognitive behavioral therapy, is more effective than both exposure therapy and cognitive restructuring on their own. Some other aspects that may enhance therapy include peer feedback, positive thinking, and skills training (Ayers, 1988; Hayes & Marshall, 1984; Lawm, Schwartz, Houlihan, & Cassisi, 1994).

1.3 Video Self-Modeling

Video self-modeling (VSM) is defined as, "the behavioral change that results from the observation of oneself on videotape that show only desired target behaviors" (Dowrick & Biggs, 1983, p. 105). The theoretical support for VSM is embedded in Bandura's social learning theory. Reciprocal determinism, the basis of social learning theory, posits that the individual's behavior influences the environment and that the environment influences the individual's behavior (Bandura, 1977). One key element of observational learning that makes modeling more likely to occur is that the model and the observer are similar (Bandura, 1977). Because the model and observer are the same person, VSM exemplifies the similarity between the model and observer, thus making the observer more likely to reproduce the desirable behaviors that the model originally produced (Dowrick & Biggs, 1983).

According to Dowrick and Biggs (1983), self-modeling is an effective technique, but there are steps that researchers and clinicians should take when implementing VSM. The major concern to address in VSM is the use of edited video. Because having participants watch themselves make mistakes can be detrimental to the therapeutic process (thereby reducing self-confidence), videos should be edited to remove speech dysfluencies (e.g., stuttering, unnecessary pauses) and other potentially problematic physiological reactions (e.g., blushing, heavy breathing). The edited videos exemplify a major aspect of treatment of social anxiety disorder: cognitive change. By individuals observing only positive aspects of their performances and being unable to negatively evaluate their behavior, which is a major maintaining factor in SAD, cognitive change is occurring (Beidel & Turner, 2007).

However, it is important to have the video seem realistic, so obvious editing should be discouraged (Dowrik & Biggs, 1983).

1.4 History of Use with PSA

The use of VSM to treat public speaking anxiety is still in its infancy, and results of the research to date are mixed. Kruger (2013) failed to find significant decreases in self-report anxiety between exposure and VSM conditions. Likewise, the results of behavioral manifestations of PSA were mixed with only one participant showing significant decreases in speech dysfluencies while the results from the other participant demonstrated an increase in speech dysfluencies.

Contrary to Kruger' findings, Poppenga (1996) found significant decreases in self-reported public speaking anxiety from baseline to intervention conditions. Poppenga found further support for VSM treatment through reductions in state anxiety and subjective discomfort. Results of behavioral manifestations of PSA were mixed, with some participants demonstrating improvement and other demonstrating stability or deterioration. Although the data demonstrate improvement from pre-treatment to post-treatment, it does not seem that VSM plays a role in the reductions. Rather, it appears as though exposure was the primary cause for reductions in self-report anxiety scores due to the lack of change in score trajectory.

Rickards-Schlichting, Kehle and Bray (2004) also found significant decreases in self-reported speech anxiety from the baseline to intervention phase. However, because this study employed an A-B design as opposed the multiple baseline design used by Kruger (2013) and Poppenga (1996), there are issues related to internal validity (e.g., the role of participant history and external events) that need to be addressed. Although the results of this study are not necessarily robust, a major advantage of this study is the population studied. Although most research on the topic of PSA involves young college students (e.g., Kruger, 2013 & Poppenga, 1996), Rickards-Schlichting et al. established generality by using participants who were in high school, suggesting that VSM treatment of public speaking anxiety can successfully be implemented with younger populations.

The majority of treatment targets of VSM research included increasing appropriate classroom behaviors (e.g., sharing, hand-raising, on-task behavior; Hitchcock, Dowrick, & Prater, 2003). However, VSM has been used to effectively treat more complex tasks including improving swimming performance, math skills, and reading fluency (Dowrick & Dove, 1980; Dowrick & Power, 1998; Dowrick, Power, Ginsburg-Block, Kim-Rupnow, & Manz, 2000; Schunk & Hanson, 1989; Woltersdorf, 1992). Using VSM to treat public speaking anxiety is a growing area of interest; however, the studies done in this area are replete with issues bringing the validity of their results into question.

1.5 The Current Study

The current study was devised to determine if exposure therapy and video self-modeling effectively treat public speaking anxiety. First, we hypothesize that participants' SIAS scores will decrease from pre-treatment to post-treatment. This hypothesis will be used to determine if the combination of treatments (exposure and VSM) effectively reduce the participant's level of social anxiety, which is commonly associated with public speaking anxiety. Second, we expect to see a decrease in the participant's PRCS-12 scores from pre-treatment to post-treatment. The purpose of this hypothesis is to determine if the treatment package effectively reduces public speaking anxiety. Third, we hypothesize that PRCS scores will be significantly lower in the intervention (VSM) phase than in the baseline (exposure) phase. This hypothesis is being used to verify the effectiveness of VSM at treating public speaking anxiety in comparison to exposure. Fourth, we expect to see that the participant's SUDS scores will be significantly lower in the intervention (VSM) phase than in the baseline (exposure) phase. The issue of concern with this hypothesis is if VSM is more effective than exposure at reducing anxiety levels immediately prior to giving speeches. Finally, we anticipate that the participant's direct observation scores (intervals indicative of PSA) will be significantly lower in the intervention (VSM) phase than in the baseline (exposure) phase. The purpose of this hypothesis is to determine if VSM is more effective than exposure in reducing behavioral manifestations of anxiety.

2. Method

2.1 Participants

Flyers were posted throughout the community advertising a free treatment for public speaking anxiety. Thus, participants were recruited from various locations throughout a Midwestern community. Interested individuals were instructed to contact the researchers with provided contact information and were invited to attend a screening session to determine if the individual met inclusion criteria for the study.

Individuals who were interested in treatment were administered the Personal Report of Confidence as a Speaker-Short Form (PRCS-12; Hook, Smith, & Valentiner, 2008) in an initial screening session. The PRCS-12 was used as the primary screening measure. Because there is no agreed upon cutoff score, a score in the 67th percentile (a score of 8 out of 12) was used as the inclusion criterion to ensure that the individuals screened were truly suffering from public speaking anxiety.

Three individuals attended screening sessions and met inclusion criteria. However, two of the participants dropped out of the study for personal reasons, yielding a single participant. The participant was a 19-year-old female attending school at a mid-sized Midwestern university. She endorsed significant public speaking anxiety, scoring 10 out of 12 on the PRCS in the screening session.

2.2 Instruments

At the first and final sessions, the Social Interaction Anxiety Scale (SIAS) was administered. The SIAS is a 19-item self-report scale that measures social anxiety. Two of the items on this scale are reverse coded. This scale was developed by Mattick and Clarke (1998) by combining social anxiety inventories and newly created items based on information obtained from clinical interviews with individuals with SAD. The most predictive 19 items from the original 164 items were selected for use. The SIAS demonstrates high internal consistency (α=.90) and fair convergent validity ($r = .41$-$.72$; Brown et al., 1997; Osman, Gutierrez, Barrios, Kopper, & Chiros, 1998). Sample items include, "I am tense mixing in a group," and "I find it difficult to disagree with another's point of view."

At each session, the PRCS-12 was administered. The PRCS-12 is a 12-item self-report measure that assesses speech anxiety. The 12-item version of this scale, developed by Hook, Smith, and Valentiner (2008), was derived from the 30-item scale to include the 12 most predictive items. The PRCS-12 demonstrates respectable internal reliability (α=.85) and acceptable convergent validity ($r = .15$-$.54$; Hook, Smith, & Valentiner, 2008).

The Subjective Units of Discomfort Scale (SUDS; Shapiro, 1995) was completed immediately prior to giving each speech. In this study, we used a 0-10 rating scale to measure self-report distress, with a zero indicating a complete absence of anxiety, a four indicating anxious thoughts/feelings that cause distraction, an eight indicating that the participant is so anxious they are unable to concentrate, and a ten indicating the highest level of anxiety the participant has ever felt. SUDS scores have been found to be significantly negatively correlated with patients' global assessment of functioning scores, ($r = -0.439$; Tanner, 2012). SUDS scores have also been found to be related to MMPI scores, showing a significant relationship between SUDS and the neurotic index of the MMPI (Tanner, 2012). The SUDS has also been found to effectively track treatment outcomes, with results demonstrating reduction in SUDS scores after 3 months of psychotherapy (Tanner, 2012).

Direct observation was used to record speech dysfluencies during each session. Although the literature suggests using momentary time sampling, some of the behaviors measured relied upon duration measures. As a result, momentary time sampling was considered inappropriate, so partial interval recording was used to measure speech anxiety. Behaviors indicative of speech anxiety are presented in Table 1. Approximately 30 percent of observations were rated by two observers in order to assess inter-observer agreement. Ten-second intervals were utilized in this study, and using partial interval agreement, inter-observer agreement was moderate, with an agreement rate of 86.2%.

Table 1.

Behaviors Indicative of Public Speaking Anxiety

Speaking too fast (the recorder cannot understand the speaker)

Speaking too softly (the recorder cannot clearly hear the speaker)

Stammering (unintentional repetition of words or letters within a word, i.e., not for emphasis)

Using verbal crutches (e.g. "um" "uh")

Extensive pauses (5 or more seconds without speaking)

Heavy breathing (i.e. gasping, evidenced by the recorder able to hear the breathing of the participant)

Lack of eye contact (5 or more seconds)

Fidgeting (unnecessary movement of hands/fingers/papers, [i.e., not for emphasis or page-turning])

Motionlessness (10 or more seconds with no movements or gestures)

Swaying (the shifting of weight from one leg to the other and back)

Note. All of these behaviors were removed during the editing process except lack of eye contact.

In order to address the participant's perception of treatment, a short self-report survey was given at the final session of treatment. This questionnaire included items to assess perception and utility of treatment and any variables that may have served as anxiety-inducing or anxiety-reducing confound.

2.3 Design

An experimental A-B design with parametric variations was utilized in this study, with "A" indicating baseline or exposure therapy and "B" indicating intervention or video-self modeling. Because VSM is a type of learning, a withdrawal design would not be appropriate for determining the effects of the intervention. Both baseline and intervention length were randomly assigned after the screening session, with possible length for baseline ranging from 3-7 sessions and intervention ranging from 5-9 sessions. Random number generation was used to select a session within each phase that would be used as a generalization probe.

2.4 Sampling Procedure

2.4.1 Exposure Intervention

During the baseline phase, the participant first completed the PRCS and SUDS. Upon completion of these measures, the participant was allowed five minutes to review a pre-written speech. After the five-minute review period, the participant performed a 6-8 minute videotaped pre-written speech that was randomly selected from a speech bank. The participant was allowed the transcript and any notes she wrote during her preparation period. Speech topics were over a range of general knowledge topics such as fast food consumption, tourist attractions, and social networking. Speeches were recorded using a Canon Power Shot ELPH 300 HS digital camera. These video recordings were used for direct observation analysis and were edited as part of the VSM treatment package. Immediately after performing the speeches, the participant was reminded of his/her right to withdraw from treatment. In addition, a debriefing session was conducted in order to alleviate any temporary anxiety that the participant may be experiencing. Imagery training and progressive muscle relaxation were implemented as a part of the debriefing sessions.

2.4.2 Video Self-Modeling Intervention

The only change from baseline to intervention phase was that, in the intervention phase, the participant watched an edited videotape of the speech performed in the last session prior to completing self-report anxiety measures. Speeches were edited with the software CyberLink PowerDirector, in order to remove any speech dysfluencies. Speech dysfluencies removed are listed in Table 1. These videos were between 2-5 minutes, as suggested by Dowrick and Biggs (1983).

2.4.3 Generalization Probes

In order to test generalization, only the researcher was present for speeches. However, for two of the twelve sessions, a larger audience, ranging from three to four people served as probes in order to ensure that treatment was able to generalize to a different audience. To further examine generalization, a follow-up session was conducted one month after treatment completion.

3. Results

Overall, the results indicate that treatments were effective at reducing self-reported public speaking anxiety. However, results regarding other forms of anxiety (e.g., social and momentary distress) were mixed.

3.1 Social Interaction Anxiety Scale

Prior to treatment, the participant endorsed a score of 25 out of 95 on the SIAS, suggesting the lack of presence of social anxiety disorder. At post-treatment, the participant again endorsed a score of 25. This lack of change indicates that the treatment was unsuccessful at treating PSA, failing to provide support for the first hypothesis.

3.2 Personal Report of Confidence as a Speaker

Prior to treatment, the participant endorsed a score of 8 out of 12 on the PRCS. At post-treatment, the participant endorsed 4 out of the 12 items on the PRCS. We used a 50% reduction in symptoms to signify a clinically significant decrease in anxiety symptomatology (Palermo, 2012). The 50% decrease in anxiety symptoms, indicates a significant decrease in PSA from pre- to post- treatment, thus, providing support for the second hypothesis. In addition, VSM did appear to be effective at reducing public speaking anxiety beyond the effects of exposure alone. These reductions suggest that the treatment was fairly effective, with PND = 71.4% (points of non-overlapping data;

Scruggs, Mastropieri, Cook, & Escobar, 1986) providing support for hypothesis 3. These results are maintained, as suggested by results of the follow-up session. These results are presented in Figure 1.
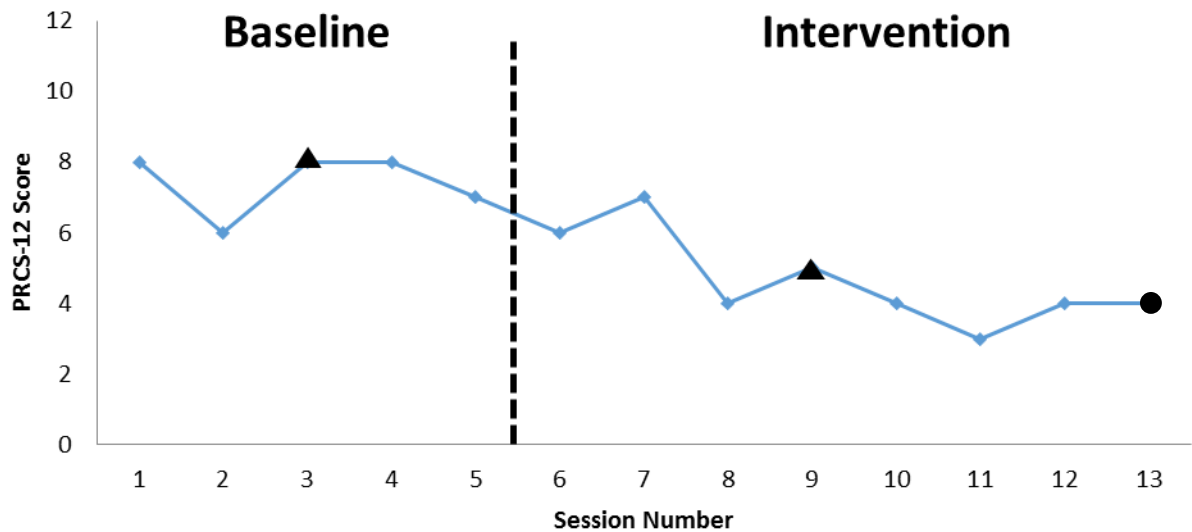
Figure 1. Participant scores on the Personal Report of Confidence as a Speaker. Triangles indicate generalization probes with larger audience size, and the circle indicates one-month follow-up.

3.3 Subjective Units of Discomfort Scale

VSM did not appear to be effective at reducing discomfort associated with public speaking anxiety. Statistical results suggest that this treatment was unreliable at reducing SUDS score, with PND = 14.2 %. Although there is a decrease in SUDS scores and this decrease is maintained, these results ultimately fail to support the fourth hypothesis (See Figure 2).

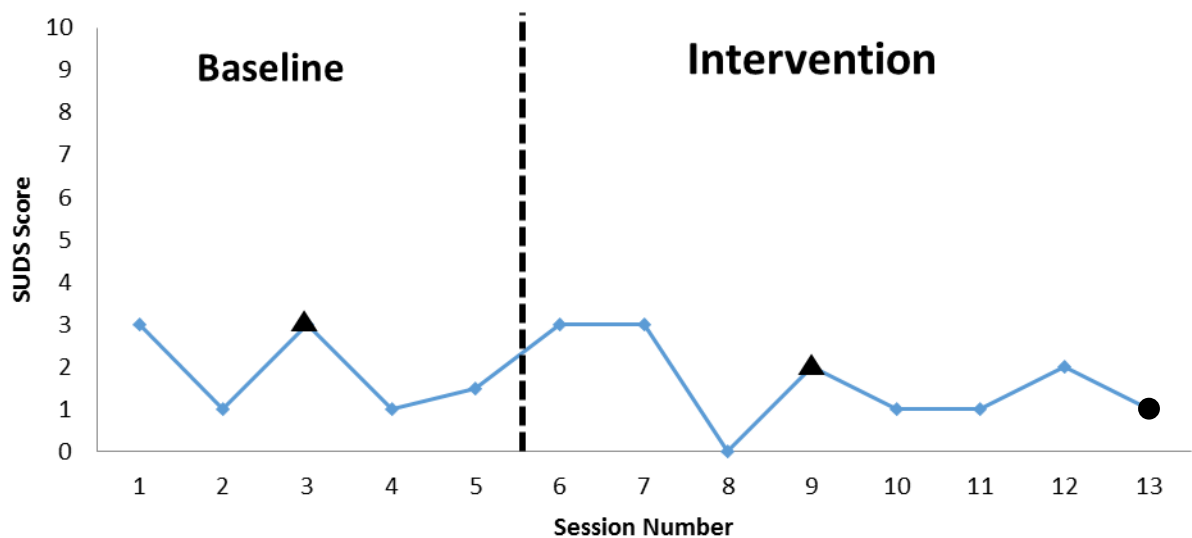Figure 2. Participant scores on the Subjective Units of Discomfort Scale. Triangles indicate generalization probes with larger audience size, and the circle indicates one-month follow-up.

3.4 Direct Observation

Treatment was ineffective at reducing behavioral manifestations of public speaking anxiety, with PND = 0.0 %. In addition, these results are maintained, as indicated by the follow-up session (See Figure 3).
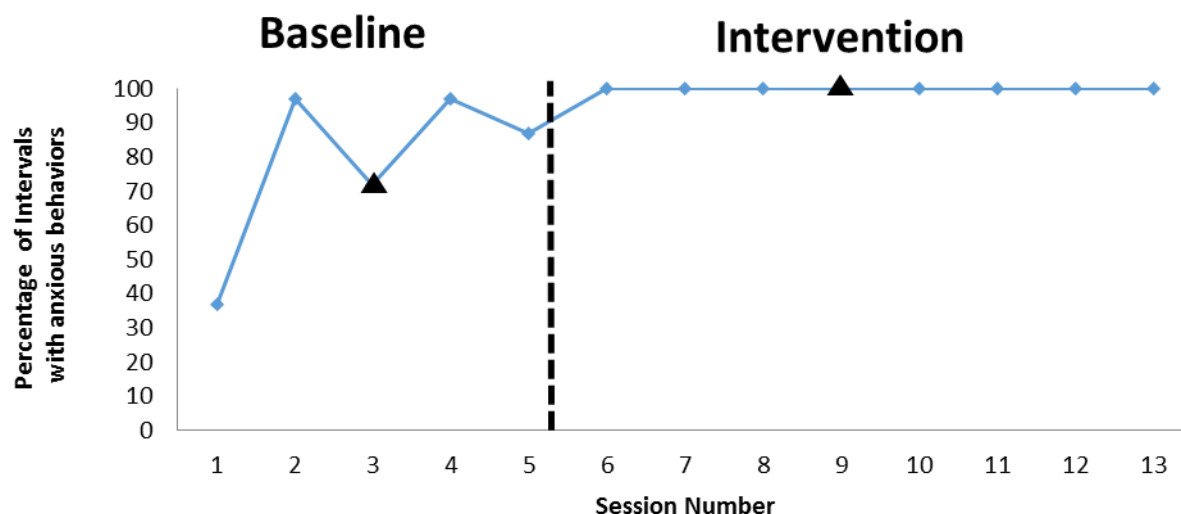
Figure 3. Participant percentage of intervals indicative of anxiety as measured by direct observation. Triangles indicate generalization probes with larger audience size, and the circle indicates one-month follow-up.

3.5 Perception of Treatment

The participant indicated that the treatment was effective at reducing public speaking anxiety while also increasing participant confidence while giving speeches. In addition, the participant indicated that she would recommend the treatment to others experiencing public speaking anxiety. Overall, the participant's satisfaction with treatment was high which may have increased the effectiveness of treatment in general.

In addition, a secondary purpose of the perception of treatment survey was to measure any variables that may be influencing treatment outcomes. The participant indicated that there were no other factors that had influenced treatment outcomes. However, the participant did indicate that she had given a speech for a class (prior to session 8), and reductions in anxiety are apparent (see Figures 1 and 2).

4. Discussion

Results of this study suggest that public speaking anxiety may be treated with both behavioral and cognitive-behavioral interventions. In addition, results indicate that including cognitive change provides added benefits in treatment that are unlikely to occur from exposure alone. In addition, results were maintained at a one-month follow-up, suggesting that treatment provides long-term decreases in public speaking anxiety. However, these results are specific to public speaking anxiety as the only outcome measure that indicated decreases was the PRCS. Overall, the participant's satisfaction with treatment was high, suggesting that this treatment should be used in the future to treat individuals in a variety of settings who experience anxiety associated with giving speeches.

Although this study does support the hypothesis that VSM provides additional benefits in comparison to exposure alone, research in this area is mixed. Furthermore, these results were only significant with one measure, the PRCS-12. More research needs to be conducted comparing VSM to other interventions in order to determine its effectiveness. In addition, other types of statistical analyses should be conducted to determine significance. For example, split middle or celeration line techniques should be used. These methods are able to test treatment effectiveness when considering the current course of behavior. This is an important consideration because with exposure therapy, the participant generally continues to improve even when another component is added to treatment. By using split middle or celeration line, it can be determined if the additional component provides benefits that would not be elicited by the initial treatment.

4.1 Limitations and Future Research

This study has some noteworthy limitations. First, this study has a small sample size, and thus, the options for study design are limited. This study employed an A-B design that lacks the experimental control that would be

provided in a multiple baseline design or a reversal design. Results could be enhanced through replication with other subjects over time. In addition, future research should contain larger sample sizes, in order to potentially produce robust results.

Using video self-modeling to treat public speaking anxiety is a novel method of treatment, and, thus far, only single-subject designs have been used to determine its effectiveness. Future research should include larger, randomized controlled trials to determine treatment effectiveness. By utilizing a larger sample size, statistical power will be increased, and the implications of such a study would be strengthened. Another major limitation of this study is the lack of sensitivity in some of the measures. The SUDS used in this study was an 11-point measure, and the participant scored within a small range on this measure (0-3). In addition, the PRCS is only a 12-point measure. Although the participant did exhibit a larger range of scores (3-10, including screening session), this measure is also fairly insensitive to change. Although some measures utilized in this case did indicate changes in scores, these changes were limited. In order to produce more meaningful and significant results, more sensitive scales should be developed to measure public speaking anxiety.

The debriefing session conducted at the end of each of session may have influenced results. Since relaxation skills were taught in this session, the participants may have utilized these techniques beyond the session which may have confounded the results. This may in fact be the case, as there is a notable decrease in PRCS and SUDS scores from the first to second session. Future research should be conducted without these debriefing sessions.

The major concern with this type of research is the trade-off between internal and external validity. Although an aim of this study was to capitalize on internal validity by implementing controls wherever possible, this results in a lack of external validity that can result in data that are not meaningful. One area within this trade-off is the treatment setting. The participant gave speeches to a small audience, which is atypical of most presentation settings. Furthermore, because the speeches were pre-written, the participants were likely to read the speeches as opposed to performing the speeches. This may aid in explaining why the participant demonstrated higher levels of speech anxiety, as indicated through direct observation data, as treatment progressed.

Future research should be done in a more naturalistic setting. For example, recording sessions in classroom setting in which individuals already give speeches may produce more meaningful results. Because public speaking anxiety is a clinical issue, it is important that results from research are able to be generalized. Thus, it is important for future research to highlight the potential external validity of research.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing. https://doi.org/10.1176/appi.books.9780890425596

Antony, M. M., Orsillo, S. M., & Roemer, L. (2001). *Practitioner's guide to empirically based measures of anxiety*. New York,, NY: Kluwer Academic/Plenum Publishers.

Ayers, J. (1988). Coping with speech anxiety: The power of positive thinking. *Communication Education*, *37*, 289-296. https://doi.org/10.1080/03634528809378730

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Beatty, M. J., & Payne, S. K. (1983). Speech anxiety as a multiplicative function of size of audience and social desirability. *Perceptual and Motor Skills*, *56*, 792-794. https://doi.org/10.2466/pms.1983.56.3.792

Beidel, D. C. & Turner, S. M. (2007). *Shy children, phobic adults: Nature and treatment of social anxiety disorder* (2nd ed.). Washington, DC: American Psychological Association. https://doi.org/10.1037/11533-000

Bishop, J. B., Bauer, K. W., & Becker, E. T. (1998). A survey of counseling needs of male and female college students. *Journal of College Student Development*, *39*(2), 205-210.

Blőte, A. W., Kint, M. J., Miers, A. C., & Westenberg, P. M. (2009). The relation between public speaking anxiety and social anxiety: A review. *Journal of Anxiety Disorders*, *23*, 305-313. https://doi.org/10.1016/j.janxdis.2008.11.007

Brown, E. J., Turovsky, J., Heinberg, R. G., Juster, H. R., Brown, T. A., & Barlow, D. H. (1997). Validation of the social intervention anxiety scale and the social phobia scale across the anxiety disorders. *Psychological Assessment*, *9*, 21-27. https://doi.org/10.1037/1040-3590.9.1.21

Dimberg, U., & Thunberg, M. (2007). Speech anxiety and rapid emotional reactions to angry and happy facial expressions. *Scandinavian Journal of Psychology*, *48*, 321-328. https://doi.org/10.1111/j.1467-9450.2007.00586.x

Dowrick, P. W. & Biggs, S. J. (1983). *Using video: Psychological and social applications.* New York, NY: John Wiley & Sons.

Dowrick, P. W., & Dove, C. (1980). The use of self-modeling to improve the swimming performance of spina bifida in children. *Journal of Applied Behavior Analysis*, *13*, 51-56. https://doi.org/10.1901/jaba.1980.13-51

Dowrick, P. W., & Power, T. J. (1998). *Video feedforward to promote reading, communication, and effective judgments by young children with disabilities* (2nd year report, H180G60031). Washington, DC: Office of Special Education Programs.

Dowrick, P. W., Power, T. J., Ginsburg-Block, M., Kim-Rupnow, W. S., & Manz, P. H. (2000). *ACE Reading: Feedforward to promote reading, communication, and problem-solving for students with disabilities* (Final Report, H180G70001). Washington, DC: U.S. Department of Education.

Hayes, B. J., & Marshall, W. L. (1984). Generalization of treatment effects in training public speakers. *Behavior Research and Therapy*, *22*, 519-533. https://doi.org/10.1016/0005-7967(84)90055-X

Hitchcock, C. H., Dowrick, P. W., & Prater, M. A. (2003). Video self-modeling intervention in school-based settings: A review. *Remedial and Special Education*, *24*(1), 36-45. https://doi.org/10.1177/074193250302400104

Hook, J. N., Smith, C. A., & Valentiner, D. P. (2008). *Personal Report of Confidence as a Speaker--Short Form* [Database record]. Retrieved from PsycTESTS. https://doi.org/10.1037/t20159-000

Kruger, A. M. (2013). *The use of video self-modeling to treat public speaking anxiety*. (Master's thesis). Retrieved from ProQuest Dissertations & Theses. (1541531).

Lawm, G. D., Schwartz, C., Houlihan, D., & Cassisi, J. E. (1994). Graduated exposure plus feedback in the treatment of speech anxiety. *Behavioral Interventions*, *9*, 213-223. https://doi.org/10.1002/bin.2360090403

Leary, M. R. & Kowalski, R. M. (1995). *Social anxiety*. New York, NY: The Guilford Press.

Mattick, R. P., & Clarke, J. C. (1998). *Social Interaction Anxiety Scale* [Database record]. Retrieved from PsycTESTS. https://doi.org/10.1037/t00532-000

Osman, A., Gutierrez, P. M., Barrios, F. X., Kopper, B. A., & Chiros, C. E. (1998). The social phobia and social interaction anxiety scales: Evaluation of psychometric properties. *Journal of Psychopathology and Behavioral Assessment*, *20*, 249-264. https://doi.org/10.1023/A:1023067302227

Palermo, T. M. (2012). *Cognitive-behavioral therapy for chronic pain in children and adolescents.* New York, NY: Oxford University Press. https://doi.org/10.1093/med:psych/9780199763979.001.0001

Poppenga, D. R. (1996). *The use of videotape self-modeling in the treatment of speech anxiety.* (Master's thesis). Mankato State University, Mankato, MN.

Richman, E. (1995). *The camera as audience: Video observation in peer- and self-directed flooding sessions to reduce public speaking anxiety.* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses. (9705617).

Rickards-Schlichting, K. A., Kehle, T. J., & Bray, M. A. (2004). A self-modeling intervention for high school students with public speaking anxiety. *Journal of Applied School Psychology*, *20*, 47-60. https://doi.org/10.1300/J370v20n02_04

Schunk, D. H., & Hanson, A. R. (1989). Self-modeling and children's cognitive skill learning. *Journal of Educational Psychology*, *81*, 155-163. https://doi.org/10.1037/0022-0663.81.2.155

Scruggs, T. E., Mastropieri, M. A., Cook, S. B., & Escobar, C. (1986). Early intervention for children with conduct disorders: A quantitative synthesis of single-subject research. *Behavioral Disorders*, *11*(4), 260-271. https://doi.org/10.1177/019874298601100408

Sefchick, B. C. (1987). *A comparison of cognitive-behavior therapy, relaxation therapy, and cognitive restructuring on state and trait anxiety in speech-anxious adults*. (Master's thesis). Retrieved from ProQuest Dissertations & Theses. (1332307).

Shapiro, R. (1995). *Eye movement desensitization and reprocessing. Basic principles, protocols, and procedures*. New York, NY: Guilford.

Tanner, B. A. (2012). Validity of global physical and emotional SUDS. *Applied Psychophysiology and Biofeedback*, *37*(1), 31-34. https://doi.org/10.1007/s10484-011-9174-x

Tsao, J. C., & Craske, M. G. (2000). Timing of treatment and return of fear: Effects of massed, uniform-, and expanding-spaced exposure schedules. *Behavior Therapy*, *31*, 479-497. https://doi.org/10.1016/S0005-7894(00)80026-X

Woltersdorf, M. A. (1992). Videotape self-modeling in the treatment of attention-deficit hyperactivity disorder. *Child & Family Behavior Therapy*, *14*(2), 53-73. https://doi.org/10.1300/J019v14n02_04

Do Elite Coaches from Disability Sport Use Psychological Techniques to Improve Their Athletes' Sports Performance?

Tânia Bastos[1], Rui Corredeira[2], Michel Probst[3] & António M. Fonseca[1]

[1] Centre of Research, Education, Innovation and Intervention in Sport (CIFI2D), Faculty of Sport, University of Porto, Porto, Portugal

[2] Research Centre in Physical Activity, Health and Leisure (CIAFEL), Faculty of Sport, University of Porto, Porto, Portugal

[3] Faculty of Kinesiology and Rehabilitation Sciences, Research Group for Adapted Physical Activity and Psychomotor Rehabilitation, KU Leuven, Leuven, Belgium

Correspondence: Tânia Bastos, Faculdade de Desporto da Universidade do Porto, Rua Dr. Plácido Costa, 91 – 4200.450 Porto, Portugal. Tel: 351-22-04-25-200. E-mail: tbastos@fade.up.pt

Abstract

Goal-setting, imagery, relaxation and self-talk are psychological strategies crucial for successful psychological preparation and consequently for the improvement of the athlete's sport performance. The coaches have an important role in the implementation of psychological skills training and may contribute to increase the use of psychological strategies by their athletes. Therefore, the purpose of this study was to examine the importance assigned to a group of psychological strategies (i.e., goal-setting, imagery, relaxation and self-talk) and its use in practice and competition setting by top elite coaches from disability sport. In-depth semi-structured interviews were conducted on ten elite Portuguese coaches. Content analysis was the qualitative methodology used for data analysis. Globally, the coaches acknowledge the importance of all four psychological strategies approached. However, the examination of the coaching routines on the application of psychological strategies suggested an undeveloped use of most of the strategies, specifically in the practice setting. Relaxation and self-talk were the most underused strategies. All the coaches reported the use of goal-setting in both the practice and competition setting. Overall, the present findings raise concerns about the effective contribution of Portuguese elite coaches for the development of successful psychological preparation among athletes with disabilities.

Keywords: coaches, goal-setting, imagery, relaxation, self-talk, qualitative methodology

1. Introduction

It is well known that psychological skills have a significant influence on athlete's performance achievements and personal development (Bonnar, 1997; Burton & Raedeke, 2008; Gould, Flett, & Bean, 2009). Highly successful athletes have great physical skills but also superior psychological skills that help them successfully deal with stress and pressure situations, to remain in control of emotions, to concentrate intensively and to set challenging but realistic goals. (Krane & Williams, 2006). In psychological training it is possible to distinguish between psychological skills and psychological techniques or strategies. Psychological skills training consists in a systematic use of psychological techniques (e.g., goal-setting, relaxation, imagery, and self-talk) in order to develop the psychological skills that coaches want their athletes to have (e.g., stress management and concentration) (Burton & Raedake, 2008). Therefore, psychological techniques are used to develop the athlete's psychological skills.

Goal-setting, relaxation, imagery and self-talk are the four psychological techniques referred to in the literature as powerful tools to enhance the development of psychological skills, and are usually developed in a combined process during psychological skills training programs. These four techniques are considered the workhorses in applied sport psychology once athletes can be taught how to control what they aim for and how they judge success (i.e., goal-setting), how to control their thoughts (i.e., imagery and self-talk) and how to control their activation levels, "pumping-up" or calming (i.e., relaxation) their mind and body (Lavalle, Williamns, & Jones, 2008).

In goal setting, athletes try to achieve a group of behavioural targets previously defined (Brewer, 2009). Goals help to focus attention and enhance an athlete's self-confidence and motivation (Burton & Raedeke, 2008). Although goal-setting is often used in the practice setting, focusing on goals is equally important in the competition setting. Goal-setting combined with self-talk will help the athletes to maintain focus on the goals during competition (Lavalle et al., 2008). Relaxation techniques require the ability to voluntarily decrease the amount of tension in muscles, calm the mind by keeping it productively occupied and decrease autonomic responses (e.g., heart rate, blood pressure) (Brewer, 2009). Relaxation strategies can be more physical in nature (e.g., deep breathing, progressive muscular relaxation) or more cognitive in nature (e.g., imagery of a quiet place).

Imagery is a powerful tool to help the athletes in the acquisition of new technical or psychological skills and consists in the creation of mental images associated to multiple senses and emotions (Brewer, 2009). Additionally, psychological benefits such as motivation, confidence and focus are related to the application of this technique (Hale, Seiser, Macguire, & Weinrich, 2005). Self-talk is typically described as the internal dialogue that athletes develop within themselves. The use of positive self-talk is very important in creating positive thoughts, feelings and behaviour in athletes, and consequently, in improving the sport outcomes (Brewer, 2009). Additionally, this strategy is useful to enhance the learning and execution of the correct skills (Lavalle et al., 2008).

Research has revealed that athletes with disabilities, just like any other, can benefit from the use of psychological techniques to improve their sport performance (Castagno, 2001; Hanrahan, 2007; Martin, 1999). Zoerink and Wilson (1995) found that athletes with intellectual disabilities are capable of setting goals in sports competition, understanding the meaning of winning and enjoying the challenge of competition. Harbalis, Hatzigeorgiadis, and Theodorakis (2008) suggested that the use of self-talk could be an effective tool for the improvement of performance in wheelchair basketball players. Eddy and Mellalieu (2003) emphasized the use of imagery by athletes with visual impairment when they studied a group of elite athletes. The authors found that goalball players use different forms of imagery (i.e., kinesthetic, tactile and spatial) in different moments (i.e., competition and practice).

Psychological skills training programs for athletes with disabilities are similar to those developed for athletes without disabilities (Harlick & McKenzie, 2000) and the challenge is to define the content of the preparation and the adaptation for each athlete individually (Page & Wayda, 2001). For instance, athletes with visual impairment can successfully use goal-setting, but they should have the opportunity to read and record information in Braille and tape record their goals (Hanharan, 1998). Athletes with physical disabilities such as amputations can develop the imagery technique but considerations have to be made regarding the use of prosthesis during sport performance in order to create the most suitable and realistic imagery sessions (Hanharan, 1995).

However, in order for athletes to successfully apply psychological techniques they need to learn the basic principles of each technique and be taught the most effective way to use them. In this context, the coach can have a crucial role in teaching their athletes how to use psychological techniques (Burton & Raedeke, 2008) in both training and competition settings. The coaches spend a great amount of time with their athletes and have the opportunity to enforce quality practice and to remind the athletes to use of psychological skills (Frey, Laguna, & Ravizza, 2003). Coaches must believe in the value of psychological training, understand their principles and apply them on a regular basis in the coaching plan.

Although the previously studies have demonstrated that athletes with disabilities can use psychological techniques to improve their performance, little is known about the routines of coaches from disability sport regarding the use of those same techniques. To our knowledge, no previous research has aimed to examine how elite coaches teach self-talk, imagery, goal-setting and relaxation to their athletes in both practice and competition settings. Knowing the importance that coaches assign to each specific psychological technique and its use in both competitive and practice settings can bring important insights about the relevance of psychological training in disability sport context. Therefore, the purpose of this study was to examine the importance assigned to self-talk, goal-setting, relaxation and imagery by Portuguese disability sport top elite coaches and how they use those techniques in the practice and competition settings.

2. Method

2.1 Participants

The sample was composed of ten coaches (eight males and two females) ranging in age from 25 to 65 years (M=45.7yrs; SD=13.0yrs) and their experience as coaches of elite athletes with disabilities ranged from 2 to 22 years (M=10.3yrs; SD=7.2yrs). A purposive sampling was selected based upon two criteria: 1) elite status (i.e.,

all coaches were included in Paralympic Projects) and 2) sport representativeness (i.e., the sample represented four Paralympic sports, boccia n=3, swimming n=5, track and field n=5 and rowing n=1). Most of the coaches trained athletes with a physical disability and only one coached athletes with visual impairment.

All the participants coached athletes that had participated in major international competitions (i.e., Paralympic Games, World Cups, World and European Championships) and half of them were several times medaled in Paralympic Games. This research was reviewed and approved by the commission responsible for the ethical issues. All coaches gave their informed consent to participate in the study.

2.2 Instrument

The data were collected from a semi-structured interview with open-ended questions organized in accordance with the research questions of the study. Participants were informed about the goals of the study and structure of the interview. Before addressing questions related with the use of goal-setting, imagery, self-talk and relaxation (note: interview guide available from the first author), the coaches were briefly clarified about the meaning of each psychological technique. Globally, coaches were asked about the importance assigned to each psychological technique and its use in both competitive and practice settings. Lastly, opportunity was given to coaches to provide final comments regarding the interview topics.

The interview guide was pilot-tested with two goalball coaches, the national coach and his assistant coach (one male; one female) after which minor refinements were made to the guide. All interviews were transcribed verbatim and sent to each coach for validity check.

2.3 Protocol and Data Analysis

Interviews were analysed in a process of content analysis recommended by Patton (2002). The process involved three steps: 1) reading the material several times to deepen the main researcher's understanding of the content; 2) organizing raw data into meaningful themes and units that emerged from the participant's statements; and 3) finding common denominators and clustering the data into a content hierarchy induction of lower and higher themes (i.e., first and second order subthemes) until it is no longer possible to generate a new level of thematic representation (i.e., general dimension). To control individual bias and ensure verifiability of the findings, all the data were presented and discussed with another author to act as "devil's advocate" (Marshall & Rossman, 1995). Through critical questioning, methods, procedures and content analysis were analyzed by both researchers. All comments or queries raised were acknowledged, discussed and clarified to reach a suitable consensus. Finally, the first author reread the interview transcripts while comparing them and validating them against the first-order, second-order and general dimension, ensuring that research questions were being answered and no relevant data had been inadvertently excluded or irrelevant data included.

3. Results

The inductive-deductive analysis exposed four general dimensions (goal-setting, imagery, self-talk, and relaxation) emerging from seventy-nine raw data themes mentioned by the elite coaches. The dimensions were abstracted from eleven second-order subthemes and these from seventeen first-order subthemes. The general dimensions are represented in Figures 1-4.

3.1 Goal-Setting

When the subjects were asked about their routines regarding the definition of goals in the training and competition settings, twenty-five raw data themes were identified (Figure 1). This dimension emerged from four second-order subthemes: importance, operationalization, application in competition and application in competition.

Raw Data Themes*1	First Order *2 Subthemes	Second Order Subthemes	Dimensions
Athletes have to know what is expected from them (n=2). Motivational tool (n=2). It is the establishment of a compromise coach-athlete (n=2). Increases the responsibility and participation of the athlete (n=2). It is the point of honour of the athlete (n=1). Helps to focus when the athlete has other general life concerns (e.g., education, job) (n=1). Crucial in elite level (n=10).	Importance (n=10)	Importance	
Dialogue with the athletes (n=10). Athlete writes a list of goals for the season (n=2). Coach individual list of goals for each athlete (n=2). Negotiation of goals coach-athlete (n=2). Coordination of goals with the athlete and sport assistants (i.e., boccia) (n=3).	Coordination with the athlete (n=10)	Operationalization	
Long term goal: Paralympic games (n=10). Short and medium term goals: personal records, national championship; European and World championships participation; international meetings participation (n=10).	Short/Medium/Long Term (n=10)	Application in Competition	Goal-Setting
Classification/best ranking (n=4). Personal records (time/mark) (n=3). Be in the national team (n=1). "Do your best" (n=2). To win all the competitions (n=1). Improvement of technical gestures (n=1).	Process/Performance/ Outcome (n=10)		
Realistic goals (n=7). Challenging goals (n=3).	Level of Difficulty (n=10)		
Specific goals for each part of the session (n=6). Tactical and technical aspects (n=10). Prescription to train alone (n=2).	Application in Practice (n=10)	Application in Practice	

Figure 1. Perspectives on the training of goal-setting technique

Regarding the first second-order subtheme, the importance of goal-setting, all the participants considered the definition of goals as crucial in the elite level. One coach confirms this thought as she shares:

> "High competition is cruel, only the strongest survive and we need to have goals…without goals a swimmer does not wake up at 6am to go to the swimming pool."

Different perspectives were pointed out by the coaches to explain the importance of goal-setting. Two coaches considered goals a motivational tool, and another argued about the increase of responsibility and participation since the definition of goals implies a commitment between athlete and coach. A swimming coach explained that goals were very important to keep the athlete's focus in the sport task when, simultaneously, the athlete has to deal with other demands (e.g., general life concerns).

An emergent theme in all the interviews was the importance of coordinating with the athlete the establishment of goals. One coach even mentioned:

> "It's crucial to have a balanced process between coach and athletes."

All the coaches have the routine to dialogue with the athletes informing them about the tasks to perform and the expected outcomes. However, only two coaches made this process in a formal way, asking the athletes to write their individual goals and then connect it with the coaches' goals. Two coaches also highlighted the negotiation of goals between coach and

athlete. The three boccia coaches also mentioned that in this specific sport the coordination of goals has to be done with the athletes but also with the sport assistant, respectively, as stated in the following quotes:

"We cannot dissociate the athlete from his/her sport assistant, otherwise we forget one of the key parts; if the sport assistant doesn't share the same goals we have a problem."

"In BC1 and BC3*[3] class, the pairs, athlete and sport assistant, define their goals for the season."

When coaches were asked about the application of goal-setting, competition setting provided three first order sub-themes: 1) short/medium/long term goals; 2) quantitative/qualitative goals; and 3) level of difficulty. All the participants settled goals according to the different moments of the sport season and according to the Paralympic cycle. The coaches also explored the different nature of the goals (quantitative/qualitative). Lastly, most of the coaches considered that goals have to be defined in a realistic way, according to the level of the athlete's abilities. The next sentence expresses this idea:

"Have to be realistic. The worst thing that can happen is an unrealistic goal that is not accomplished, it's a trauma."

In the practice setting, six coaches explained that in all training sessions the goals of each part of the session were clearly established. All the participants mentioned goals related with technical and tactical aspects of the sport. One boccia coach even mentioned goals regarding the choice of the material to play (e.g., type of balls). The rowing coach and a track and field coach explained that during specific periods of time their athletes trained by themselves following the training plans with the tasks and goals previously set by the coach.

3.2 Imagery

This dimension contained eighteen raw data themes abstracted into two second-order subthemes: 1) importance and 2) application (Figure 2).
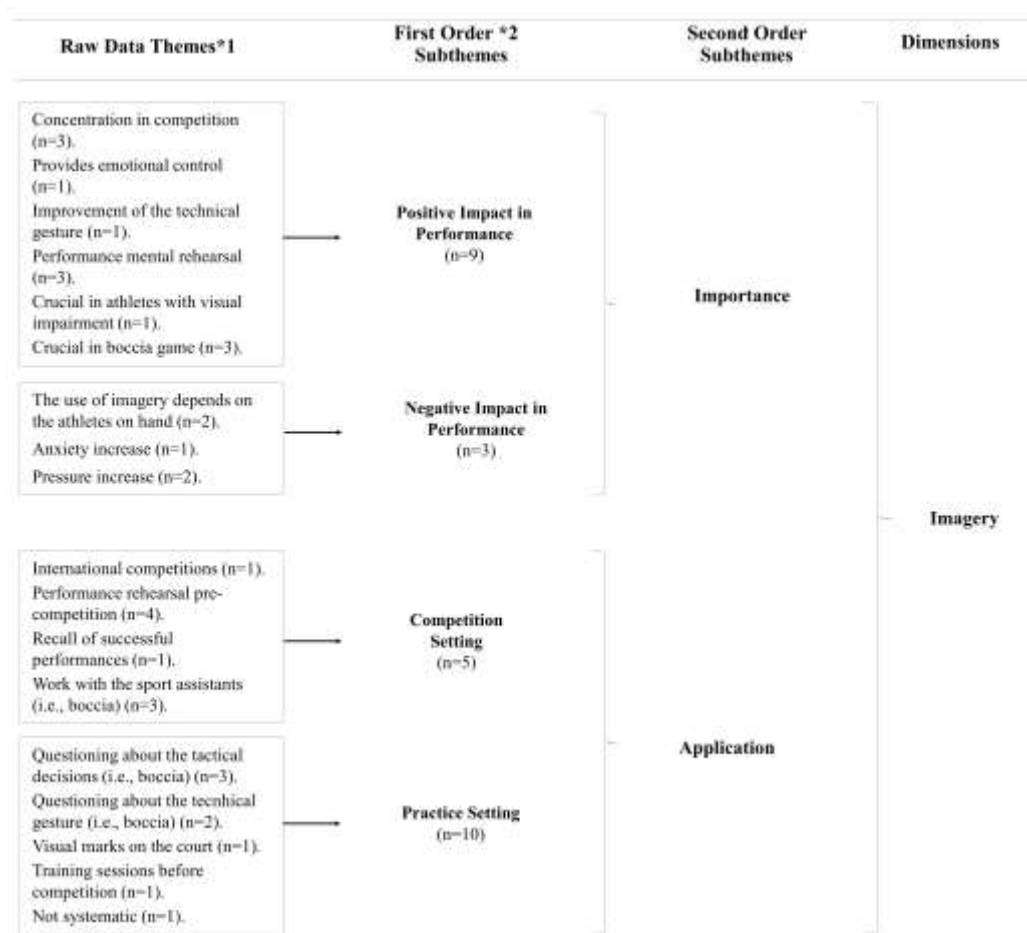
Figure 2. Perspectives on the training of imagery technique

Regarding the first second-order subtheme, importance of imagery, nine coaches focused on the positive impact that imagery has in athletic performance. The positive impact of imagery techniques in concentration (n=3) was highlighted. Three coaches pointed the importance of imagery for performance rehearsal and one even mentioned improvements in the technical due to imagery use. Two specific disability issues were raised concerning athletes with visual impairment and the boccia game. The track and field coach that works with elite athletes with visual impairment considered imagery to be particularly important in cases of lack of accuracy to see. The coach said:

> "Since they [the athletes with visual impairment] don't have the visual references to control the running speed, I have to help them to build the mental images giving other references … The images have to be created according to proprioceptive components."

The boccia coaches considered imagery crucial due to the accentuated tactical characteristics of this specific sport. The following quotation is quite representative of that:

> "Boccia is like chess, it requires a strong mental representation of what the athlete has to do technically and tactically …For the athlete to be able to anticipate the opponent game, imagery has to work…"

However, three coaches revealed that not all the athletes seem to benefit from the use of imagery. Imagery implies a focusing in the performance that may increase anxiety (n=1) and pressure (n=2) within the athlete.

Applied imagery training was predominant in the competition setting (n=6), although four coaches also mentioned its use in the training setting. In the competition setting, coaches from different sports (i.e., boccia, swimming and track & field) used imagery to promote performance rehearsal of the athletes in pre-competitive moments (e.g., the night before competition, moments before leaving the hotel for the competition venues, or during warm up). One boccia coach also stated to encourage the athletes to focus on success by recalling past games when the athlete was successful. All the boccia coaches were unanimous to refer to the participation of sport assistants in the training of imagery. Since sport assistants spend more time with a specific athlete than the coach, the coaches explained that it is necessary to give instructions to the sport assistants to work on this technique with the athletes in several moments during the competition events.

In the training setting, the work of the boccia coaches was again noticed. The three coaches explained that they had a systematic intervention during training sessions, constantly asking athletes about their tactical and technical decisions. One coach even mentioned the use of visual marks in the court to help athletes to visualize the expected route of the balls before throwing. However, the coach also alerted that despite the effort of the coaches to promote the use of imagery by the athletes, she has serious doubts about the systematic use of this technique by the players. One track and field coach also mentioned the use of imagery in the training sessions prior to competing. For that reason he did not consider it a systematic intervention.

3.3 Self-Talk

The self-talk dimension shows the coaches' perspectives on the use of self-talk with their athletes, and included eighteen raw data themes that merged into three second-order subthemes: 1) importance, 2) operationalization and 3) application (Figure 3).

Only six coaches clearly pointed out the importance of self-talk, specifically as a motivational strategy (n=4) and to maintain concentration over time (n=1). One boccia coach explained that during the game the players have to be constantly talking with themselves about the tactical decisions and the corrections of the technical gestures. Two coaches put in evidence the benefits/disadvantages of positive and negative self-talk.

Only three coaches mentioned the operationalization of the self-talk technique. Two of the coaches explained that their intervention was based on intuition and not scientifically supported. Dialogue was conducted with the athletes with two different aims: 1) to highlight abilities and capacities and 2) to spur.

When coaches were asked about the application of specific strategies to promote positive self-talk in athletes four mentioned the use of trigger words (note that three of them were boccia coaches), and three argued about the use of specific gestures with the athletes.
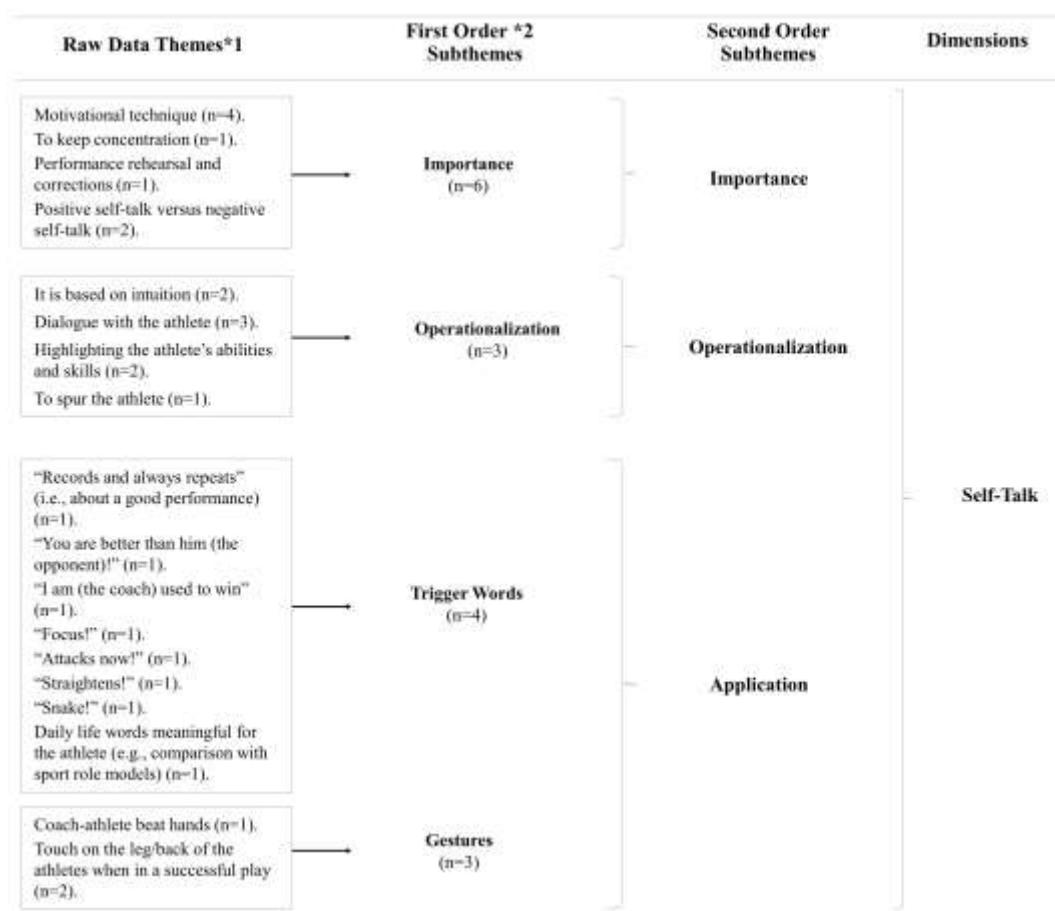
Figure 3. Perspectives on the training of self-talk technique

3.4 Relaxation

The relaxation dimension included eighteen raw data themes that were merged into two second-order subthemes: 1) importance and 2) application (Figure 4).

Most of the coaches acknowledge the importance of the relaxation technique and considered it a useful technique to improve psychological skills as stress and anxiety management (n=2), self-confidence (n=1), emotions control (n=1) and concentration (n=1). Both practice and competition settings were mentioned as important in the application of relaxation techniques.

All the boccia coaches mentioned the specific impact that the relaxation technique has in the performance of boccia players due to the physical consequences of cerebral palsy. The following quote depict this perspective:

> "This is [relaxation] indispensable to improve the quality of the technical gesture, especially in athletes with more spasticity. If the athlete is too stressed he won't be able to achieve the maximal range of movements. Physical relaxation allows the achievement of that range of movements and athletes feel more confident."

Although most of the coaches showed awareness about the benefits of relaxation, only half of the sample applied this technique. Moreover, from those five coaches only two assumed that relaxation was promoted by themselves but in a non-systematic way. The other three coaches explained that physiotherapists that supported the national team of boccia in international competitions developed relaxation techniques. Muscular relaxation was the most referred technique used in the competition setting.

Half of the sample mentioned several barriers to justify the lack of applied training of relaxation, namely lack of knowledge (n=4), lack of time (n=2) and lack of proper training conditions (n=2), as stated in the next sentence:

> "To correctly apply relaxation techniques I need specific training condition (i.e., calm and relax venue). I need time to develop the techniques and quite often I don't have those conditions in my training

setting …Besides, in my opinion, it's a very technical procedure that requires learning and should be applied by a specialist."

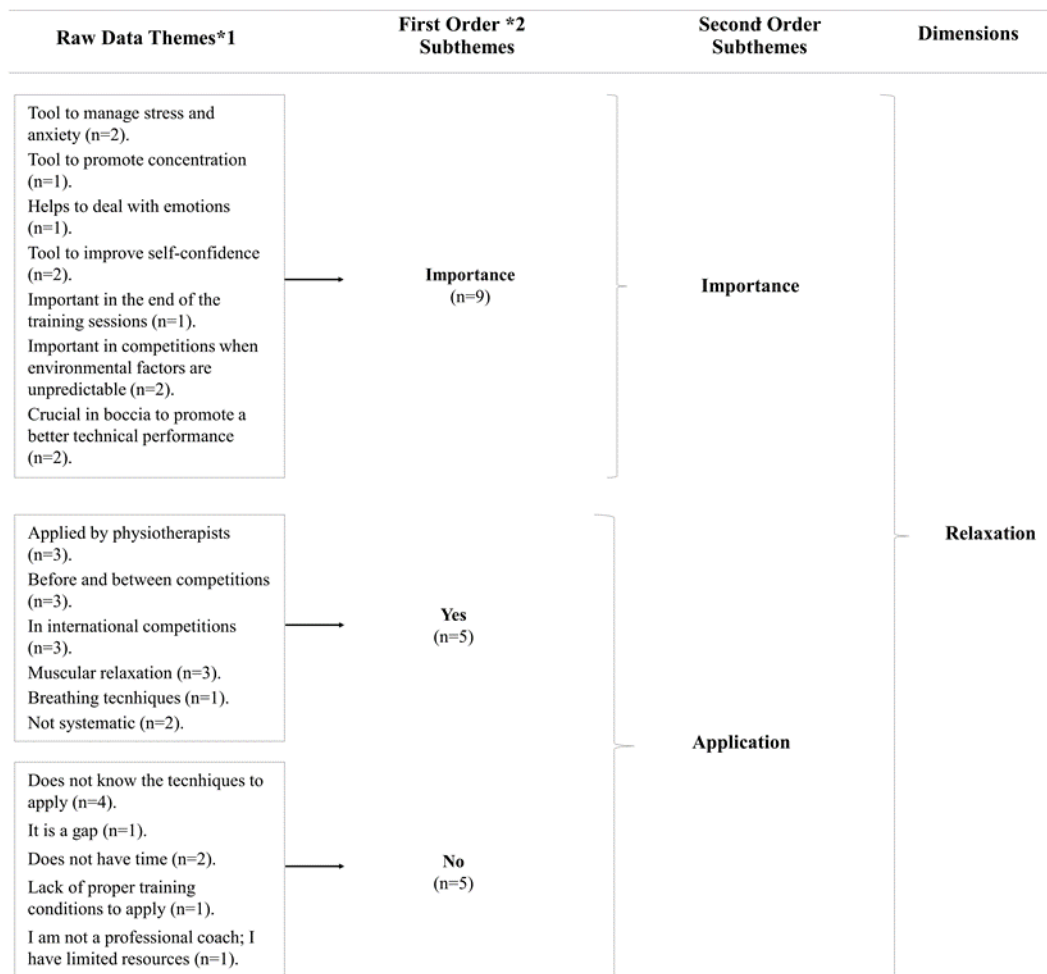| Raw Data Themes*1	First Order *2 Subthemes	Second Order Subthemes	Dimensions
Tool to manage stress and anxiety (n=2). Tool to promote concentration (n=1). Helps to deal with emotions (n=1). Tool to improve self-confidence (n=2). Important in the end of the training sessions (n=1). Important in competitions when environmental factors are unpredictable (n=2). Crucial in boccia to promote a better technical performance (n=2).	Importance (n=9)	Importance	
Applied by physiotherapists (n=3). Before and between competitions (n=3). In international competitions (n=3). Muscular relaxation (n=3). Breathing tecnhiques (n=1). Not systematic (n=2).	Yes (n=5)	Application	Relaxation
Does not know the tecnhiques to apply (n=4). It is a gap (n=1). Does not have time (n=2). Lack of proper training conditions to apply (n=1). I am not a professional coach; I have limited resources (n=1).	No (n=5)		

Figure 4. Perspectives on the training of relaxation technique

4. Discussion

The purpose of this research was to conduct an in-depth examination about the importance of psychological techniques (i.e., goal-setting, imagery, self-talk, and relaxation) by top elite coaches from disability sport. Moreover, the use of those techniques was analysed in both training and competition settings. Globally, the majority of the coaches acknowledged the importance of psychological techniques to enhance the psychological preparation of their athletes. However, the coaches do not develop a systematic training of those techniques in the competition and practice setting. In some cases coaches simply do not apply some techniques such as relaxation and self-talk. The coaches are aware of the importance of the psychological training but do not apply psychological strategies on daily-basis. The lack of knowledge on how to apply these strategies and the lack of time to include these contents in the training session (Gould, Medbery, Damarjian, & Lauer, 1999) may undermine the coaches' willing to develop a regular psychological training.

Goal-setting is considered one of the most effective means to promote motivation and direct athletic behaviour (Burton, Naylor, & Holliday, 2001; Gould, 2001). Several benefits result from this technique such as enhancement of focus and concentration, self-confidence, intrinsic motivation and improvement of overall performance (Burton and Raedeke, 2008). That is why setting goals is the basis of any psychological training (Porter, 2003). The importance of goal-setting was also clearly demonstrated by the participants of this study. All

coaches acknowledge the importance of goal setting in elite sport. Enhancements of motivation and of attentional control were some of the advantages pointed out.

An interesting idea was presented by two coaches that highlighted the role of goals as a way to establish a compromise between athletes and coach, and consequently increase the responsibility of the athlete in the achievement of the established goals. All the coaches considered that goals have to be settled in coordination with the athlete. Allowing athletes to participate in setting their own goal and encouraging them to write down their goals are some strategies that increase the athlete's commitment to achieve the goals (Burton & Raedeke, 2008). In addition, asking athletes to record goals in written form and return them in to the coach is a good strategy to monitor the progress toward goal achievement and make adjustments overtime (Caruso, 2004; Gould et al., 2009). However, only two coaches mentioned doing it on regular basis. It is necessary to invest in the educational background of coaches giving them practical tools to fully explore goal-setting technique. This could be achieved by including more hours to approach the psychological contents in the training and education of the coaches (Bastos, Corredeira, Probst, & Fonseca, 2012).

A specific disability issue was raised by the three boccia coaches regarding the importance of setting goals in coordination of the athlete and his/her sport assistance. It is known that in some specific sport events athletes with disabilities need the assistance of another practitioner without disability to assist in their performance. For example, in track and field events, runners with visual impairment (i.e., B1 and B2 class) depend on a guide athlete to perform while in boccia, some athletes with cerebral palsy (i.e., BC1 and BC3 class) play in straight collaboration with a sport assistant. In this regard, Bawden (2006) argued that there is no interest to work the psychological skills of the athlete if their guide or assistant does not share the same psychological approach. For example, it is necessary to understand if the sports assistants are able to perform in highly stressful environments and to ensure that they are mentally prepared to adequately respond to those demands. For this reason the boccia coaches from the present study considered fundamental to include the boccia assistant in the process of goal-setting making it a combined process between the athlete and sport assistant.

It is clear that all coaches use goal-setting in the training and competition setting. In this sense, it is important to understand if they do it properly exploring all principles of goal-setting. Regarding the type of goals that coaches set for competition, all participants mentioned short-medium and long term goals, being the participation in the Paralympic Games the "dream" goal of all the coaches. This is a very important procedure since having specific goals throughout the sports season is one of the most powerful to increase performance (Porter, 2003). Coaches use intermediate goals to constantly offer encouragement and positive reinforcement toward reaching high levels of performance (Caruso, 2004). Most of the coaches set outcome and performance goals for competition; however, literature has shown that the best way to achieve outcome goals is to focus on process and performance goals. Process and performance goals require the development of skills and strategies necessary to achieve outcome measures (Weinberg, Harmison, Rosenkranz, & Hookom, 2005). In the practice setting the emphasis was given to process goals related with the improvement of technical and tactical aspects of the sport.

Literature is unanimous in describing effective goals as realistic yet challenging (Burton & Raedake, 2008; Caruso, 2004; Weinberg et al., 2005). Most of the coaches chose to set realistic goals according to the individual characteristic of the athletes and their level of ability and three highlighted the need to have challenging goals to push athletes to the limit. Moderately difficult goals promote the best gains in performance (Burton et al., 2001) since they are difficult enough to demand effort and persistence but easy enough to allow realist success (Burton & Raedeke, 2008).

Overall, coaches use goal-setting in both the practice and training setting and considered a technique of higher importance in elite sport. However, further applied research should introduce coaches to a formal goal-setting program in order to explore all the strategies that can be implemented in order to set the most effective and right king of goals. The majority of the coaches acknowledge the positive impact of imagery in sports performance. Three main ideas were focused: 1) the improvement of psychological skills (i.e., concentration and emotions management); 2) the improvement of technical performance; and 3) sport-specific (i.e., boccia) and disability-specific (i.e., athletes with visual impairment) issues.

The benefits of imagery use regarding the development of physical and psychological skills are reported in general literature (Burton & Raedeke, 2008; Hale et al., 2005). All the boccia coaches highlighted the greater importance of imagery for the boccia game. Since boccia is mainly a tactical game supported in cognitive processes (Marta, 1998), one of the psychological requirements is the ability to constantly visualize the game strategy and anticipate the game of the opponent. To instill the use of this strategy the coaches constantly question the athletes about their tactical and technical decisions. Therefore, athletes will have to think and

visualize their moves before they play. In this context, the boccia coaches also highlighted the important role of the athletes' sport assistants. The sport assistant spends more time with the athlete than the coach, so a collaborative work between the coach and sport assistant is needed in order to instill the use of imagery techniques. The need to share the psychological training with the practioners that support the performance of athletes with disabilities (i.e., athletes-guide of athletes with visual impairment and sport assistants of boccia players) was also highlighted by Bawden (2006) as we have previously mentioned.

Imagery was also considered of great importance for athletes with visual impairment. Athletes with visual impairment are able to create vivid visual images and movement images (Hanharan, 2007). The coach showed awareness about the need to help athletes to create their mental images. This is a positive contribution since athletes may create their images based on what sighted people describe to them.

Although most of the coaches mentioned the benefits of imagery in performance, some participants also highlight the negative impact of this skill. The main reason was related with the increasing anxiety and pressure feelings that athletes may feel when using imagery. It was suggested that not all the athletes were able to successfully use imagery techniques. Likewise, Murphy and Martin (2002) mentioned several situations when imagery can be detrimental for performance: 1) creates too much anxiety; 2) directs attention to irrelevant stimulus; 3) creates negative images of failure or mistakes; and 4) makes the athletes overconfident. The fact that different athletes may have antagonistic outcomes of imagery use is very important information for coaches. Coaches have to be aware of the individual psychological characteristics of their athletes in order to understand which psychological techniques will suite them better. Nevertheless, the coach can provide useful help in teaching athletes to create clear and controllable images. This is crucial for the athletes who have low imagery ability but also for those with higher imagery ability who want to get the most of the imagery training (Burton & Raedeke, 2008).

Regarding the use of imagery techniques in both training and competition settings, there was a clear prevalence of its application in competition for performance rehearsal and recall of successful performances. Since the participants of this study are coaches of elite athletes that have accomplished major results in international events, the recall of successful performance can be a very important imagery strategy to apply. Athletes can recall experiences with great vividness and detail helping to focus on positive images and increase motivation (Burton & Raedeke, 2008). Only one coach reported the use of this technique for a similar purpose. With the exception of boccia coaches, almost none of the remaining reported the use of imagery during training sessions. This is a concerning fact since imagery, just like any other skill, has to be consistently practiced in order to strengthen the ability to use imagery in competition (Hale, 1982).

When coaches were asked about the importance of self-talk only six participants pointed out the benefits of this technique. Most of them saw self-talk as a powerful tool to increase motivation in their athletes. The use of positive self-talk is important to instill a sense of optimism and directs the athlete's focus to the task in hand (Gould et al., 2009). Two coaches highlighted the need to increase positive self-talk against negative self-talk. According to Porter (2003), the negative thoughts results from outside influences that lead the athlete to think that he or she is not good enough and are detrimental for sports performance. Therefore, coaches need to understand positive thought patterns that facilitate performance (Burton & Raedake, 2008), which in the case of the coaches participating in this study.

When asked about specific strategies to increase positive self-talk only a reduced number of coaches mentioned the use of trigger words and gestures in competition setting. Trigger words are cues that can be used to instill confidence (Caruso, 2004), to combat negative thoughts and short-circuit negative talk (Porter, 2003). The trigger words described by the coaches of the sample represent some of those roles. Some coaches use cues that usually are not true at the time but supports what they want to be true (Porter, 2003), and the word "snake" mentioned by one the coaches is a good example of it. It is a word that is meaningful for the athlete and the coach and represents the way that the athlete wants to view him/herself and his/her abilities. Some coaches also mentioned the use of meaningful gestures between the athlete and coach as a way to promote a positive reaction of the athlete, motivating and keeping thoughts controlled.

The results of the present study showed that a small number of coaches have concerns about the implementation of positive thought patterns in their athletes and, once more, the competition is the moment when coaches invest in this specific psychological strategy. This situation clearly limits the benefits of self-talk since rehearsing the cues or trigger words in practice allows the simple word or phrase to take on powerful meaning (Caruso, 2004) and an immediate effect on the athlete.

Most of the coaches considered the relaxation technique as an important tool, but only half of them develop some kind of training for it. The present findings need to be carefully analysed since most athletes have never been taught the basic requisites of this technique or simply do not know how to relax on command (Burton & Raedeke, 2008). In these cases, the coach assumes an important role to teach and raise awareness of the athletes for the importance of relaxation techniques and how to develop them.

Stress management, concentration, self-confidence and emotions management were mentioned by the coaches as psychological skills that would benefit from relaxation training. The literature also highlights the several benefits from relaxation such as the ability to cope with the pressure of competition, particularly in the highest levels (Hanton, Thomas, & Mellalieu, 2009). This is considered crucial for the success in sport since it helps athletes to feel better and free their minds to be successful in the performance of other psychological skills. One of the coaches highlighted the importance of relaxation in the competition setting due to the unpredictable nature of the competitive context. However, it is necessary to keep in mind that the ability to quickly attain a relaxed physical and mental state, according to the athletes' will, have to be progressively trained in different situations (i.e., stress-free environments, non-threating situation, non-sporting stressful environments, sports practice and fully competitive events) (Hanton, et al., 2009). Coaches cannot expect athletes to apply relaxation techniques in competition environments if those techniques were not systematic approach previously. To be effective, coaches have to teach athletes to develop relaxation skills that work quickly during practice and competition (Burton & Raedeke, 2008).

A specific-disability issue was raised by two boccia coaches in relation to the greater importance of relaxation in athletes with cerebral palsy. It is known that athletes with cerebral palsy suffer abnormal reflex activity during competition (Sherrill, 2004) and the increment of anxiety in stressful environments accents the condition consequences such as spasticity and involuntary movements. Consequently, the use of relaxation can help athletes to properly cope with specific disability uncontrollable factors (e.g., spasms) and reduce its influence on sports performance (e.g., concentration). That is one of the reasons why Marta (1998) considered emotional control as one of the most decisive psychological requirements to play boccia.

Half of the coaches recognized that they do not include relaxation techniques in their training routines due to lack of knowledge, lack of time and lack of proper conditions. Although we could not find any previous study examining the use of relaxation techniques by elite coaches of disability sport, the reasons mentioned are in accordance with general literature about the reasons for lack of psychological skills training in sport context (Burton & Raedeke, 2008; Johnson, Anderson, & Falby, 2011). It is important to note that in the group of coaches who mentioned relaxation training only two applied the techniques by themselves. In the other situations relaxation was a physiotherapist's responsibility.

Although there are a variety of strategies to help athletes to relax (e.g., diaphragmic breathing, imagery relaxation, progressive muscular relaxation and self-directed relaxation) (Burton & Raedake, 2008), muscular relaxation was the most used method referred in the present study. For instance, controlled breathing for relaxation is the most popular technique used because it is partially a natural innate technique (Caruso, 2004), but only one coach mentioned its use. Learning how to breathe more rhythmically and deeper increases the amount of oxygen in the brain and muscles favour a calming relaxing response by the athlete (Caruso, 2004), and therefore coaches should take advantage of this simple technique. Our findings showed a clear underuse of relaxation techniques by coaches who trained elite athletes with disabilities. It is crucial to provide coaches with more opportunities to learn the basics of this technique and how to organize the training sessions to include relaxation skills in a productive way.

5. Conclusion

The Portuguese elite coaches from disability sport interviewed in the present study seem to be aware of the importance of psychological training for sports performance. Globally, the participants acknowledged the importance of goal-setting, self-talk, imagery and relaxation for the improvement of the psychological preparation of their athletes to compete. However, when asked about their coaching routines in order to develop the abovementioned psychological strategies our findings were of concern. Not all the coaches use psychological techniques with their athletes. For example, a reduced number of coaches mentioned the use of relaxation and self-talk techniques. On the contrary, goal-setting was the psychological strategy that all the participants used in a systematic way. Another important finding was the considerable lack of use of psychological strategies in the practice setting. Only goal-setting was reported to be a psychological technique consistently applied by all the coaches during practice.

Several sport-specific and disability-specific issues emerged in the present study. The boccia coaches considered imagery and relaxation as very valuable techniques in their sport. Moreover, the boccia coaches highlighted the importance of including the sport assistants in the psychological training (e.g., goal-setting and imagery). Finally, one coach working with athletes with visual impairment considered imagery techniques of greater importance for the athletes.

Although we have presented and discussed separately the four psychological techniques (i.e., goal-setting, relaxation, imagery and self-talk), it would be advantageous to integrate them within a single psychological skills training program. The lack of use of psychological techniques exhibited by the coaches in this study, specifically when the practice setting is considered, is a concern fact since it compromises the implementation of an effective psychological skills training program. Coaches must be aware of the relationship between psychological skills in practice and success in competition in order to positively influence their athletes to give equal importance to both competition and practice settings for psychological training (Frey et al., 2003).

Acknowledgements

References

Badwen, M. (2006). Providing Sport Psychology support for athletes with disabilities. In J. Dosil (Ed.), *The Sport Psychologist′s Handbook: A Guide for Sport-Specific Performance Enhancement* (pp. 665 - 683). Chichester, United Kingdom: John Wiley and Sons, Inc. https://doi.org/10.1002/9780470713174.ch29

Bastos, T., Corredeira, R., Probst, M., & Fonseca, A. M. (2014). Elite athletes' perspectives about the importance of psychological preparation and personal experiences with sport psychology. *International Journal of Psychological Studies*, *5*(1), 33-44. https://doi.org/10.5539/ijps.v6n1p33

Boccia International Sports Federation. (2017). *BISFed Classification Rules – 3r^d Edition*. [Online]. Retrieved 12 September of 2018, from http://www.bisfed.com/wp-content/uploads/2014/02/Boccia-Classification-Rules-3rd-Edition-2017.pdf

Bonnar, K. (1997). Psychological/Mental Skills. *Disability Sport Web Site* Retrieved 15 March of 2009, from http://edweb6.educ.msu.edu/kin866/Research/resbonnar1.htm

Brewer, B. W. (2009). Introduction. In B. W. Brewer (Ed.), *Handbook of Sports Medicine and Science: Sport Psychology* (pp. 1 - 6): Wiley-Blackwell Publishing. https://doi.org/10.1002/9781444303650.ch1

Burton, D., Naylor, S. & Holliday, B. (2001). Goal-setting in sport: Investigating the goal effectiveness paradox. In R. N. Singer, H. A. Hausenblas, & C. M. Janelle (Eds.), *Handbook of sport psychology* (2nd ed., pp. 497-528). New York: Willey.

Burton, D., & Raedeke, T. D. (2008). *Sport Psychology for Coaches*. Champaign Illinois: Human Kinetics.

Caruso, A. (2004). *Sport Psychology Basics*. Spring City: Reedswain Publishing.

Castagno, K. S. (2001). Special Olympics Unified Sports: Changes in Male Athletes During a Basketball Season. *Adapted Physical Activity Quarterly*, *18*(2), 193-206. https://doi.org/10.1123/apaq.18.2.193

Eddy, K. A., & Mellalieu, S. D. (2003). Mental imagery in athletes with visual impairment. *Adapted Physical Activity Quarterly*, *20*(4), 347-368. https://doi.org/10.1123/apaq.20.4.347

Frey, M., Laguna, P. L., & Ravizza, K. (2003). Collegiate athletes' mental skill use and perceptions of success: an exploration of the practice and competition settings. *Journal of Applied Sport Psychology*, *15*(2), 115-128. https://doi.org/10.1080/10413200305392

Gould, D. (2001). Goal setting for peak performance. In J. M. Williams (Ed.) *Applied sport psychology: personal growth to peak performance* (4th ed., pp.190-228). Mountain View, CA: Mayfield.

Gould, D., Flett, M. R., & Bean, E. (2009). Mental preparation for training and competition. In B. W. Brewer (Ed.), *Handbook of Sports Medicine and Science: Sport Psychology* (pp. 53 - 63): Wiley-Blackwell Publishing. https://doi.org/10.1002/9781444303650.ch6

Gould, D., Medbery, R., Damarjian, N., & Lauer, L. (1999). A survey of mental skills training knowledge, opinions, and practices of junior tennis coaches. *Journal of Applied Sport Psychology*, *11*(1), 28-50. https://doi.org/10.1080/10413209908402949

Hale, B. D. (1982). The effects of internal and external imagery on muscular and ocular concomitants. *Journal of Sport Psychology*, *4*(4), 370-387. https://doi.org/10.1123/jsp.4.4.379

Hale, B. D., Seiser, L., McGuire, E.J., & Weinrich, E. (2005). Mental Imagery. In J. Taylor & G. Wilson (Eds.), *Applying Sport Psychology: Four Perspectives* (pp. 117 - 135). Champaign Illinois. United States of America: Human Kinetics.

Hanrahan, S. J. (1995). Psychological skills training for competitive wheelchair and amputee athletes. *Australian psychologist*, *30(2)*, 96-101. https://doi.org/10.1080/00050069508258911

Hanrahan, S. J. (1998). Practical considerations for working with athletes with disabilities. *The Sport Psychologist*, *12(3)*, 143-155. https://doi.org/10.1080/00050069508258911

Hanrahan, S. J. (2007). Athletes with disabilities. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of Sport Psychology* (3rd ed., pp. 845 - 858). New Jersey, United States of America: John Wiley and Sons, Inc., Hoboken, NJ, USA. https://doi.org/10.1002/9781118270011.ch38

Hanton, S., Thomas, O., & Mellalieu, S. (2009). Management of competitive stress in elite sport. In B. W. Brewer (Ed.), *Handbook of Sports Medicine and Science: Sport Psychology* (pp. 30-42): Wiley-Blackwell Publishing. https://doi.org/10.1002/9781444303650.ch4

Harbalis, T., Hatzigeorgiadis, A., & Theodorakis, Y. (2008). Self-talk in Wheelchair Basketball: the effects of an intervention program on dribbling and passing performance. *International Journal of Special Education*, *23*(3), 62-69.

Harlick, M., & McKenzie, A. (2000). Psychological skills training for athletes with disabilities: a review. *New Zealand Journal of Sports Medicine*, *28*(3), 64-66.

Johnson, U., Andersson, K.,, & Fallby, J. (2011). Sport psychology consulting among Swedish premier soccer coaches. *International Journal of Sport and Exercise Psychology*, *9*(4), 308-322. https://doi.org/10.1080/1612197X.2011.623455

Krane, V., & Williams, J. M. (2006). Psychological characteristics of peak performance. In J. M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (5th ed., pp. 207-227). New York: McGraw-Hill.

Lavallee, D., Williams, J. M., & Jones, M. V. (2008). Cognitive Strategies. In D. Lavallee, J. M., Williams, & M. V. Jones (Eds.), *Key Studies in Sport and Exercise Psychology* (pp. 191-193). McGraw Hill.

Marshall, C., & Rossman, G. B. (1995). *Designing qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.

Marta, L. (1998). *Boccia – Estudo piloto sobre o estado de conhecimento na modalidade* [Boccia – pilot study about the state and knowledge of the sport] (Unpublished master thesis). University of Porto, Porto, Portugal.

Martin, J. J. (1999). A personal development model of sport psychology for athletes with disabilities. *Journal of Applied Sport Psychology*, *11*(2), 181-193. https://doi.org/10.1080/10413209908404199

Murphy, S., & Martin, K. (2002). The use of imagery in sport. In T. Horn (Ed.) *Advances in sport psychology* (3rd ed., pp. 297-324). Champaign, IL: Human Kinetics

Page, S. J., & Wayda, V. K. (2001). Modifying sport psychology services for athletes with cerebral palsy: suggestions for professional practice. *Palaestra*, *17*(1), 10-14.

Patton, M. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks: Sage Publications.

Porter, K. (2003). *The Mental Athlete – Inner Training for Peak Performance in All Sports*. Human Kinetics.

Sherrill, C. (2004). Adapted physical activity, recreation, and sport: Crossdisciplinary and lifespan. (6th. Ed.). Madison, WI: WCB/McGraw Hill.

Weinberg, R. S., Harmison, R. J., Rosenkranz, R., & Hookom, S. (2005). Goal Setting. In J. Taylor & G. Wilson (Eds.), *Applying Sport Psychology: Four Perspectives* (pp. 101 - 116). Champaign Illinois. United States of America: Human Kinetics.

Zoerink, D. A., & Wilson, J. (1995). The competitive disposition: Views of athletes with mental retardation. *Adapted Physical Activity Quarterly*, *12*(1), 34-42. https://doi.org/10.1123/apaq.12.1.34

Notes

Note 1. The number following each raw data theme indicates the number of times that it was reported.

Note 2. The number below the first order subthemes indicates the number of coaches who reported them.

Note 3. Depending on their physical and functional abilities, boccia athletes are assigned to one of the five sports classes: BC1, BC2, BC3, BC4 or BC5. BC1, BC2 and BC3 classes include players with cerebral palsy and BC4 class is only for athletes who are diagnosed with conditions of non-cerebral origin. BC5 class include athletes with less severe impairments and both groups (i.e., with cerebral palsy and with non-cerebral origin) are eligible (Boccia International Sports Federation, 2017).

Copyrights

Factors Predicting Psychological Adjustment among University Students in Turkey

Ezgi Soncu Buyukiscan[1]

[1] Department of Neuroscience, Institute of Experimental Medicine, Istanbul University, Turkey

Correspondence: Ezgi Soncu Buyukiscan, Department of Neuroscience, Institute of Experimental Medicine, Istanbul University, Sehremini, 34093, Istanbul.

Abstract

Young adulthood is a period that requires serious transitions. Psychological adjustment during this period might be an important contributor to academic as well as social wellbeing. This study aims at identifying factors that predict psychological adjustment among university students in Turkey. Attachment style and coping strategies were suggested as possible predictors. The data was gathered from 105 undergraduate students. The results reveal attachment and coping styles as significant predictors for psychological adjustment. Implications of the findings are discussed in an attempt to foster better psychological adjustment among young adults.

Keywords: young adulthood, adjustment, adaptation, coping

1. Introduction

Adolescence or young adulthood is a period that requires serious transitions. In addition to regular burdens of daily life, the young adult has to deal with additional stressors that are unique to that life period. These stressors include university education, obtaining a job for the first time, leaving family, and forming new social and emotional relationships that require the responsibilities of an adult person (Arnett, 2000). It is quite imperative, then, to infer that this period might pose additional psychological burdens for the individual. Extensive literature on this topic in fact suggests that adolescents and young adults face many psychological problems including anxiety, depression, drug addiction, and eating disorders (Costello, Copeland, & Angold, 2011; Lewinsohn, Hops, Roberts, & Seeley, 1993; Merikangas, Nakamura, & Kessler, 2009).

It seems that although many adolescents and young adults face problems, not all of them end up suffering from psychological difficulties; that is, some are better at adapting to their environment. (Dumont & Provost, 1998; Masten, Hubbard, Gest, Tellegen, Garmezy, Ramirez, 1999). This fact brings us to the concept of psychological adjustment. According to Rohner (2004), psychological adjustment is a state characterized by a sense of independence, positive self-esteem and self-adequacy, stability of emotional experiences, high emotional responsiveness, diminished hostility and aggression, and a positive worldview. Poor psychological adjustment has been consistently related to increased psychopathology and also higher prevalence of social and emotional problems among adolescents and young adults (Freitas et al., 2013; Werner & Crick, 1999).

One of the variables that has been studied extensively within adjustment literature is attachment (eg. Mattanah, Hancock, & Brand, 2004; Seiffge-Krenke, 2006). The concept, first proposed by Bowlby (1977), is generally viewed as a continuously functioning, and more or less stable system that serves to maintain the child's sense of security. This system is considered to be persistent throughout life (Ainsworh, 1989; Sroufe & Waters, E., 1977). Research supports the continuity of attachment constellations in adulthood and across different relationships, as well (Hamilton, 2000; Waters, Hamilton, & Winfield, 2000).

Bartholomew and Horowitz (1991) propose a four-category adult attachment classification based on Bowlby's theory. These categories are: secure, dismissing, preoccupied, and fearful. Secure individuals have a positive view of both themselves and others whereas dismissing individuals have a positive view of themselves but a negative view of others. Preoccupied individuals perceive themselves as unworthy and others as valuable. Fearfully attached individuals, on the other hand, perceive both themselves and others negatively. Preoccupied, dismissing, and fearful attachment styles are also collectively labeled as insecure attachment styles.

Research investigating the relationship between attachment and adjustment consistently reveals significant results. Secure attachment style has been found to be related to good psychological adjustment whereas insecure attachment styles have generally been found to be associated with poorer psychological adjustment (Lapsley & Edgerton, 2002; Lopez, Melendez, Sauer, Berger, Wyssmann, 1998; Matttanah, Hancock, & Brand, 2004; Seiffge-Krenke, 2006). The strength of this relationship is maintained across different cultures and ethnicities (Arbona & Power, 2003; Bakker, van Oudenhoven, & van der Zee, 2004; Wang & Mallinckrodt, 2006).

It is generally argued that early life events largely determine the way a person copes with life stressors, and consequently, the way he or she adapts to the environment. Coping is defined as an active and purposeful response to events or situations which are evaluated as demanding or overwhelming in terms of the resources of the individual (Lazarus, 1993). It involves cognitive, emotional, and behavioral attempts to deal with the stressors (Lazarus, 1998).

Although there is universality in terms of the diverse repertoire of coping strategies among different cultures, there seem to be certain cross-cultural differences with respect to the extent to which each strategy is used. In a study comparing Indian, Italian, Hungarian, Swedish and Yemenite adolescents in terms of their coping strategies, for instance, Oláh (1995) found that, regardless of culture and ethnicity, adolescents with higher anxiety levels used more avoidance-based coping strategies whereas those with low and medium anxiety employed more constructive and adaptive coping strategies. In addition, European adolescents more frequently utilized assimilative coping strategies whereas those from Yemen and India used emotion-focused solutions more often. The results of another study comparing Turkish and American university students revealed that, with respect to coping, Turkish students were more likely to use strategies including reallocating their time and energy, and cognitive restructuring. American students, on the other hand, were more willing to engage in acceptance, self-disclosure, and health-promoting physical activities (Matheny, Curlette, Aysan, Herrington, Gfoerer, Thompson, & Hamarat, 2002).

Problem-focused, active coping strategies have generally been associated with better outcomes with respect to psychological functioning whereas avoidant coping strategies have been associated with poorer psychological outcomes (eg. McNamara, 2000). In a study investigating the relationship between coping and psychological adaptation among university students, for instance, Dyson and Renk (2006) found that avoidant coping strategies (including mental and behavioral disengagement, avoidance through drugs and use of humor) significantly predicted depressive symptomatology among this group. In a similar study, active coping strategies were found to be associated with better psychological adjustment (as indicated by lower levels of depressive symptomatology) whereas avoidant coping strategies were found to be associated with poorer psychological adjustment (as indicated by higher levels of depressive and anxiety symptomatology) (Crockett, Iturbide, Stone, McGinley, Raffaelli, & Carlo, 2007).

Cross-cultural literature in general points to a universality in terms of the relationship between coping strategies and adjustment. A study comparing Turkish and American university students, for example, found that the use of active coping strategies (including active problem solving, receiving emotional support, and positive reframing) was associated with positive psychological adjustment whereas strategies such as substance use, behavioral engagement, and denial were associated with poorer psychological adjustment. Although there were minor differences with respect to the extent to which each strategy was more dominantly used, this relationship was observed for both samples (Tuna, 2003).

This study aims to understand psychological adjustment among university students in in Turkey, mainly in relation to attachment and coping. Based on previous findings, we expect attachment and coping to be significantly related to psychological adjustment. Specifically, we expect a positive relationship between secure attachment and adjustment in addition to a negative relationship between insecure attachment and adjustment. With respect to coping, we expect that use of active coping strategies would be associated with a better adjustment whereas avoidant strategies would be associated with poorer psychological adjustment.

2. Method

2.1 Participants

105 undergraduate students (10 men and 95 women) from a university in Istanbul participated in the study. The age of the participants ranged from 19 to 27 years ($M = 21.98$, $SD = 1.56$). 43.8 % of the participants were sophomore, 14.3 % were junior, and 41.9 % were seniors.

The majority of the participants (78.1 %) were living with their families. Among 95 students whose parents were both alive, 85.26 % reported that their mother and father are together. 84.6 % has one or more siblings.

Less than half of the sample (44.8 %) was involved in a relationship. Among this group the mean duration of the current relationship was 25. 62 months (*SD* = 25.16 months). The mean amount of time (in terms of hours) the sample reported spending for social activities was 16.23 hours per week (*SD* = 11.61 hours).

2.2 Materials

2.2.1 Relationship Scales Questionnaire (RSQ)

This is a 30-item self-report questionnaire that assesses adults' attachment patterns (Griffin & Barthelomew, 1994). The respondents are asked to rate how much they agree with each of the statements on a 7-point Likert scale. The results indicate four scores with respect to four attachment styles: *secure, preoccupied, dismissive*, and *fearful*. In addition, the category that receives the highest score is acknowledged as the person's dominant attachment style.

Griffin and Bartholomew (1994) found that internal consistency score of RSQ ranged from .41 for secure type to .70 for dismissing type. In terms of convergent validity, RSQ was compared to The Relationship Questionnaire (Bartholomew & Horowitz, 1991), which is another attachment measure. The validity coefficients were found to range between .22 and .50.

RSQ was adapted to Turkish by Sümer and Güngör (1999). Test-retest reliability of the Turkish version was found to vary between .54 and .78. Internal consistency coefficients, on the other hand, ranged between .27 and .61. In the present study, Cronbach alphas for *secure, preoccupied, dismissing*, and *fearful* attachment scores were .68, .49, .65, and.78, respectively.

2.2.2 Coping Questionnaire

This questionnaire was developed by Özbay (1993) in order to measure coping styles of international students living in the United States. The original scale consists of 56 items, each to be ranged on a 5-point Likert scale. The questionnaire intends to measure five main coping strategies: active planning, seeking external help, turning to religion, acceptance/cognitive restructuring, and avoidance/disengagement. The questionnaire was later adapted to Turkish language by Özbay and Şahin (1997) in an attempt to devise a scale to identify coping patterns of the Turkish population. The Turkish version consists of 43 items, each ranged on a 5-point likert scale. Factor analytic studies yielded 6 factors in this version: *active planning, seeking external help, turning to religion, avoidance/disengagement (emotional-behavioral), avoidance/disengagement (biochemical)*, and *acceptance/cognitive restructuring*. Each subscale score is calculated by summing the scores on items relevant to that scale.

Active planning includes 10 items that indicate actively seeking solutions for one's problems, and making rational plans and decisions in an attempt to solve them. *Seeking external help* is composed of 9 items that evaluate the extent to which a person is likely to seek emotional, cognitive, and physical support from others when the person is faced with a problem. *Turning to religion* refers to one's tendency to turn to religious or spiritual practices as a way of reducing and dealing with stress. This factor is represented by 6 items in the scale. *Avoidance/disengagement (emotional-behavioral)* involves the extent to which the individual is likely to emotionally and behaviorally disengage himself from distressing situations or events. It is represented by 7 items. *Avoidance/disengagement (biochemical)*, on the other hand, is composed of 4 items and includes attempts to create physiological changes in the body (through drugs, alcohol, smoking, etc.) as a way of reducing stress. Finally, *acceptance/cognitive restructuring* is characterized by the acceptance of the problem and mentally attempting to deal with the problem in different ways. This coping style is represented by 7 items in the Turkish version.

In order to establish the validity of the Turkish version, Özbay and Şahin (1997) compared the scale with the Turkish version of Scale of Coping with Stress (SCS; Lazarus & Folkman, 1984; adapted to Turkish by Şahin & Durak, 1995) and found the overall validity coefficient around .54. The authors found Cronbach alpha values as .76 for *active planning*, .79 for *seeking external help*, .90 for *turning to religion*, .65 for *avoidance/disengagement (emotional-behavioral),* .75 for *avoidance/disengagement (biochemical)*, and .57 for *acceptance/cognitive restructuring* dimensions. In the current study, alpha values for *active planning, seeking external help, turning to religion, avoidance/disengagement (emotional-behavioral), avoidance/disengagement (biochemical)*, and *acceptance/cognitive restructuring* dimensions were calculated as .79, .87, .96, .61, .52, and .68, respectively.

2.2.3 Personality Assessment Questionnaire (PAQ)

PAQ is a self-report inventory that was developed to assess an individual's personality with respect to seven dimensions*: hostility and aggression, dependency, self-esteem, self-adequacy, emotional responsiveness,*

emotional stability, and *world view* (Rohner, Saavedra, & Granum, 1978). Participants are asked to rate the extent to which they agree with 63 items on a 4-point Likert scale. The total score of PAQ represents the person's overall psychological adjustment, with higher scores indicating higher maladjustment. The total score in PAQ can range between 63 and 252. In this study, each item was reverse coded so that higher total PAQ score indicates better psychological adjustment.

PAQ was adapted to Turkish by Varan (2003). Internal consistency coefficients for the subscales were found to range between .68 and .82 whereas overall Cronbach alpha value for the questionnaire was found as .91. In this study, the Cronbach alpha value for total PAQ score was found as .94.

2.3 Procedure

Participants were recruited via announcements made during class hours of undergraduate psychology courses. Interested students signed up for participation at a predetermined time and place. Students received an extra course credit in exchange for their participation.

All questions and surveys used in the study were written in Microsoft Word format, printed, and given the participants at a predetermined date and time. The ordering of the questionnaires was counterbalanced.

The questionnaires were distributed to students in class hours. Each student received course credit in exchange for participation.

3. Results

3.1 The Relationship between Sociodemographic Characteristics of the Sample and Psychological Adjustment

Descriptive statistical information including means, standard deviations, and ranges of all the continuous variables that are included in the analyses are provided in Table 1. In order to determine whether the sociocultural variables provided in Table 1 are related to overall adjustment score in PAQ, a series of Pearson correlation analyses were carried out. None of the correlations turned out to be statistically significant ($p > .01$). The results are given in Table 2.

Table 1. Descriptive Statistics for the Continuous Variables that are Included in the Analyses

Variables	Mean (M)	Standard Deviation (SD)	Range
Sociocultural Variables			
Age	21.98	1.56	19-27
Current GPA	3.09	0.46	1.81-3.94
Average time spent for weekly social activities (hrs)	16.23	11.61	2-55
RSQ Variables			
Secure attachment score	41.16	8.25	18-62
Preoccupied attachment score	23.30	5.44	9-38
Dismissing attachment score	28.60	6.86	15-49
Fearful attachment score	30.36	9.86	10-59
Coping Variables			
Active planning	28.53	5.66	14-40
Seeking external help	25.92	6.24	5-36
Turning to religion	10.60	8.35	0-24
Avoidance/disengagement (emotional/behavioral)	12.96	4.57	2-24
Avoidance/disengagement (biochemical)	2.57	2.72	0-10
Acceptance/cognitive restructuring	15.90	4.42	6-25
PAQ Variables			
Psychological Adjustment	185.38	24.95	93-236

RSQ: Relationships Scale Questionnaire, PAQ: Personality Assessment Questionnaire.

Table 2. Intercorrelations between Continuous Sociodemographic Variables and Overall PAQ Score

Sociodemographic Variables	Adjustment Score
Age	.058
Current GPA	.117
Average time spent for weekly social activities (hrs)	.123

In addition to correlational analyses, two Mann-Whitney U tests were conducted in order to assess whether gender and currently being involved in a romantic relationship had an effect on overall adjustment score. The results turned out to be nonsignificant for both gender ($U = 296$, $p = .431$), and relationship status ($U = 942$, $p = .132$); indicating that these two variables did not have an effect on participants' adjustment scores.

3.2 Relationships between Attachment, Coping, and Psychological Adjustment

Table 3 reports correlations between RSQ attachment scores and adaptation. Mean adjustment score was found to be significantly correlated to secure attachment score (r (95) = .624, $p < .01$), dismissing attachment score (r (95) = -.465, $p < .01$), and fearful attachment score (r (95) = -.620, $p < .01$). The correlation between adjustment and preoccupied attachment score, on the other hand, was nonsignificant. These findings suggest a positive

relationship between secure attachment and adjustment and a negative relationship between insecure attachment and adjustment.

Table 3. The Relationship between RSQ Attachment Scores and PAQ Adaptation Score

Attachment Scores	Adjustment Score
Secure attachment score	.624**
Preoccupied attachment score	-.175
Dismissing attachment score	-.465**
Fearful attachment score	-.620**

** $p < .01$

Another set of correlational analyses were conducted to assess the relationship between different coping strategies and adjustment (See Table 4). The results indicate significant correlations between adjustment score and the following coping measures: active planning ($r (97) = .240$, $p < .05$), avoidance/disengagement through drugs or alcohol ($r (92) = -.354$, $p < .01$), and acceptance/cognitive restructuring ($r (96) = .230$, $p < .05$); indicating that using active planning and cognitive restructuring strategies are associated with a better psychological adjustment whereas avoidance through biochemical means is associated with decreased psychological adjustment.

Table 4. Intercorrelations between Adaptation and Coping Scores

Coping Styles	Adjustment Score
Turning to Religion	.093
Seeking External Help	.009
Active Planning	.240*
Avoidance/Disengagement (emotional-behavioral)	-.195
Avoidance/Disengagement (biochemical)	-.354**
Acceptance/Cognitive Restructuring	.230*

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

3.3 Predicting Psychological Adjustment

A stepwise multiple regression analysis was conducted in order to identify variables that predict adjustment score. Three attachment scores (secure, dismissing, and fearful), and three coping scores (active planning, biochemical avoidance, and acceptance/cognitive restructuring), which were found to be related to overall adjustment score in previous analyses were included in the model.

Table 5 illustrates the results of multiple regression analysis for variables predicting adjustment score. The major predictor of adjustment was secure attachment score, which explained approximately 39 % of the overall variance. Biochemical avoidance/disengagement, fearful attachment, and active planning were other significant predictors. Adjustment score increased as secure attachment and active planning scores increased; and it decreased as fearful attachment and biochemical avoidance/disengagement scores increased. These variables together explained 57 % of the overall variance.

Table 5. Summary of Stepwise Multiple Regression Analysis for Variables Predicting Total Adjustment Score

Variables	B	SE B	β	Δ R^2
Secure Attachment Score	.228	.051	.404	.389
Avoidance/Disengagement (Biochemical)	-.461	.122	-.269	.115
Fearful Attachment Score	-.154	.043	-.325	.058
Active Planning	.132	.058	.161	.025

Adj. $R^2 = .568$, ($p < .05$)

4. Discussion

This study aimed at identifying factors predicting psychological adjustment among Turkish university students. In line with our expectations, variables related to attachment style and coping were revealed as significant predictors.

With respect to attachment, secure and fearful attachment scores were identified as significant predictors for adjustment. Specifically, secure attachment was associated with better psychological adjustment whereas fearful attachment was associated with poorer psychological adjustment. Secure attachment is characterized by a worldview in which the person considered both himself and others as valuable and loveable. Fearful attachment, on the other hand, is characterized by a negative sense of self and a view of others as unresponsive and rejecting. Fearfully attached individuals, as a result, fear and avoid close relationships (Bartholomew & Horowitz, 1991). It is then possible to make the inference that a positive view of self and the other helps the person better adjust to personal and environmental stressors, which has also been suggested by previous research (Cooper, Shaver, & Collins, 1998; Lapsley & Edgerton, 2002; Lopez et al., 1998; Mattanah, Hancock, & Brand, 2004).

Regarding coping, among six coping strategies, two were found as significant predictors of adjustment: biochemical avoidance/disengagement and active planning. This finding has also been largely in line with previous literature on this topic (Dyson & Renk, 2006; Ebata & Moos, 1991). It seems that, when faced with stress, taking an active coping attitude helps the individual better adjust to his environment. Using a passive or avoidant strategy, on the other hand, might bring together a poorer adjustment.

Certain limitations of this study should be taken into account while interpreting the results. First of all, this study was carried out with a relatively small sample size. This is especially the case when the ratio of male participants to female participants is considered. It is possible that our findings represent more of psychological adjustment patterns for females than males. Therefore it is crucial to replicate these findings with a more gender-balanced group. It is also important to replicate these findings with different cultural and ethnical groups in order to make more universal assumptions. Second, the data collected in this study relies exclusively on self-report of the participants, which might shed some doubt upon the objectivity of the data. Finally, since the design of this study was not longitudinal, the findings can provide only a limited insight into adjustment literature. Longitudinal studies are warranted in order to gain a deeper understanding of the possible causality between attachment and coping, and adjustment.

This study has possible implications with respect to both counselors and therapists working with young adults and for psychoeducational programs focusing on increasing adjustment to university. Given the significant relationship between attachment, coping and psychological adjustment; we suggest that adolescents and young adults could highly benefit from attachment-oriented intervention and treatment programs focusing on development of adaptive coping strategies.

Acknowledgments

References

Ainsworth, M. D. S. (1989). Attachment beyond infancy. *American Psychologist*, *44*, 709-716. https://doi.org/10.1037/0003-066X.44.4.709

Arbona, C., & Power, T. G. (2003). Parental attachment, self-esteem, and antisocial behaviors among African American, European American, and Mexican American adolescents. *Journal of Counseling Psychology*, *50*, 40-51. https://doi.org/10.1037/0022-0167.50.1.40

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teen through the twenties. *American Psychologist*, *55*, 469-480. https://doi.org/10.1037/0003-066X.55.5.469

Bakker, W., van Oudenhoven, J. P., & van der Zee, K. I. (2004). Attachment styles, personality, and Dutch emigrants' intercultural adjustment. *European Journal of Personality*, *18*, 387-404. https://doi.org/10.1002/per.515

Bartholomew, K. & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, *61*, 226-244. https://doi.org/10.1037/0022-3514.61.2.226

Bowlby, J. (1977). The making and breaking of affectional bonds. *British Journal of Psychiatry*, *130,* 201-210. https://doi.org/10.1192/bjp.130.3.201

Cooper, M. L., Shaver, R. R., & Collins, N. L. (1998). Attachment styles, emotion regulation, and adjustment in adolescence. *Journal of Personality and Social Psychology*, *74,* 1380-1397. https://doi.org/10.1037/0022-3514.74.5.1380

Costello, E. J., Copeland, W., & Angold, A. (2011). Trends in psychopathology across the adolescent years: What changes when children become adolescents, and when adolescents become adults? *Journal of Child Psychology and Psychiatry*, *52*, 1015-1025. https://doi.org/10.1111/j.1469-7610.2011.02446.x

Crockett, L. J., Itirbude, M. I., Stone, R. A. T., McGinley, M., Raffaelli, M., & Carlo, G. (2007). Acculturative stress, social support, and coping: Relations to psychological adjustment among Mexican-American college students. *Cultural Diversity and Ethnic Minority Psychology*, *13*, 347-355. https://doi.org/10.1037/1099-9809.13.4.347

Dumont, M., & Provost, M. A. (1998). Resilience in adolescents: Protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression. *Journal of Youth and Adolescence*, *28*, 343-363. https://doi.org/10.1023/A:1021637011732

Dyson, R., & Renk, K. (2006). Freshmen adaptation to university life: Depressive symptoms, stress, and coping. *Journal of Clinical Psychology*, *62*, 1231-1244. https://doi.org/10.1002/jclp.20295

Ebata, A. T., & Moos, R. H. (1991). Coping and adjustment in distressed and healthy adolescents. *Journal of Applied Developmental Psychology*, *12*, 33-54. https://doi.org/10.1016/0193-3973(91)90029-4

Freites, I. R., Castro, M., Sarmento, S. L., Moura, C., Viana, V., Areias, J. C., & Areias, M. E. G. (2013). A cohort study on psychological adjustment and psychopathology in adolescents and young adults with congenital heart disease. *BMJ Open*, *3*, e001138. https://doi.org/10.1136/bmjopen-2012-001138. https://doi.org/10.1136/ bmjopen-2012-001138

Griffin, D., & Bartholomewi K. (1994). The metaphysics of measurement: The case of adult attachment. In K. Bartholomew & D. Perlman (Eds.). *Advances in personal relationships* (pp. 17-52). London: Jessica Kingsley.

Hamilton, C. E. (2000). Continuity and discontinuity of attachment from infancy through adolescence. *Child Development*, *71*, 690-694. https://doi.org/10.1111/1467-8624.00177

Lapsley, D. K., & Edgerton, J. (2002). Separation-individuation, adult attachment style, and college adjustment. *Journal of Counseling and Development*, *80*, 484-492. https://doi.org/10.1002/j.1556-6678.2002.tb00215.x

Lazarus, R. S. (1993). Coping theory and research: Past, present, and future. *Psychosomatic Medicine*, *55*, 234-247. https://doi.org/10.1097/00006842-199305000-00002

Lazarus, R. S. (1998). *Fifty years of the research and theory of R. S. Lazarus.* Mahwah, NJ: Erblaum.

Lazarus, R. S., & Folkman, S. (1984). Coping and adaptation. In W. D. Gentry (Ed.), *Handbook of behavioral medicine* (pp. 282-325). New York: Guilford.

Lewinsohn, P. M., Hops, H., Roberts, R. E., & Seeley, J. R. (1993). Adolescent psychopathology: Prevalence and incidence of depression and other DSM-III-R disorders in high school students. *Journal of Abnormal Psychology*, *102*, 133-144. https://doi.org/10.1037/0021-843X.102.1.133

Lopez, F. G., Melendez, M. C., Sauer, E. M., Berger, E., & Wyssmann, J. (1998). Internal working models, self-reported problems, and help-seeking attitudes among college students. *Journal of Counseling Psychology*, *45*, 79-83. https://doi.org/10.1037/0022-0167.45.1.79

Masten, A. S., Hubbard, J. J., Gest, S. D., Tellegen, A., Garmezy, N., Ramirez, M. (1999). Competence in the context of adversity: Pathways to resilience and maladaptation from childhood to late adolescence. *Development and Psychopathology*, *11,* 143-169. https://doi.org/10.1017/S0954579499001996

Matheny, K. B., Curlette, W. L., Aysan, F., Herrington, A., Gfoerer, C. A., Thompson, D., & Hamarat, E. (2006). Coping resources, perceived stress, and life satisfaction among Turkish and American university students. *International Journal of Stress Management*, *9*, 81-97.https://doi.org/10.1023/A:1014902719664

Mattanah, J. F., Hancock, G. R., & Brand, B. L. (2004). Parental attachment, separation-individuation, and college student adjustment: A structural equation analysis of meditational effects. *Journal of Counseling Psychology*, *51*, 213-225. https://doi.org/10.1037/0022-0167.51.2.213

Merikangas, K. R., Nakamura, E. F., & Kessler, R. C. (2009). Epidemiology of mental disorders in children and adolescents. *Dialogues in Clinical Neuroscience*, *11*, 7-20.

McNamara, S. (2000). *Stress in young people: What's new and what can we do?* New York: Continuum.

Özbay, Y. (1993). *An investigation of the relationship between adaptational coping process and self-perceived negative feelings on international students.* (Unpublished doctoral dissertation). Texas Tech University, Texas.

Özbay, Y. & Şahin, B. (1997). Stresle Başa Çıkma Tutumları Envanteri: Geçerlik ve güvenirlik çalışması. *IV. Ulusal Psikolojik Danışma ve Rehberlik Kongresi*, 1-3 Eylül 1997, Ankara Üniversitesi, ANKARA.

Rohner, R. P., Saavedra, J., Granum, E.O. (1978). Development and validation of the personality assessment questionnaire. *Catalog of Selected Topics in Psychology*, *8*, 17-48.

Rohner, R. P. (2004). The parental "acceptance-rejection syndrome": Universal correlates of perceived rejection. *American Psychologist*, *59*, 827-840. https://doi.org/10.1037/0003-066X.59.8.830

Seiffge-Krenke, I. (2006). Coping with relationship stressors: The impact of different working models of attachment and links to adaptation. *Journal of Youth and Adolescence*, *35*, 25-39. https://doi.org/10.1007/s10964-005-9015-4

Seiffge-Krenke (2008). Coping behavior of Finnish adolescents: Remarks on a cross-cultural comparison. *Scandinavian Journal of Psychology*, *33*, 301-314.

Sroufe, L. A., & Waters, E. (1977). Attachment as an organizational construct. *Child Development*, *48*, 1184-1199. https://doi.org/10.2307/1128475

Sümer, N. & Güngör, D. (1999). Yetişkin bağlanma stilleri ölçeklerinin Türk örneklemi üzerinde psikometrik değerlendirmesi ve kültürlerarası bir karşılaştırma. *Türk Psikoloji Dergisi*, *14*, 71-106.

Şahin, N. H., & Durak, A. (1995). Stresle Başaçıkma Tarzları Ölçeği: Üniversite öğrencileri için uyarlanması. *Türk Psikoloji Dergisi*, *10*, 56-73.

Tuna, M. E. (2003). *Cross-cultural differences in coping strategies as predictors of university adjustment of Turkish and U.S. students* (Unpublished doctoral dissertation). Middle East Technical University, Istanbul.

Varan, A. (2003). *Ebeveyn Kabul-Red/Kontrol Ölçeği (EKRÖ/K) ve Kişilik Değerlendirme Ölçeği (KİDÖ) yetişkin formları ile eş Kabul-Red/Kontrol Ölçeği (EŞKRÖ/K) Türkiye Güvenilirlik ve Geçerlik Çalışması.* Retrieved from http://www.azmivaran.com/arastirma/ekar-kurami-arastirmalari

Wang, C. C. D. C., & Mallinckrodt, B. (2006). Acculturation, attachment, and psychosocial adjustment of Chinese/Taiwanese international students. *Journal of Counseling Psychology*, *53*, 422-433. https://doi.org/10.1037/0022-0167.53.4.422

Waters, E., Hamilton, C. E., & Winfield, N. S. (2000). The stability of attachment security from infancy to adolescence and early adulthood: General introduction. *Child Development*, *71*, 678-683. https://doi.org/10.1111/1467-8624.00175

Werner, N. E., & Crick, N. R. (1999). Relational aggression and social-psychological adjustment in a college sample. *Journal of Abnormal Psychology*, *108*, 615-623. https://doi.org/10.1037/0021-843X.108.4.615

Copyrights

Saying "I Do" in College: Examining Marital Status and Academic Performance

Selena M. Beard[1] & Michael R. Langlais[1]

[1]Department of Family Studies, University of Nebraska – Kearney, Kearney, NE, USA

Correspondence: Selena Beard, Department of Family Studies, University of Nebraska – Kearney, Kearney, NE, USA. Tel: 1-909-294-9940 E-mail: s.moniquebeard@gmail.com

Abstract

Marriage as an undergraduate student is not the norm, as only 7% of undergraduate students are married. Therefore, marital status may have negative consequences for college students' academic performance, as they navigate marital roles simultaneously with other roles, such as that of student. However, relationship quality may predict how well undergraduates perform academically, with individuals in higher quality marriages performing better than those in lower quality marriages. Thus, the goal of this study is to examine how marital status predicts academic performance and whether or not relationship quality moderates this association. Data for this study comes from an online survey of undergraduate students from a university in the Midwestern United States ($N = 111$, 81.1% female, 87.4% White/Caucasian, 21.2% married). Results revealed that marital status is negatively associated with cumulative grade point average (GPA) and perception of GPA. There were no significant effects of relationship satisfaction, relationship communication, or the interaction of relationship quality and marital status for academic performance. Implications for academic performance and young adult development will be discussed.

Keywords: marital status, undergraduate, academic performance, relationship quality

1. Introduction

Many studies have illustrated the benefits of being married for individual well-being (Kiecolt-Glaser et al., 2003; Neff & Broady, 2011) and longevity of life (e.g., Idler, Boulifard, & Contrada, 2012). However, these benefits may not be present in contexts where being married is not the norm. The traditional college student is typically about 18-22 years old, unmarried, and comes directly from high school (Oswalt & Wyatt, 2014). According to the United States Department of Education (2014), approximately 7% of undergraduate students are married and the average age of first marriage is 27 for women and 29 for men (United States Census Bureau, 2017). Because being married as an undergraduate student is not typical, the context of being married may have negative implications for individuals' academic performance. The transition into the role of spouse is likely to distract from academics. However, there is some support that relationship quality may provide a stronger explanation than relationship status for academic performance and relationship outcomes (e.g., Le & Agnew, 2003). Therefore, this study has two goals. First, we examine how marital status predicts undergraduate academic performance. Second, we test relationship quality as a moderator for this relationship.

It is important to examine academic performance in college, as success in this context is positively associated with professional development such as occupational attainment and higher salaries, (Oreopoulos & Petronijevic, 2013; Perna, 2003) and personal development such as less stress and higher life satisfaction (Cardillo, 2018; Merisotis, 2016). Additionally, academic performance represents a central aspect of young adult development and a measure of young adult well-being (Harter, 1999; Zvonkovic, Pennington, &, Schmiege, 1994; Merisotis, 2016). Academic performance is also an important measure of development for late adolescents and young adults because academic competencies are indicators of later success in the workplace (Roisman, Masten, Coatsworth, & Tellegen, 2004). A limitation in past studies is consistency regarding the measure of academic performance, as some studies use perception of academic performance (i.e., Giordano, Phelps, Manning, & Longmore, 2008) and others simply ask about grades, such as mostly A's, A's and B's, etc. The current study seeks to expand the measure of academic performance using three indicators: cumulative grade point average (GPA), last semester GPA, and perception of GPA compared to peers.

1.1 Marital Status and Academic Performance

Although the number of married undergraduate students has increased in the United States (Negy, 2003; Steinberg, 2011), few studies examine how marital status predicts academic performance in college. One study demonstrated a positive influence of marriage on the academic performance of community college students (Yess, 1981). However, Negy (2003) found that some married college students face more day-to-day difficulties than non-married students, which could potentially hinder academic performance. Meehan and Negy (2003) elaborated on these day-to-day difficulties, which included maintaining residences, supporting a spouse, and general marital distress. Being married as a college student is also a trait of non-traditional students, (Rosenthal et al., 2000) and non-traditional students experience higher levels of stress then traditional college students (Dill & Henley, 1998). Transitioning to college can be both an important and stressful psychosocial development experience for emerging adults in the United States.

Research on marital status, specifically in terms of academic performance of college students is relatively scarce, focuses on non-traditional students, or does not primarily focus on undergraduate university students (Meehan & Negy, 2003). There are some studies examining academic performance on graduate students, revealing that marital status is positively associated with academic performance, particularly when receiving spousal support (Stern, 1998). Another study, which focused on graduate students, found married men had better student outcomes than single men, but married women did not do worse than single women in terms of student outcomes (Price, 2006). This study provides some support that marriage may be beneficial for academic performance, but probably more so for men than women. Research on non-traditional students reveals that these students experience more stress than traditional students because they are more likely to already have a job, travel to campus (as opposed to living on campus), and have children (Hoffman & Youngblade, 2002; Li & Kam, 2002; Meehan & Negy, 2003; Stern, 1998). However, it should be noted that non-traditional students are also those that work full-time or are over the age of 25 (Rosenthal et al., 2000). The focus on the current study is undergraduate married couples specifically, rather than non-traditional students. One of the few studies on undergraduate married couples, which followed six married college couples performed worse academically compared to non-married college students due to their increased responsibilities (Norton et al., 1998). As these authors note, however, the experiences of these six couples may not be representative of all undergraduate married couples, particularly since all six were enrolled at the same university. Generally, there appears to be a negative trend concerning marriage and academic performance. Therefore, we propose the following hypothesis:

Hypothesis 1: Marital Status will be negatively associated with academic performance.

1.2 Marital Quality and Academic Performance

In addition to marital status, marital quality may also contribute to academic performance. Studies have shown several benefits of being in high quality relationships for individual health and well-being (e.g., Kiecolt-Glaser et al., 2003). In the case of undergraduate academic performance, marital quality may provide a stronger predictor of academic performance than marital status, as low quality relationships are likely to distract from courses due to high amounts of conflict and stress compared to high quality relationships (Papp, Kouros, & Cummings, 2009). In one study, Roberson et al. (2015) found that individuals who reported more satisfaction with their romantic relationship and had better conflict management skills reported better academic adjustment. Another study found that women's GPAs were related to the love they had for their dating partner (Zvonkovic et al., 1994). Studies on non-traditional college student success have illustrated that spousal support, indicative of higher quality relationships, was positively associated with academic performance (Katz, Monnier, Libet, Shaw, & Beach, 2000). Studies focusing on spousal support are founded on communication skills within married couples, meaning that couples with better communication skills are likely to be better at providing emotional support (Katz et al., 2000; Meehan & Negy, 2003). Therefore, not only should more satisfied married college students perform better academically compared to lower quality married college students, but those couples who communicate more effectively are also likely to perform better academically in college than those couples who do not communicate effectively. Based on these studies, some evidence exists that the quality of students' marital relationships is likely to be related with how well they perform in college. In these cases, simply being married may not be enough to discern academic performance. Therefore, we propose the following hypothesis:

Hypothesis 2: Relationship quality (satisfaction and communication) will moderate the relationship between marital status and academic performance. More precisely, high quality marital relationships will be associated with higher academic performance, whereas lower quality marital relationships will be associated with lower academic performance.

2. Method

2.1 Participants and Procedures

Data for this study comes from undergraduate students from a university in a Midwestern area of the United States ($N = 111$). Participants were recruited through classroom announcements in which the primary author was currently or formerly enrolled in. The first author either visited their current classes or sent emails out to classes they were previously enrolled in. Interested participants completed an online survey that asked students about their academic performance, relationship status, and relationship quality (if they were in a relationship). Demographics for the study sample are presented in *Table 1*. The majority of participants were female (81.1%) and White/Caucasian (87.4%). Of the 111 participants, 24 were married, six were casually dating, 49 were in a serious romantic relationship (not married), and 31 were single. Based on mean differences tests between married participants and non-married participants, the only significant difference was age, with married participants reporting older ages than single and seriously dating participants ($F = 17.09$, $p < .001$). There were no differences in terms of gender, ethnicity, sexual orientation, educational level, and academic performance.

Table 1. Descriptive statistics by relationship status.

		Single	Seriously Dating	Married	Total	$\chi^2(2,110)$
n		38	49	24	111	
Age		20.85 (2.41)	21.09 (1.95)	24.96 (4.62)	21.87 (3.30)	---
Gender	Male	6 (15.8)	7 (14.3)	7 (29.1)	20 (18.0)	6.56
	Female	32 (84.2)	42 (85.7)	16 (66.7)	90 (81.1)	
	Other	0 (0.0)	0 (0.0)	1 (4.2)	1 (0.9)	
Ethnicity	White/Caucasian	33 (86.8)	45 (91.8)	19 (79.2)	97 (87.4)	11.88
	Black/African-American	0 (0.0)	0 (0.0)	1 (4.2)	1 (0.9)	
	Asian/Pacific Islander	2 (5.3)	0 (0.0)	0 (0.0)	2 (1.8)	
	Hispanic	2 (5.3)	4 (8.2)	4 (16.6)	10 (9.0)	
	Other	1 (2.6)	0 (0.0)	0 (0.0)	1 (0.9)	
Sexual Orientation	Heterosexual	36 (94.8)	47 (96.0)	21 (87.4)	104 (93.7)	3.62
	Homosexual	0 (0.0)	1 (2.0)	1 (4.2)	2 (1.8)	
	Bisexual	1 (2.6)	1 (2.0)	1 (4.2)	3 (2.7)	
	Other	1 (2.6)	0 (0.0)	1 (4.2)	2 (1.8)	
Honors Student	Yes	7 (18.4)	7 (14.3)	6 (25.0)	20 (18.0)	
	No	31 (81.6)	42 (85.7)	18 (75.0)	91 (82.0)	
Employment	None	7 (18.4)	6 (12.2)	3 (12.5)	16 (14.4)	8.98
	Part-time	29 (76.3)	36 (73.5)	13 (54.2)	78 (70.3)	
	Full-time	2 (5.3)	7 (14.3)	8 (33.3)	17 (15.3)	
Education	Freshman	8 (21.1)	7 (14.3)	1 (4.2)	16 (14.4)	17.21
	Sophomore	5 (13.1)	8 (16.3)	1 (4.2)	14 (12.6)	
	Junior	6 (15.8)	14 (28.6)	6 (25.0)	26 (23.5)	
	Senior	17 (44.7)	14 (28.6)	9 (37.5)	40 (36.0)	
	5 or more years	2 (5.3)	6 (12.2)	7 (29.1)	15 (13.5)	
Academic Performance	Cumulative GPA[a]	3.26 (.54)	3.39 (.46)	3.22 (.51)	3.31 (.50)	
	Last semester GPA[a]	3.32 (.55)	3.45 (.54)	3.44 (.47)	3.41 (.53)	
	Perception of GPA[b]	4.27 (1.12)	4.71 (1.23)	4.63 (.97)	4.55 (1.15)	

Note: All variables are presented as counts with column percentages in parentheses, except for age and each measure of academic performance, which is presented as means with standard deviations in parentheses.

[a] GPA = grade point average and is on a 4.0 scale.

[b] Perception of GPA is measured on a scale of 1 (*below average*) to 7 (*above average*).

2.2 Measures

2.2.1 Academic Performance

Academic performance was measured using three variables: cumulative grade point average (GPA), last semester GPA, and perception of GPA compared to peers. Participants answered the following open-ended question regarding their cumulative GPA: "What was your GPA last semester (on a 4.0 scale)? Participants answered the following open-ended question regarding their last semester GPA: "What was your GPA last semester (on a 4.0 scale)?" Regarding perception of GPA, participants answered the following question, "In your opinion, how does your academic performance compare to your peers?" with responses ranging from 1 (*below average*) to 7 (*above average*). Means for each of these variables are: Cumulative GPA = 3.31 (*SD* = .50); last semester GPA = 3.41 (*SD* = .53); and perception of GPA = 4.55 (*SD* = 1.15). Correlations across these variables with other study variables are presented in *Table 2*.

2.2.2 Marital Status

Participants were asked to identify their current romantic relationship status by answering the following question, "What best describes your relationship status?" with responses being single, casually dating, in a serious relationship, and married. This variable was dichotomized to represent married (value = 1) and not married (value = 0).

2.2.3 Relationship Satisfaction

Relationship satisfaction was measured using the Relationship Assessment Scale (RAS; Hendrick, 1988). Examples of this 7-item scale include, "How good is your relationship compared to others?" and "How much do you love your partner?" Responses for each item ranged from 1 (*Low*) to 5 (*High*). This scale demonstrated acceptable internal consistency (Cronbach's alpha = .76), and the average level of satisfaction reported by participants was 4.47 (*SD* = .47).

2.2.4 Communication

Communication was assessed using the Couple Communication Scale (Grello & Harper, 2001). Example items from this 12-item scale are, "I openly tell my partner when I feel ignored by him or her" and "I express my feelings to my partner when I am upset with him or her." Responses ranged from 1 (*strongly disagree*) to 6 (*strongly agree*). This scale demonstrated acceptable internal consistency (Cronbach's alpha = .73), and the average level of communication reported by participants was 4.76 (*SD* = .61).

Table 2. Correlations of study variables (*N* = 111).

Study Variables	1	2	3	4	5	6
1. Current GPA	---	.79**	.62**	.04	.03	-.12
2. Last Semester GPA	.87**	---	.75**	-.13	.03	-.21
3. Perception of GPA	.57**	.67**	---	.06	.15	-.13
4. Marital Status	.44	.34	.04	---	.02	.16
5. Relationship Satisfaction	-.30	-.39	-.31	-.20	---	.19
6. Relationship Communication	-.02	-.03	-.12	.27	.05	---

Note: Male participants are below the diagonal and female participants are above the diagonal.

** *p* < .01.

2.3 Analytical Approach

For both hypotheses, linear regression analyses were conducted. For each regression model, control variables were entered in Step 1: age, gender, sexual orientation (dichotomized; heterosexual = 0, all other responses = 1), whether or not a participant was an honors student (dichotomized; honors student = 1, non-honors student = 0), and employment (dichotomized; part-time or full-time job = 1, no job = 0). Control variables were entered because each of these variables have been associated with collegiate academic performance in previous studies (e.g., Meehan & Negy, 2003; Negy 2003). Predictor variables were entered in Step 2. For hypothesis 1, the predictor variables were marital status (1 = married, 0 = not married), length of engagement, and length of marriage, which is also consistent with past studies (e.g., Langlais, Anderson, & Greene, 2016). For hypothesis 2, the predictor variables were marital status, relationship satisfaction, communication, the interaction between marital status and relationship satisfaction, and the interaction between marital status and communication. All predictors were

mean-centered for analyses. For each hypothesis, three separate regression models were conducted, each corresponding with the following dependent variables: cumulative GPA, last semester GPA, and perception of GPA. For all analyses, we examined changes in R^2 between Step 1 and Step 2 for each model to measure variance beyond the control variables.

3. Results

The first hypothesis predicted marital status would be negatively associated with academic performance. Results for this hypothesis are presented at the top of *Table 3*. According to this analysis, marital status was negatively associated with cumulative GPA and perception of GPA, but not last semester GPA. Length of marriage and length of engagement were not significant in these analyses. Additionally, only one control variable was significant; being an honors student was negatively associated with all three measures of academic performance. The variance explained by including marital status in these models ranged from .8% to 5.1% according to the changes in R^2.

Table 3. Examining the influence of marital status, relationship quality, and the interaction for undergraduate academic performance ($N = 111$).

Predictor Variables	Cumulative GPA	Last Semester GPA	Perception of GPA
Hypothesis 1			
Intercept	3.76 (.67)	3.04 (.72)	5.34 (1.44)
Marital Status	-.36 (.20)*	-.15 (.21)	-.33 (.42)*
Length of Marriage	.22 (.00)	.06 (.00)	.11 (.01)
Length of Engagement	.10 (.01)	.06 (.01)	.12 (.02)
ΔR^2	.051	.008	.037
Hypothesis 2			
Intercept	3.20 (5.10)	4.80 (5.68)	10.59 (10.70)
Marital Status	.30 (.21)	.24 (.29)	.23 (.24)
Relationship Satisfaction	-.07 (.17)	-.02 (.19)	.07 (.35)
Relationship Communication	-.06 (.12)	-.06 (.13)	-.17 (.24)
Marital Status x Satisfaction	-.39 (.29)	-1.28 (.33)	-.38 (.61)
Marital Status x Communication	-.20 (.27)	1.48 (.30)	.74 (.56)
ΔR^2	.021	.033	.024

Note: All participants had been in school for more than one semester. All analyses controlled for the following variables: age, gender, ethnicity, sexual orientation, relationship status, honors student, and employment. Only honors student was significant in each analysis, resulting in a negative association for academic performance.

* $p < .05$.

The second hypothesis predicted relationship quality would moderate the relationship between marital status and academic performance. Results for this hypothesis are presented at the bottom of *Table 3*. Relationship satisfaction, relationship communication, and marital status were not associated with any of the academic performance variables. Additionally, the interactions between marital status and the measures of relationship quality were not significant in these analyses. The control variable of honors students remained negatively associated with all three measures of academic performance in these analyses. Additionally, the variance explained by these models ranged from 2.1% to 3.3% based on changes in R^2 from Step 1 to Step 2 of the regression analyses.

4. Discussion

The goal of this study was to examine the relationship between marital status and academic performance for undergraduate college students. The results of this study showed marital status was negatively associated with academic performance. This study also illustrated that relationship quality did not moderate the relationship between academic performance and marital status, nor significantly predict academic performance. Study results extend past research on academic performance for married students in the collegiate context.

The goal of the first hypothesis was to examine if there were any associations between marital status and academic performance. Results for this hypothesis showed marital status was negatively associated with cumulative GPA and perception of GPA, but not last semester GPA. Length of marriage and length of engagement were not significant in these analyses. The only control variable that was significant for the first hypothesis was being an honors student. The negative association between marital status and academic performance may relate to certain experiences specific to married couples than non-married couples. Consistent with research on non-traditional students, married couples may face more issues than non-married students when it comes to college (Li & Kam, 2002; Meehan & Negy, 2003). For example, married couples may not only have to focus on their own daily schedules but also their spouses' schedule. These students may also have to worry about commuting to campus and being responsible for household chores compared to traditional students and students who are not married (Negy, 2003). The insignificant finding with last semester GPA is a little more difficult to explain. Hypothetically, shortly after being married, couples experience a honeymoon stage (Lorber, Erlanger, Heyman, & O'Leary, 2015), which may negate some of the everyday stress of college. Presumably, some of the honeymoon stage wears off over time, which supports the negative association between academic performance and current semester GPA.

The goal of the second hypothesis of this study was to examine if relationship quality would moderate the relationship between marital status and academic performance. Results of the second hypothesis illustrated that relationship satisfaction, relationship communication, and interactions with marital status were not associated with any of the academic performance variables. There are some explanations for these null findings. First, little variability was reported by participants with relationship quality. The lack of variability may make it difficult to find significant effects. Second, individuals in college may opt to focus on a single domain, meaning they could either focus primarily on their romantic relationship or academic performance. For example, if an individual experiences conflict with their romantic partner, they may concentrate on solving the marital conflict and they may not let the residual stress of their conflict interfere with their focus on academics. On the other hand, if an individual performs poorly in school, they may not let their deficient performance interfere with the quality of their romantic relationship. During emerging adulthood, individuals sometimes experience difficulty multi-tasking with varying domains (Roberson et al., 2015).

Although this study advances knowledge on academic performance and marital status, no study is without limitations. A majority of the participants in this study were female and heterosexual. Also, the participants in this study were primarily from the Midwest. Future studies could improve on the current study by having a larger, more diverse sample size. Another limitation of this study was that participants were not asked about the number of children that they had. Married couples are more likely to have children than non-married couples. Thus, married students might report lower levels of GPA due to raising children, a task that is likely to distract from academic performance (Hoffman & Youngblade, 2002; Stern, 1998). Future studies should examine the impact of children for academic performance in undergraduate education. This study could also be improved by using a pre- and post-test design. For example, participants could answer questions about their academic performance before they get married, and then answer the same questions about their academic performance after they get married. Therefore, we recommend a longitudinal approach using a pre- and post-test design to verify the results of this study.

Implications for this study can extend to college students who are interested or planning on getting married during college as well as marriage counselors, teachers, and other professionals. College students who are married or who get married during college are recommended to discuss with their partner the role of school during their marriage. Given the significance of emotional support during marriage while individuals are in school (Katz et al., 2000), married college students are encouraged to support each other while they juggle multiple roles, including that of spouse and that of student. College educators may also use information in this study to assist married college students to help them navigate the role of a student while also being married. Being married while in college, although uncommon, appears to influence academic performance. Since academic performance in college is associated with professional achievement later in life (Oreopoulos & Petronijevic, 2013; Perna, 2003), it is important to assist this group of students to maximize their academic potential. It is likely that their success in college is likely to positively impact the quality of the married couple (Cardillo, 2018; Merisotis, 2016).

The goal of this study was to examine how marital status predicts undergraduate academic performance, and tests relationship quality as a moderator for the relationship between marital status and academic performance. Results of this study illustrated the importance of marital status for academic performance as opposed to relationship quality. This study emphasizes the impact of marriage during a developmental period where marriage may not be the norm.

References

Cardillo, D. (2018). Can a college degree make you healthier and happier? *Oz*. Retrieved from https://www.doctoroz.com/blog/donna-cardillo-rn-ma/can-college-degree-make-you-healthier-and-happier.

Dill, P. L., & Henley, T. B. (1998). Stressors of college: A comparison of traditional and nontraditional students. *Journal of Psychology*, *132*, 25-32. https://doi.org/10.1080/00223989809599261

Giordano, P. C., Phelps, K. D., Manning, W. D., & Longmore, M. A. (2008). Adolescent academic achievement and romantic relationships. *Social Science Research*, *37*, 37-54. https://doi.org/10.1016/j.ssresearch.2007.06.004

Grello, C. M., & Harper, M. S. (2001). *Couples' Communication Scale.* Unpublished instrument. (Available from Deborah Welsh, Department of Psychology, University of Tennessee, Knoxville, TN 37996-0900).

Harter, S. (1999). *The construction of the self: A developmental perspective*. New York, NY, US: Guilford Press.

Hendrick, S. (1988). A generic measure of relationship satisfaction. *Journal of Marriage and the Family, 50*, 93–98. https://doi.org/10.2307/352430

Hoffman, L. W., & Youngblade, L. M. (2002). Mothers at work: Effects on children's well-being. *Family Therapy, 29*, 188-222.

Idler, E. L., Boulifard, D. A., & Contrada, R. J. (2012). Mending broken hearts: Marriage and survival following cardiac surgery. *Journal of Health And Social Behavior*, *53*, 33-49. https://doi.org/10.1177/0022146511432342

Katz, J., Monnier, J., Libet, J., Shaw, D., & Beach, S. R. H. (2000). Individual and crossover effects of stress on adjustment in medical student marriages. *Journal of Marital and Family Therapy, 26*, 341-351. https://doi.org/10.1111/j.1752-0606.2000.tb00303.x

Kiecolt-Glaser, J. K., Loving, T. J., Stowell, J. R., Malarkey, W. B., Lemeshow, S., Dickinson, S. L., & Glaser, R. (2005). Hostile Marital Interactions, Proinflammatory Cytokine Production, and Wound Healing. *Archives of General Psychiatry*, *62*, 1377-1384. https://doi.org/10.1001/archpsyc.62.12.1377

Le, B., & Agnew, C. R. (2003). Commitment and its theorized determinants: A meta-analysis of the investment model. *Personal Relationships*, *10*, 37-57. https://doi.org/10.1111/1475-6811.00035

Lorber, M. F., Erlanger, A. C. E., Heyman, R. E., & O'Leary, K. D. (2015). The honeymoon effect: Does it exist and can it be predicted? *Prevention Science*, *16*, 550–559. https://doi.org/10.1007/s11121-014-0480-4

Meehan, D. C. M., & Negy, C. (2003). Undergraduate students' adaptation to college: Does being married make a difference? *Journal of College Student Development*, *44*, 670-690. https://doi.org/10.1353/csd.2003.0055

Merisotis, J. (2016). Want to be happier and healthier? Then go to college. *Huffpost*. Retrieved from https://www.huffingtonpost.com/jamie-merisotis/want-to-be-happier-and-he_b_8288354.html.

Negy, C. (2003). Undergraduate students' adaptation to college: does being married make a difference? *Journal of College Student Development, 44*, 670-690. https://doi.org/10.1353/csd.2003.0055

Neff, L. A., & Broady, E. F. (2011). Stress resilience in early marriage: Can practice make perfect?. *Journal of Personality and Social Psychology*, *101*, 1050-1067. https://doi.org/10.1037/a0023809

Norton, L. S., Thomas, S., Morgan, K., Tilley, A., & Dickins, T. E. (1998). Full-time studying and long-term relationships: Make or break for mature students? *British Journal of Guidance & Counselling, 26*, 75-88. https://doi.org/10.1080/03069889808253840

Oreopoulos, P., & Petronijevic, U. (2013). Making college worth it: A review of the returns to higher education. *The Future of Children, 23*, 41-65. https://doi.org/10.1353/foc.2013.0001

Oswalt, S. B., & Wyatt, T. J. (2014). But I'm married: Understanding relationship status and college students' sexual behaviors. *American Journal of Sexuality Education*, *9*, 4-20. https://doi.org/10.1080/15546128.2013.854009

Papp, L. M., Kouros, C. D., & Cummings, E. M. (2009). Demand-withdraw patterns in marital conflict in the home. *Personal Relationships*, *16*, 285-300. https://doi.org/10.1111/j.1475-6811.2009.01223.x

Perna, L. W. (2003). The private benefits of higher education: An examination of the earnings premium. *Research in Higher Education*, *44*, 451-472. https://doi.org/10.1023/A:1024237016779

Price, J. (2006). Does a spouse slow you down? Marriage and graduate student outcomes [Electronic version]. Retrieved February 22, 2017, from Cornell University, School of Industrial and Labor Relations site: http://digitalcommons.ilr.cornell.edu/workingpapers/147/.

Roberson, P. E., Fish, J. N., Olmstead, S. B., & Fincham, F. D. (2015). College adjustment, relationship satisfaction, and conflict management: A cross-lag assessment of developmental 'spillover'. *Emerging Adulthood*, *3*, 244-254. https://doi.org/10.1177/2167696815570710

Roisman, G. I., Masten, A. S., Coatsworth, J. D., & Tellegen, A. (2004). Salient and emerging developmental tasks in the transition to adulthood. *Child Development*, *75*, 123-133. https://doi.org/10.1111/j.1467-8624.2004.00658.x

Rosenthal, G. T., Folse, E. J., Allenman, N. W., Boudreaux, D., Soper, B., & Von Bergen, C. (2000). The one-to-one survey: Traditional versus nontraditional student satisfaction with professors during one-to-one contacts. *College Student Journal, 34*, 315-320.

Steinberg, S. (2011, August 8). *Saying 'I do' while studying at the 'U'.* Cable News Network. Retrieved on March 8, 2017 from http://www.cnn.com/2011/08/04/living/married-college-students/.

Stern, L. S. (1998). The experience of women combining multiple roles and graduate training in counseling psychology. *Dissertation Abstracts International, Section B: The Sciences & Engineering, 58*, 6829.

United States Department of Education. (2014). *Profile of Undergraduate Students: 2011-2012*. Retrieved on March 2, 2017 from https://nces.ed.gov/pubs2015/2015167.pdf.

United States Census Bureau. (2017). *Historical Marital Status Tables.* Retrieved on October 1, 2018 from https://www.census.gov/data/tables/time-series/demo/families/marital.html.

Yess, J. P. (1981). The influence of marriage on community college student achievement in specific programs of study. *Research in Higher Education, 14*, 103-118. https://doi.org/10.1007/BF00976288

Zvonkovic, A. M., Pennington, D. C., & Schmiege, C. J. (1994). Work and courtship: How college workload and perceptions of work environment relate to romantic relationships among men and women. *Journal of Social and Personal Relationships*, *11*, 63-76. https://doi.org/10.1177/0265407594111004

Copyrights

The Impact of Different Genres of Music on Teenagers

Junle Richard Chen[1]

[1] The Hun School of Princeton, New Jersey, United States

Correspondence: Junle Richard Chen, The Hun School of Princeton, 176 Edgerstoune Rd, Princeton, NJ 08540, United States. E-mail: junlechen@hunschool.org

Abstract

The purpose of this study was to determine the impact of different genres of music (Jazz, Hip-hop, Pop, Classical) on the cognitive abilities, calmness, stress, mood, and energy of adolescents. Utilizing Muse Headband, an EEG Monitoring app, and Sennheiser headphone, volunteers completed a designed experimental protocol and were tested on the aforementioned variables. The study found that all music indicated a trend of improved energy, stress, mood, and calmness. Although some of the results were insignificant, the consistency of the results suggests correlations between (a) calmness and cognitive abilities, (b) stress and calmness, (c) mood and energy level, and (d) calmness and energy level.

Keywords: music, calmness, cognitive ability, stress, teenager, energy, mood

1. Introduction

Music, as a form of art, is created when different sounds are combined to create a new sound that is euphonic. Every piece of music has six essential elements: rhythm, dynamics, melody, harmony, texture, and form. Each distinct genre of music combines these elements differently. Genres of music include Classical, Jazz, Hip-hop, Pop, and many other categories. Classical music, compared to other genres of music, has a larger dynamic range, longer duration, and greater notational precision. Hip-hop has a stronger beat than other genres of music. Jazz music has frequently-changing melodies and improvisations. Pop music, although it varies across different eras, usually lasts for about two to five minutes and often has more memorable melodies than other music.

As music has become more accessible, it is increasingly common to see people listening to music in public, whether in the airport or on the street. At the same time, people have displayed increasing interest in the benefits of listening to music. The widespread interest in the benefits that music listening can bring started after the publication of an article that stated that people who listen to Mozart have a better spatial ability (Jenkins, 2001). Although this so-called "Mozart Effect" does demonstrate immediate benefits after listening to music, this only lasts for about 10 to 15 minutes. In the following years, other researchers studied the links between music and other benefits from listening to music, including improved work performance, creativity, and mood. Creativity — defined as the ability to turn inventive and imaginative ideas into reality — is negatively impacted by stress and negative mood (Ciotti, 2015). As people listen to music, however, their stress levels decrease and their mood improves, which can in turn increase their creativity (Lesiuk, 2005). Researches also indicates that music can significantly increase work quality and how listening to music can "lead to short-term and long-term cognitive benefits" such as memorization (Schellenberg, 2004).

However, different genres of music likely have different impacts on people. Teenagers studying for the SAT or other standardized tests might listen to music that boosts concentration. Athletes who are playing games or practicing might listen to music that can help them become more excited. The purpose of this research is to determine the impacts of different genres of music on cognitive abilities, stress, mood, and energy in adolescents. We utilized Muse — a headband that helps users become calmer by providing feedback from EEG data it collects — as well as other equipment, such as headphone and EEG monitor, to expose students to different genres of music in an experimental protocol and to collect data. Data were collected in a soundproof room in a school library with students during a summer school program. Data of energy level, stress level, mood, EEG, and calmness were analyzed, which provide evidence for different impacts of different genres of music on teenagers.

2. Prior Work

Electroencephalogram (EEG) is a test that is used to monitor electrical activity in the brain. Electrodes are attached to the scalp to analyze and record brain waves. Considerable research shows that EEG can effectively record different emotional states and stress levels. Specifically, this research study uses the Muse headset and Muse Monitor app for recording and analyzing EEG. Muse is a brain-sensing headband that helps users have better meditation experiences by giving them real-time EEG feedback and meditation advice. It has four EEG sensors: three Reference Sensors, two Forehead Sensors, and two SmartSense Conductive Rubber Ear Sensors. Evidence demonstrates that Muse can provide accurate and high-quality EEG data (Krigolson, 2017). Since other research provides a strong validation of the reliability of both EEG and Muse, it is legitimate to use Muse for collecting EEG data and analyzing EEG to identify changes in participants' levels of emotion and calmness.

From present and past studies, it is known that music can impact individuals' emotion, mood, stress, and cognitive abilities. When listening to music, the listener creates a bond with the composer; the composer embodies his emotion, memory, and imagination while the listeners perceive the emotion in the music, thus resonating with the composer (Bennett, 1942).Music can "evoke the full range of human emotion from sad, nostalgic, and tense, to happy, relaxed, calm, and joyous," which can greatly affect listeners' emotion and mood (Ahtisaari, 2015). The emotions evoked by music can be both positive and negative emotions (Schaeffer, 2017). At the same time, music can subdue the impact of stressors on individuals' stress and anxiety (Knight and Richard, 2001). Studies on the effects of music on stress stated that "music listening impacted the psychobiological stress system" (Thoma, 2013). Several empirical studies, such as Jenkins's research on the Mozart effect and Schellenberg's study on music and IQ, have shown that listening to music can improve individuals' spatial IQ and other cognitive abilities (Jenkins, 2001 & Schellenberg, 2013). Many researches used EEG to analyze the effect of music on emotion and brain (Ramirez, 2018). In sum, previous research indicates that music can improve stress levels, mood, emotion, and cognitive abilities.

The purpose of this study is to test the impacts of different genres of music on teenagers' cognitive abilities, mood, stress, energy levels. Four distinct music genres were selected for the experiment: Classical, Jazz, Hip-hop, and Pop. According to Shigeki Ogata's paper on EEG and music, EEG varies according to "the combination of music's components, i.e., rhythm, melody, and harmony" (Ogata, 1995). Classical music is usually with clear rhythm, tuneful melodies, and played by piano or classical instruments. Jazz usually has more syncopations, improvisation, and dynamic rhythms. For this research, Swing Jazz, which is defined by "a rhythm section [that] smoothly accentuates each beat in 4/4 or a 'swinging' rhythmic pattern", is chosen for the Jazz genre (Apell, 1955). Hip-hop has a powerful beat, chanted and simple lyrics, and a simple melody (Harvard Dictionary of Music). Pop music, "a musical idiom of recent centuries whose mass disseminated works appeal to a broad public" has a bright melody and rhyme, but different music regression than Jazz or Classical Music (Apell, 1955). These four genres of music have distinct and different rhythms, melodies, and harmonies, making them distinguishable for testing purposes.

This research aims to determine the impacts of different genres of music on cognitive abilities, stress, mood, and energy in adolescents, providing insights into the potential benefits of listening to different genres of music for different occasions.

3. Methods

3.1 Stage One

3.1.1 Purpose

The purpose of Stage One is to determine the impact of different genres of music on stress level, energy level, mood, and calmness of the participants, and to then select two genres of music that have opposite effects on the energy levels of participants. This stage included four independent variables and two dependent variables. The four genres of music (Jazz, Classical, Hip-hop, Pop) are the independent variables. Survey results and EEG data from Muse are the dependent variables.

3.1.2 Participants

Stage one had 60 participants in total: 30 men and 30 women. The participants' ages ranged from 14 to 17 years old. All participants were randomly divided into four music genre groups (Jazz, Classical, Hip-hop, Pop) so that each group included 15 participants. In each group, participants listened to a piece of music from the genre of music they were assigned to. Participants in the classical group listened to music that had a more regular and traditional melody, and mostly played by an orchestra. Participants in the Jazz group listened to

pieces consisting of swing beats, blues elements, and improvisations. Participants in the pop group listened to music that had a memorable melody with strong beats and rhythms. Participants in the Hip-hop group listened to music that consisted of chanted lyrics, strong beats, and repeating background music.

3.1.3 Materials

The musical app NetEase Music did the randomization of the songs; different pieces were put into the four different playlists according to their genres. All the participants in Stage One were tested in the same location (a soundproof room) and during the same time of the day (1:00 p.m. to 3:00 p.m.) throughout two consecutive days. Sennheiser headphones connected to an iPad provided all Sound stimuli.

3.1.4 Procedure

The experiment was performed as follows. Participants were given a short and basic survey with three short questions. The survey asked about the energy level, stress level, and mood of the participants on a scale of one to five. For energy level, "one" represented very tired or exhausted, and "five" represented very energetic or excited. For stress level, "one" represented least stressed or depressed, and "five" represented most stressed or depressed. For mood, "one" represented very sad or unhappy, and "five" represented very happy or satisfied. All the numbers between "one" and "five" represent participants' energy level, stress level, and mood between the two extremes. After taking the survey, participants were instructed to put on the Muse headset. After the Muse headset successfully calibrated with participants, the participants put on headphones and listened to a piece of music from the genre they were assigned to while meditating. Each meditating session lasted for three minutes, and all the participants lied back into the chair with their eyes closed. Immediately after the three-minute meditation session, participants took the same survey they took at the start of the experiment. EEG data analyzed by the Muse app were recorded with all the survey data.

3.2 Stage Two

3.2.1 Purpose

The purpose of Stage Two was to determine the impact of two genres of music identified during Stage One as being either calming or energizing on participants' cognitive ability, specifically their memory. For this experiment, card memorization was chosen for a cognitive/memory test.

3.2.2 Participants

Stage two had 20 participants in total, consisting of 10 men and 10 women, all between 14 and 17 years old. Participants were randomly divided into two groups (Jazz and Classical) so that each group included 10 volunteers. Each group listened to the same pieces of music from the same composers for that genre of music from Stage One.

3.2.3 Materials

Stage Two was conducted in the same location and during the same time period as the previous stage. In addition to previous equipment, this stage also required the use of a deck of poker. The experiment was conducted in one day.

3.2.4 Procedure

Experiments were performed as follows. First, participants were given the same survey that was used in Stage One where they were asked about their energy level, stress level, and mood. Then, 30 cards were selected randomly from a deck of 54 cards. Participants were given one minute to remember as many cards out of 30 cards as possible. The participants did not have to remember colors or suits, but they did need to remember the order of the cards. Three or more consecutive cards counted as a sequence, and the participants had to remember sequences in order to have a valid card count. They also did not have to remember these sequences in a specific orientation; it could be from bottom to top of the deck or from top to bottom. After card memorization, the participants immediately recited the order of the cards or the sequences they remembered out of the 30 cards they were given. Then, participants listened to the theme of music they were assigned to while meditating. The duration of the meditation for all participants was three minutes. All participants rested on their chair with their eyes closed. The same survey taken at the beginning of the stage was administered against immediately after meditation. Lastly, participants repeated the same card-memorizing test. Data on card memorization, survey responses, and EEG were collected.

4. Results

In Stage One, the effects of each music genre on energy level, stress level, mood, and calmness were examined. By comparing EEG data collected from participants in different musical groups, it became clear that those in the Classical music group exhibited the most calmness (Figure 1). However, the survey results showed that classical music had a relatively small impact on improving stress levels compared to other genres (Figure 2). Comparing the average EEG data of all participants on calmness, it was discovered that participants who listened to Hip-hop were least calm. However, comparing the energy change of participants showed that participants who listened to Hip-hop had the highest score in the change of energy, meaning it was best able to excite listeners (Figure 3). Pop music had a minor effect on stress, mood, and energy of the participants compared to other music genres. Lastly, Jazz was able to substantially improve participants' calmness compared to other genres of music (Figure 1). The survey results also showed that Jazz was relatively better at improving stress and mood of the participants than other genres of music. While Classical and Jazz music had a slightly larger impact on calmness, Pop and Hip-hop have slightly greater impacts on increasing energy level (Figures 1 through 4).

The purpose of Stage Two was to build on the findings of Stage One by limiting the four themes of music to the two genres that showed biggest changes in calmness and energy: Jazz and Hip-hop, respectively. A significant finding in Stage Two was the impact of Jazz and Hip-hop on cognitive skills. Participants who listened to Jazz, on average, remembered approximately three cards more than participants who listened to Hip-hop in the second card test. The mean score of participants in the Jazz group was 13.5, while the mean score of participants who listened to Hip-hop was 10.8 (Figure 5). Five out of ten participants who listened to Hip-hop became worse at remembering cards than they were before listening to the music. In comparison, nine out of ten participants who listened to Jazz remembered the same or more cards after listening to music than before. For the change of cards – i.e., the difference between the number of cards remembered by participants in the first card test and second card test – participants in the Jazz group, on average, remembered 1.4 additional cards, while the Hip-hop participants averaged 0.6 fewer (Figure 6). In short, this means that, in the cognitive test, participants who listened to Jazz improved about two cards more than those who listened to Hip-hop.

While Stage Two reinforced some findings of Stage One, the results also show some discrepancies. In Stage Two, the EEG data of participants who listened to Jazz showed a higher calmness level than participants in Hip-hop group (Figure 7). Comparing the survey results on energy, stress, and mood across the genres, participants who listened to Hip-hop scored slightly higher on energy and mood, and participants who listened to Jazz scored better at stress (Figure 8). The average score of participants in the Jazz group demonstrated a more significant improvement in stress levels than participants in the Hip-hop group. All of these results reinforced the findings in Stage One, except for mood improvement. In Stage One, according to the survey results, Jazz has a significantly larger impact on mood improvement than Hip-hop. In Stage Two, on the other hand, Hip-hop showed a slightly larger impact on improving mood than Jazz. This might be caused by the imprecision of the survey or different psychological or physical conditions of participants. The largest possible improvement for stress level on a scale of five is four, and Jazz was only able to improve stress level more than Hip-hop by 0.2 on participants. Hip-hop also only scored 0.2 better score than Jazz on the change of energy level and 0.15 better than Jazz on change of mood (Figure 8).

However, the t-test results all showed insignificant results for independent variables in Stage Two except the score of energy for Hip-hop. Although the results are shown as insignificant, the results for Stage Two are consistent for both genres of music, which suggests that significant results could be found with a larger sample.
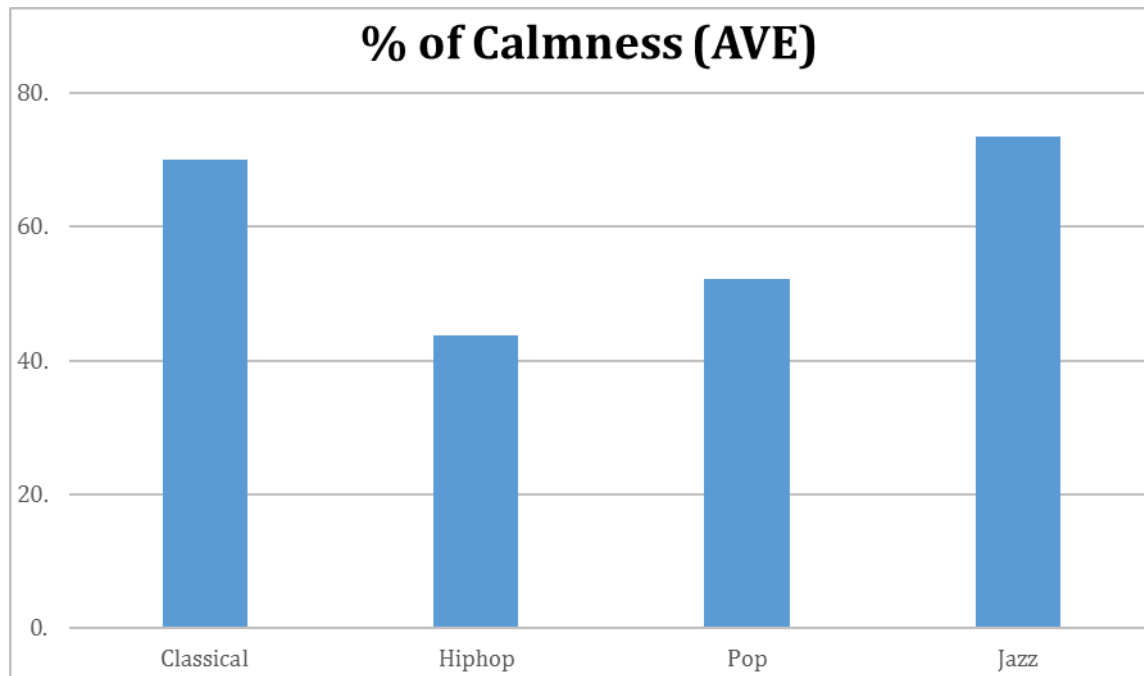
Figure 1. A comparison of calmness(EEG) between four genres of music

Figure 2. A comparison of improvement for stress level between four genres of music
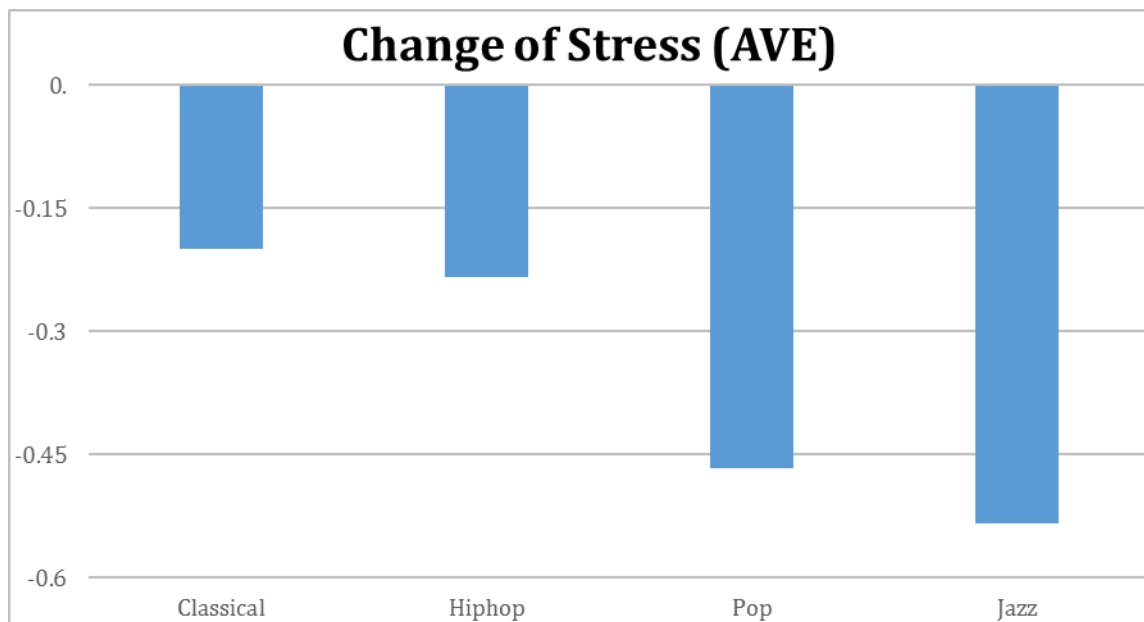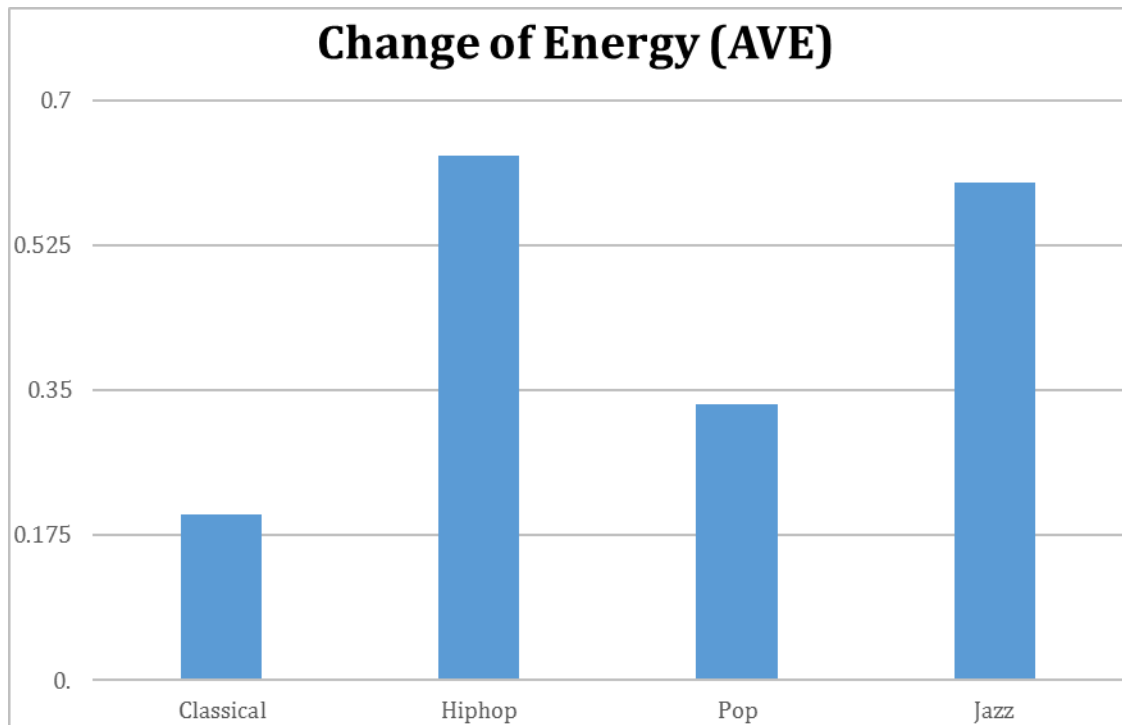
Figure 3. A comparison of improvement for energy level between four genres of music
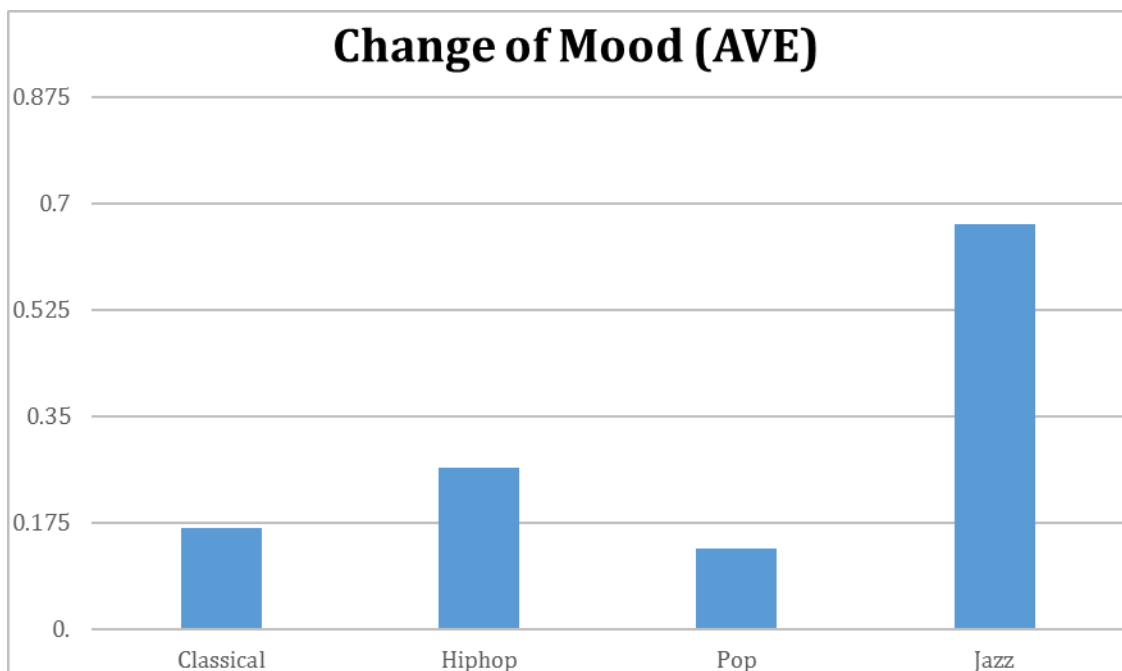

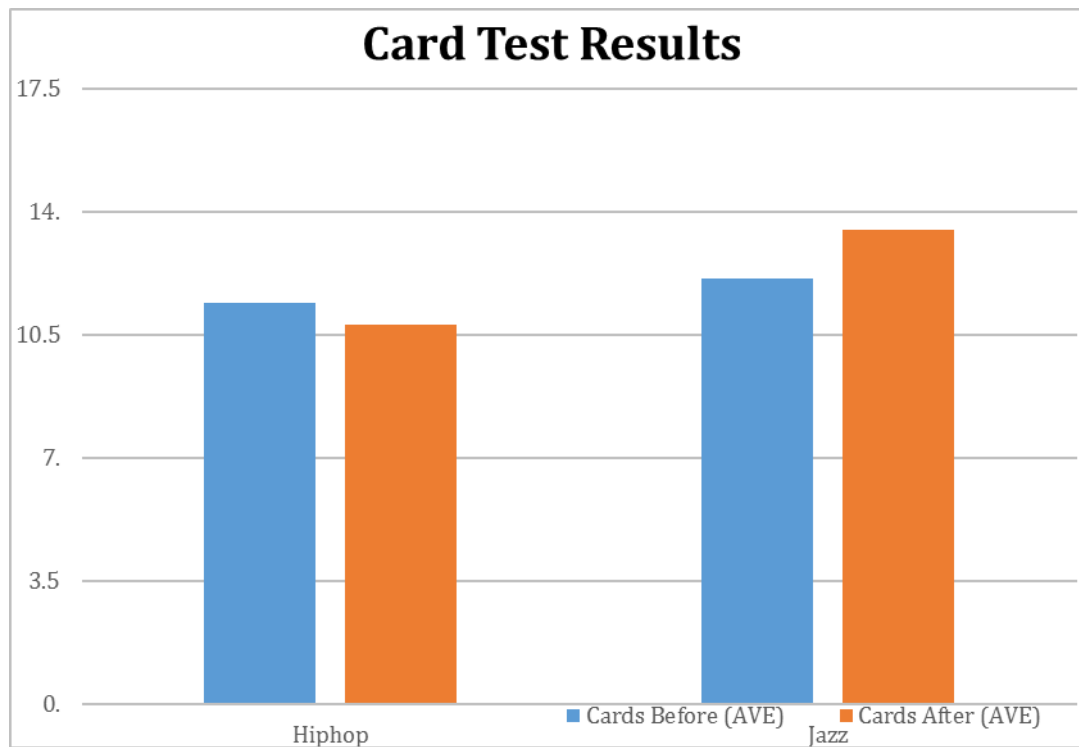Figure 4. A comparison of improvement for mood between four genres of music

Figure 5. The comparison between card test results of Jazz and Hip-hop in Stage Two
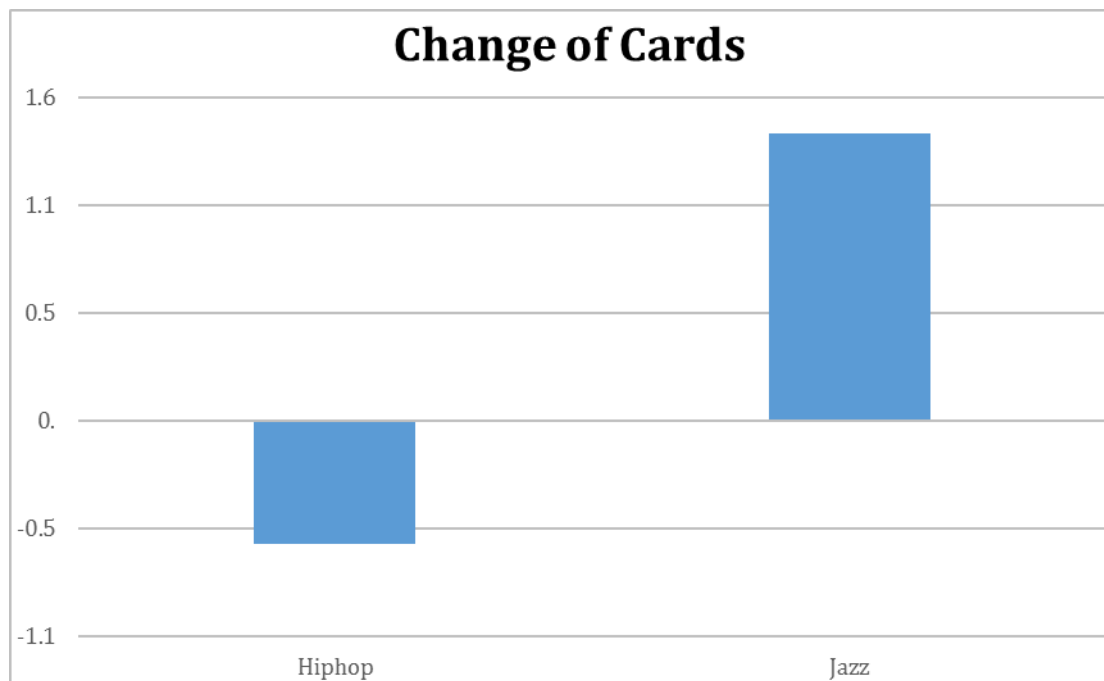
Figure 6. The comparison of change of cards for Jazz and Hip-hop in Stage Two
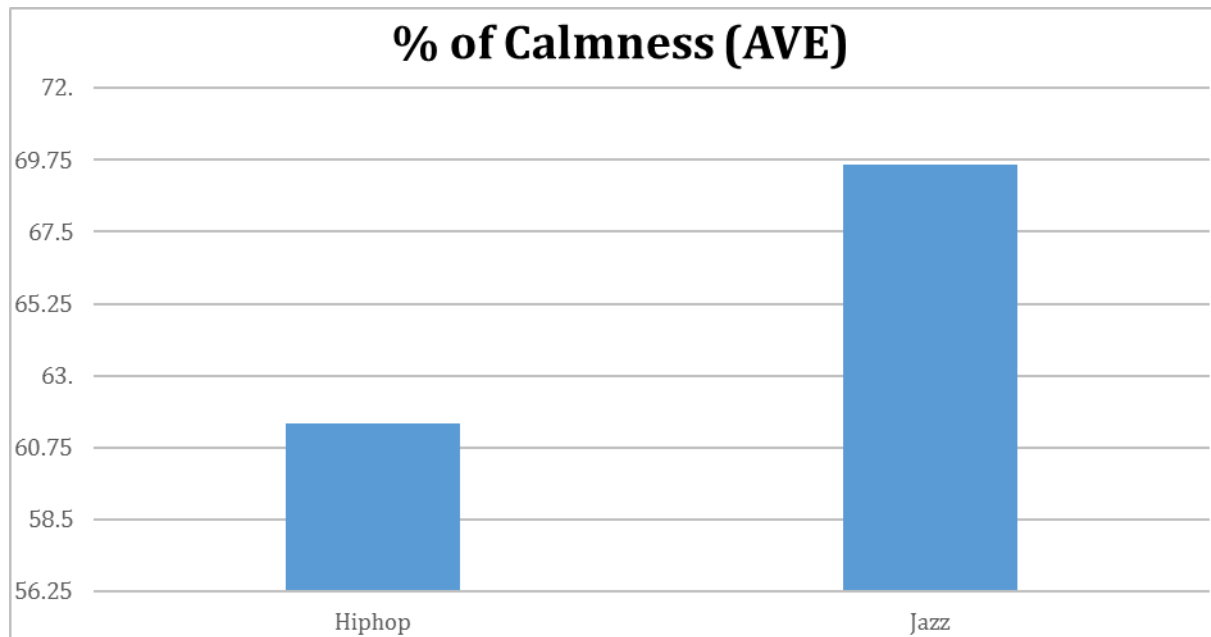
Figure 7. The comparison of calmness (EEG) Jazz and Hip-hop in Stage Two
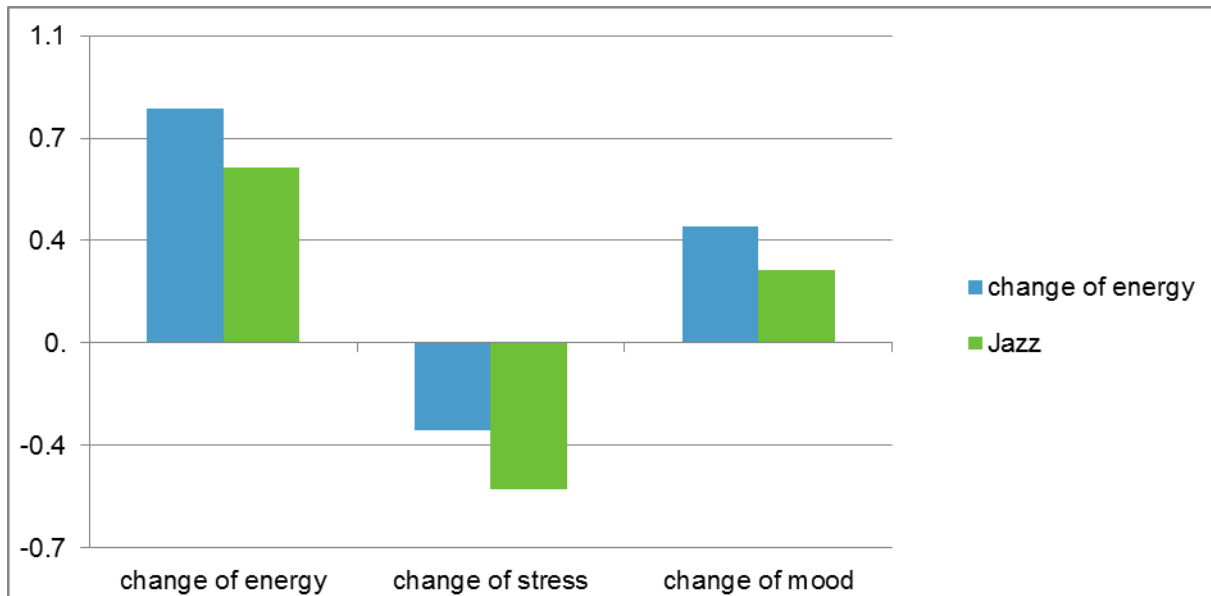
Figure 8. The comparison of change of mood, stress, and energy between Jazz and Hip-hop in Stage Two

5. Discussion

This research has several findings concerning the impacts of different genres of music on energy level, mood, stress level, calmness, and cognitive abilities as well as the correlations between these variables. In Stage One, the results indicated that Jazz had the largest impact on calmness and stress of the participants, which was also found in Stage Two of the experiment. Classical music had a relatively higher impact on calmness and usually caused participants to have lower energy. Pop had little to no effect on stress, energy, calmness, or mood improvement when comparing to the EEG and survey results of other genres of music. Hip-hop increased participants' energy level the most and had a positive impact on their mood. After comparing the results of the surveys, a correlation between energy, stress, mood, and calmness can be found between different genres of music. For all genres, the score for stress level improved when the calmness of the participants was relatively

high during meditation. The mood of the participants improved when the score energy level improved. These findings may imply that calmness and stress are correlated and that energy and mood are correlated.

In Stage Two, Jazz had a positive impact on calmness and cognitive abilities, whereas Hip-hop had more negative effects on both categories. At the same time, participants who listened to Jazz were less energetic than participants who listened to Hip-hop music. Since both types of music had opposite effects on calmness, it is possible that the increment of calmness level has an increasingly positive effect on cognitive skills, and the increment of energy level has an adverse effect on cognitive skills. The results on changes in energy level and calmness span all genres of music in both stages, suggesting that the higher the energy level, the lower the calmness level. In other words, calmness and energy have a negative relationship with each other. Stress and mood did not demonstrate a direct relationship with cognitive skills.

However, in this experiment, there are several discrepancies of data between different genres of music in Stage One and Stage Two, such as the improvement for mood and stress levels. The discrepancies of results and data between the two stages might be caused by several factors, such as the inaccuracy of the survey, different conditions of participants, and the short experiment time. In Stage One, Jazz demonstrated a very high score on participants' energy level. Interestingly, when the calmness score of Jazz was relatively high, we would expect energy level to be low given that excitement and calmness are opposites. However, Jazz had a high score on both the change of energy level and calmness. Since calmness is measured by EEG and Muse headset, which are both stated to be reliable in prior research, the data on calmness is likely more accurate and reliable. The discrepancy between theoretical and actual results might be caused by the inaccuracy of the survey. Since the survey was elementary and quick, some participants might have given an inaccurate answer comparing to their actual condition on energy. The survey was also based on the feelings of participants on their conditions of energy, stress, and mood; thus, some participants might have given inaccurate or false feedback. This inaccuracy of survey data might have also caused the discrepancy in mood between the two stages: whereas Stage One showed that Jazz produced a significantly greater change in mood than Hip-hop, Stage Two showed the opposite. The survey's inaccuracy might also cause this discrepancy.

Although Jazz was better able to improve cognitive skills than Hip-hop, it is worth considering how the baseline cognitive abilities of participants could have impacted the results. Even though participants who listened to Hip-hop remembered fewer cards than participants who listened to Jazz in the cognitive test at the beginning of the experiment, this cannot necessarily be attributed to the music. Indeed, it is possible that the natural cognitive abilities of participants in the Jazz group are better than those in the Hip-hop group. The different cognitive abilities of participants might influence the results of cards remembered by participants positively or negatively.

Even though there are differences between the results of different genres of music between the two stages, the results of the research only showed a trend. T-tests comparing energy, stress, mood, and cognitive abilities from before and after the experiment all showed insignificant results. The differences of all dependent variables between each genre of music were also small in comparing the highest possible changes in those variables. However, since the results in Stage Two were consistent with energy, stress, mood, calmness, and cognitive test, the results seem to indicate a correlation or trend. This experiment might have also rendered more significant results if additional time had been dedicated to each session of music listening (meditation), since this would allow participants an opportunity to calm down and adjust their condition.

Reference

Ahtisaari, M., & Karanam, K. (2015, July 21). Music and Emotion. Retrieved October 28, 2018, from Sync Project website: http://syncproject.co/blog/2015/7/21/music-and-emotion

Alstyne, D. V. (n.d.). Classical vs. Popular Music. Retrieved October 28, 2018, from davidvanalstyne website: http://davidvanalstyne.com/index.html

Bennett, V. (1942). Music and Emotion. *The Musical Quarterly*, *28*(4), 406-414. https://doi.org/10.1093/mq/XXVIII.4.406

Blocka, K. (2017, September 14). EEG (Electroencephalogram). Retrieved October 28, 2018, from healthline website: https://www.healthline.com/health/eeg#uses

Ciotti, G. (2014, July 11). How Music Affects Your Productivity. Retrieved October 28, 2018, from Fast Company website: https://www.fastcompany.com/3032868/how-music-affects-your-productivity

Ciotti, G. (2015, August 27). How Music Affects Your Productivity. Retrieved October 28, 2018, from HelpScout website: https://www.helpscout.net/blog/music-productivity/

Cox, R. (1990). A History of Music. *The Journal of Aesthetics and Art Criticism*, *48*(4), 395-409. https://doi.org/10.2307/431576

Fuller, R. P. (2010, January 14). Classical Music. Retrieved October 28, 2018, from rpfuller website: https://www.rpfuller.com/gcse/music/classical.html

H., S. (n.d.). Why is Music Important to Human Beings? Retrieved October 28, 2018, from Life Advancer website: http://www.lifeadvancer.com/why-is-music-important-to-humans/

Herrmann, N. (2018, January). What is the function of the various brainwaves. Retrieved October 28, 2018, from Scientific America website: https://www.scientificamerican.com/article/what-is-the-function-of-t-1997-12-22/

Hohstadt, L. (n.d.). What Is "Classical Music"? Retrieved October 28, 2018, from Lowell Hohstadt website: http://lowellhohstadt.com/what-is-classical-music/

How Does Music Affect Teenagers. (2016, November 15). Retrieved October 28, 2018, from Pumpic website: http://pumpic.com/security/how-does-music-affect-teenagers/

Jena, S. K. (2015). Examination stress and its effect on EEG. *International Journal of Medical Science and Public Health*, *4*(11). https://doi.org/10.5455/ijmsph.2015.23042015308

Jenkins, J S. (2001). The Mozart effect. *Journal of the Royal Society of Medicine*, *94*(4), 170-2. https://doi.org/10.1177/014107680109400404

Knight, W. E., & Rickard, N. S. (2001). Relaxing music prevents stress-induced increases in subjective anxiety, systolic blood pressure, and heart rate in healthy males and females. *Journal of Music Therapy*, *38*(4), 254 - 272. https://doi.org/10.1093/jmt/38.4.254

Krigolson, O. E., Williams, C. C., Norton, A., Hassall, C. D., & Colino, F. L. (2017). Choosing MUSE: Validation of a Low-Cost, Portable EEG System for ERP Research. *Frontiers in neuroscience*, *11*, 109. https://doi.org/10.3389/fnins.2017.00109

Lee Y-Y, Hsieh S (2014) Classifying Different Emotional States by Means of EEG-Based Functional Connectivity Patterns. PLoS ONE 9(4): e95415. https://doi.org/10.1371/journal.pone.0095415

Lesiuk, T. (2005). The effect of music listening on work performance. *Psychology of Music*, *33*(2), 173-191. https://doi.org/10.1177/0305735605050650

Lopes, F. (1991). Neural mechanisms underlying brain waves: from neural membranes to networks. *Electroencephalography and Clinical Neurophysiology*, *79*(2), 81-93. https://doi.org/10.1016/0013-4694(91)90044-5

Michelon, P. (2006, December 18). What are Cognitive Abilities and Skills, and How to Boost Them? Retrieved October 28, 2018, from Sharp Brains website: https://sharpbrains.com/blog/2006/12/18/what-are-cognitive-abilities/

Ogata, S. (1995). Human EEG responses to classical music and simulated white noise: Effects of a musical loudness component on consciouness. *Perceptual and Motor Skills*, *80*(3, Pt 1), 779-790. https://doi.org/10.2466/pms.1995.80.3.779

Popular Music. (2012, December 28). Retrieved October 28, 2018, from New World Encyclopedia website: http://www.newworldencyclopedia.org/entry/Pop_music

R. Scott Heath. (2006). Hip_Hop Now: An Introduction. *Callaloo*, *29*(3), 714-716. https://doi.org/10.1353/cal.2006.0145

Ramirez, R., Planas, J., Escude, N., Mercade, J., & Farriols, C. (2018). EEG-Based Analysis of the Emotional Effect of Music Therapy on Palliative Care Cancer Patients. *Frontiers in psychology*, *9*, 254. https://doi.org/10.3389/fpsyg.2018.00254

Randel, D. M. (2003). *The Harvard Dictionary of Music* (4th ed.). The Belknap Press of Harvard University Press.

Schellenberg, E. G., & Weiss, M. W. (2013). Music and cognitive abilities. In D. Deutsch (Ed.), *The psychology of music* (pp. 499-550). San Diego, CA, US: Elsevier Academic Press. https://doi.org/10.1016/B978-0-12-381460-9.00012-2

Teplan, M. (2002). Fundamentals of EEG Measurement. *Measurement Science Review*, *2*. Retrieved from http://www.edumed.org.br/cursos/neurociencia/MethodsEEGMeasurement.pdf

Thoma, M. V., La Marca, R., Brönnimann, R., Finkel, L., Ehlert, U., & Nater, U. M. (2013). The effect of music on the human stress response. *PloS one*, *8*(8), e70156. https://doi.org/10.1371/journal.pone.0070156

Tierney, A. T., Krizman, J., Kraus, N., & Tallal, P. (2015). Music training alters the course of adolescent auditory development. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(32), 10062-10067. https://doi.org/10.1073/pnas.1505114112

(2017). Music-Evoked Emotions-Current Studies. *Frontiers in neuroscience*, *11*, 600. https://doi.org/10.3389/fnins.2017.00600

what does muse measure? (n.d.). Retrieved October 28, 2018, from choosemuse website: http://www.choosemuse.com

Bayesian Modeling of Working Memory and Inhibitory Control

Héctor A. Cepeda-Freyre[1], Gregorio Garcia-Aguilar[1] & J. Jacobo Oliveros-Oliveros[2]

[1] Benemerita Universidad Autonoma de Puebla, Faculty of Psychology, Mexico.

[2] Benemerita Universidad Autonoma de Puebla, Faculty of Physics and Mathematic Sciences, Mexico

Correspondence: Gregorio Garcia-Aguilar, Benemerita Universidad Autonoma de Puebla, Faculty of Psychology, Mexico. E-mail: gregorio.garcia@correo.buap.mx

Abstract

In cognitive science, working memory is a core cognitive ability that might be functionally related to other capacities, such as perceptual processes, inhibitory control, memory and attention processes and executive functions. The mathematical study of working memory has been explored before. However, there is not enough research aiming to study the relationship between working memory and inhibitory control. This is the objective of the present report. Bayesian hypothesis testing is often more robust than traditional p-value null hypothesis testing. Yet, the number of studies using this approach is still limited. A secondary objective of this paper is to contribute to fill that gap, as well as provide an empirical application of Bayesian hypothesis testing using cognitive and behavioral data. A within-subjects design was used to measure working memory function for three types of visual stimuli that varied in the degree of attentional interference they were designed to elicit. Data collected was contrasted with measurements of inhibitory control and analyzed using Bayes' theorem. Our results provide evidence against the theoretical relationship of working memory and inhibitory control. This outcome is analyzed in light of related cognitive research.

Keywords: working memory, inhibitory control, bayesian analysis

1. Introduction

Working memory is a cognitive process that has received the attention of a multitude of thinkers and researchers through the years (Cassel, Cassel, & Manning, 2013). Working memory involves the capacity for maintaining and storing information for short periods of time. The information to maintain may come from visual and auditive sensory modalities mainly, but cognitive psychologist have interested in other forms of information (Baddeley, 2003). The concept of working memory has been invented by Miller, Galanter and Pribram, but the leading theorist is A. Baddeley (Baddeley, 2017).

Working memory is a type of memory used to process several cognitive operations. One of the models most used to describe it is the one proposed by Baddeley and Hitch in 1974 (Baddeley & Hitch, 1974). The authors use empirical evidence to create a model that sees working memory as a dynamic system, a special kind of temporal buffer that both stores and processes information. In this model, there exist three components: a visuospatial sketchpad, dealing with visual information; a phonological loop in charge of the linguistic information; these two components are for storing information. A central executive component, working as a control system complete the model. Recently, a forth component, called episodic buffer has been added, as an interface between long term and working memory (Baddeley, 2003) .

The working memory (WM from now on) research has been driven by theory. At first, scientific discussion regarding memory focused on whether it was a single capacity or multiple ones; the first position saw memory as an unitary capacity that handled all tasks related to retention and retrieval of information, the second point of view theorized the existence of several types of memory, which were independent to each other and were divided according to the type of functions they carried out; evidence obtained through the years has supported this last posture (Atkinson & Shiffrin, 1968; Repovš & Baddeley, 2006)

However, because memory is a double storing and processing function cognitive capacity, it is not clear at the present how much of these functions, or in what degree memory works together with other cognitive capacities, hence facilitating the processing; or if memory is an independent and unrelated process, coming along with different cognitive processes, as attention or inhibitory control. For this reason, two different approximations

exist when it comes to the study of WM (Baddeley, 1992): the first approximation tries to find the relations between WM and other cognitive capacities, the second approach tries to analyze the WM structure as a cognitive system.

Supporters of the first approximation state that information to be retained may come with irrelevant, distracting or conflicting information, hence a cognitive system for suppressing these is needed. This system has been identified as inhibitory control (Dempster, 1991). The debate is about what comes first, WM or inhibitory control? Are they related?

For A. Diamond, both WM and inhibitory control are interrelated executive functions. The statement of Diamond subordinates the cognitive maturation and development to inhibitory control however . For example, she quoted a longitudinal study by Moffitt, remarking the relevance of inhibitory control in cognitive development (Moffitt et al., 2011). Both cognitive processes are interrelated in early childhood -until 8 years-, however, but are separated during late childhood and early adolescence (Shing, Lindenberger, Diamond, Li, & Davidson, 2010).

In the same vein, N. Duell and collaborators have studied the Stroop task in its inhibition component, by the manipulation of incongruent trials; and the WM by the low proportion of incongruent trials in a large sample of adolescents (Duell et al., 2018). The results prove a high correlation between inhibitory control accuracy and working memory; however, when using the response time, it seems that inhibitory control are affected by the memory load in adults.

This effect was reported in children by Diamond (Wright & Diamond, 2014). If the WM load is kept constant, but variations in incongruent trials are made, hence children make more errors.This results are representative of the influence inhibitory control in accuracy of memory task during childhood.

Supporters of the second approximation take the initial concept of WM from Miller, Galanter and Pribram (Miller, Galanter, & Pribram, 1960) arguing for WM to be a part of a more complex and extended process related to goals or Plans (Beaman, 2010). A second form of this approach argues in favor of an cognitive system from which WM emerges . This approximation conceives WM as dedicated system which is embedded into an extended cognitive structure (Cowan, 1988; 1999). This system has been identified as the executive attention (Engle, 2002).

We can show two interesting things about the second approximation. First, it seems that inhibitory control is a separable cognitive process, which do not influences WM. This is showed by the investigation of Borella, Carretti and De Beni (Borella, Carretti, & De Beni, 2008). These authors assessed accuracy on WM task, both in visual and verbal modalities, as well as in verbal inhibitory tasks in adult subjects. Their first analysis aimed to correlate age with accuracy; the second a regression showed correlation between age and WM, meaning that this cognitive process decline with age. At the same time, inhibition do not have the same results, because inhibition correlates with age in older, but not in younger adults. Hierarchical analysis confirm the low rate influence of inhibition on memory.

In second place, WM is a general cognitive capacity, under which some components may be identified. Carriedo and collaborators (Carriedo, Corral, Montoro, Herrero, & Rucian, 2016), showed differences in updating information (WM) until fifteen years old; inhibition showed changes until young adulthood however. Two main components emerged from this study: an active maintenance/suppression of information vs. a control of proactive interference. In the same vein, Redick and collaborators showed no relationship between WM and inhibition (Redick, Calvo, Gay, & Engle, 2011). The WM capacity hence is related to the hypothesis of the differences of memory between individuals. The WM is part of an attentional account in which the maintenance and retrieval of information depends on the velocity of subjects' processing, but not merely on the interference-rich (inhibitory) of situations.

The present paper takes a posture in between both approximations. Using simple Bayesian modeling we explore the relationship between working memory and inhibitory control, and their interaction in relation to the presence of visual noise during a working memory task. We assessed subjects in order to identified high inhibitors from low ones. Then, we assessed the visual working memory (vWM from now on) in a three conditions paradigm.

2 Methods and Materials

2.1 Sample

Data analyzed in the present paper were collected from 30 undergraduate students, whom provided voluntary informed consent and authorized the usage of data obtained from their participation. The notation $S_1, S_2, ..., S_n$ will be used to refer to each one of the n participants, while S represents any random participant. Additionally,

half of the participants are denoted I_H (High inhibitory control), and the other half I_L (Low inhibitory control). This denomination is assigned according to their scores on a "Go/No-no" task (Gomez & Perea, 2007) and a median split of said scores (Iacobucci, Posavac, Kardes, Schneider, & Popovich, 2015).

2.2 Experimental Conditions

In the present paper three stimulus types: a control and two test conditions, that vary in the degree of visual interference present were applied, for assessing visuospatial working memory (vWM). α, β, γ, which represent the type of stimulus used. In condition α the stimuli used consisted of 4 black irregular polygons, without a background figure; this is the control condition. In condition β the stimuli used consisted of 4 black irregular polygons, with a thick gray line forming the perimeter of a square. In condition γ the stimuli were 4 black polygons as in the previous conditions, with a background figure consisting of an irregular polygon. (see figure 1).

α **β** **γ**
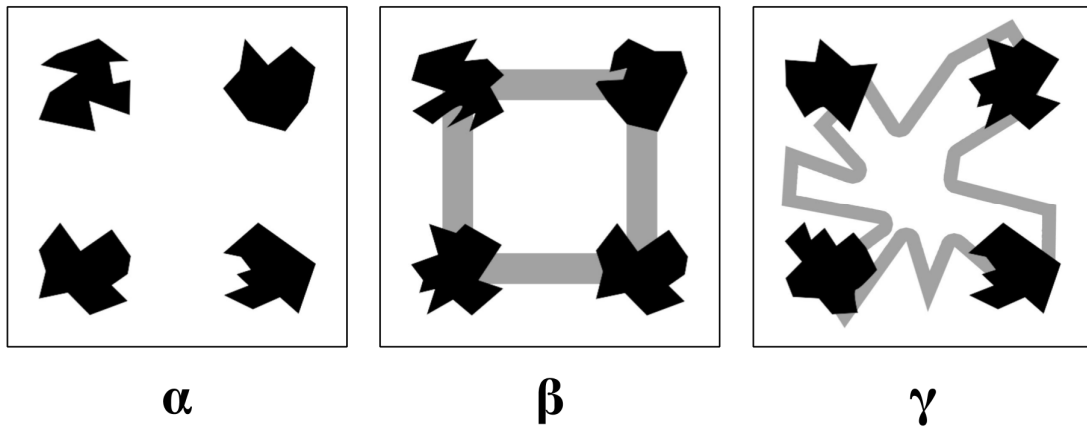
Figure 1. Alpha, beta, and gamma experimental conditions.

2.3 Experimental Blocks and Design

An experimental block, denoted B^m is a series of k trials under an experimental condition $m \in \{\alpha, \beta, \gamma\}$. Each volunteer performed tasks in an experimental block of each condition, following a repeated measures design. Working memory measurements were obtained using a change detection task. One trial of this task is denoted t, and it belongs to an experimental block B.

$$t \in B \tag{1}$$
$$B \supset \{t_1...t_k\} \tag{2}$$

In the present paper $k = 150$. Additionally, B contains for every trial correct answers V and responses given by the experimental subject, these responses are denoted by U. Finally, each experimental block B contains a result Q given by the combination of V and U, as is shown in (8). It follows that:

$$\forall t_i \in B, V_i \in B \tag{3}$$
$$\forall t_i \in B, U_i \in B \tag{4}$$
$$\forall t_i \in B, Q_i \in B \tag{5}$$
$$B \supset \{t_1, ..., t_k, V_1, ..., V_k, U_1, ..., U_k, Q_i, ..., Q_k\} \tag{6}$$

In every t within an experimental block B, a subject denoted by S is shown an stimulus E_1 for 1.5 seconds on a computer screen, at the end of this period of time, the computer screen remains blank for another 1.5 seconds after which S is shown a second stimulus E_2. S must then produce a response U. $U_i = \Delta_\theta$ if S declares that $\{E_1 = E_2\} \in t_i$, $U_i = \Delta$ if S declares that $\{E_1 \neq E_2\} \in t_i$. Each $t_i \in B$ has a correct answer V_i, which is given by the equation:

$$(\{E_1 = E_2\} \in t_i \Rightarrow \{V_i \in t_i\} = \Delta_\theta) \vee (\{V_i \in t_i\} = \Delta) \tag{7}$$

Each t_i has a different result Q_i depending on the combination of V_i and U_i:

$$
\begin{aligned}
(V_i = \Delta_\theta \quad \& \ U_i = \Delta_\theta) &\Rightarrow Q_i = Q_{CR} \\
(V_i = \Delta \quad \& \ U_i = \Delta) &\Rightarrow Q_i = Q_H \\
(V_i = \Delta_\theta \quad \& \ U_i = \Delta) &\Rightarrow Q_i = Q_{FA} \\
(V_i = \Delta \quad \& \ U_i = \Delta_\theta) &\Rightarrow Q_i = Q_M
\end{aligned}
\tag{8}
$$

Where Q_{CR} denotes a correct rejection (lack of change detected), Q_H denotes a hit (change identified), Q_M denotes a miss (failed to detect a change that was present), and Q_{FA} denotes a false alarm (change detected when it is not present). It follows that for each $t_i \in B$, there is a $Q_i \in B$. For each $j \in \{1 \dots n\}$, a S_j participates in an experimental block for each of the experimental conditions, in such way that for S_j and index $m \in \{\alpha, \beta, \gamma\}$, the corresponding experimental block is denoted B_j^m. From the participation of S_j in each B_j^m the number of correct responses is obtained, this amount is denoted as R_j^m, and it is calculated as:

$$
[P] = \begin{cases} 1 & \text{if } P \text{ is correct} \\ 0 & \text{if } P \text{ is not correct} \end{cases}
\tag{9}
$$

$$
C(x, y, z) = \sum_{i=1}^{k} [Q_{i,y}^z = x]
$$

$$
R_j^m = C(Q_H, j, m) + C(Q_{CR}, j, m)
$$

Where $Q_{i,j}^m \in B_j^m$.

Experimental blocks were presented to each subject following a balanced Latin square, as shown in Figure 2.

Figure 2. Latin square of the experimental design. Each row represents the chronological order of participation in each of the three conditions. There were 6 possible configurations in which a participant would perform the tasks in each block. Subjects were randomly assigned to one of the 6 configurations.

2.4 Data Processing

Data obtained from the experiment was analyzed using the statistical environment R (Team, 2011).

2.5 Probabilistic Modeling

Inhibitory control ability is denoted I, and every S_j has their own correspondent I_j, where $j \in \{1, 2, ..., n\}$. Using a median split, half of the S_j are categorized has having high inhibitory control, in which case $I_j = I_H$; the other half is categorized as having low inhibitory control, in which case $I_j = I_L$. Inhibitory control can be then modeled as a Bernoulli variable, where $I_H = 1$ and $I_L = 0$, so for every experimental condition $m \in \{\alpha, \beta, \gamma\}$ there is a binomial distribution $x^m \sim B(n^m, p^m)$. Using the same notation from equation 9, n^m and p^m are given by:

$$
n^m = \sum_{j=1}^{n} R_j^m
\tag{10}
$$

$$
r^m = \sum_{j=1}^{n} R_j^m [I_j = I_H]
\tag{11}
$$

$$
p^m = \frac{r^m}{n^m}
\tag{12}
$$

This same modeling style was used to evaluate the effect of the experimental conditions over working memory,

defining a Bernoulli variable depending on the experimental condition from which a correct response was obtained, in such way that for β a correct response under this condition will be coded as 1 while a correct response obtained under the α condition will be coded as 0, resulting in a distribution $x_\beta \sim B(n_\beta, p_\beta)$. Regarding the γ condition, the same logic can be applied resulting a distribution $x_\gamma \sim B(n_\gamma, p_\gamma)$.

$$n_\beta = \sum_{j=1}^n R_j^\beta + \sum_{j=1}^n R_j^\alpha \tag{13}$$

$$r_\beta = \sum_{j=1}^n R_j^\beta \tag{14}$$

$$p_\beta = \frac{r_\beta}{n_\beta} \tag{15}$$

$$n_\gamma = \sum_{j=1}^n R_j^\gamma + \sum_{j=1}^n R_j^\alpha \tag{16}$$

$$r_\gamma = \sum_{j=1}^n R_j^\gamma \tag{17}$$

$$p_\gamma = \frac{r_\gamma}{n_\gamma} \tag{18}$$

2.6 Bayesian Inference

For each experimental condition $m \in \{\alpha, \beta, \gamma\}$ the posterior probability of 9 models was evaluated using Bayes' theorem (Stone, 2006):

$$P(\text{Model} \mid \text{Data}) = \frac{P(\text{Data}|\text{Model})P(\text{Model})}{P(\text{Data})} \tag{19}$$

$P(\text{Model})$ represents the *prior* probability of each model. With respect to the evaluated models, these were created using binomial distributions $\sim B(\theta_1, \theta_2)$. $P(\text{Data} \mid Model)$ was calculated using the equation:

$$P(\text{Data} \mid Model) = \binom{\theta_1}{r^m} \theta_2^{r^m} (1 - \theta_2)^{\theta_1 - r^m} \tag{20}$$

where r^m was calculated with equation (11). $P(\text{Data})$ is calculated with equation:

$$P(\text{Data}) = \sum_{q=1}^9 P(\text{Model}^q)P(\text{Data} \mid \text{Model}^q) \tag{21}$$

where q indicates the model.

Three possible hypotheses were formulated for each experimental condition: The first hypothesis supposed both inhibitory control groups had the same probability of responding correctly to the task and was denoted H_θ; the second hypothesis supposed S_j had a larger probability of responding correctly to the task when $I_j = I_H$, this hypothesis was denoted H_1; lastly, the third hypothesis supposes S_j has a larger probability of answering correctly to the task when $I_j = I_L$, this hypothesis was denoted H_2. For H_θ the parameter $\theta_2 = 0.5$ was evaluated. For H_1 the parameters $\theta_2 = 0.6$, $\theta_2 = 0.7$, $\theta_2 = 0.8$, and $\theta_2 = 0.9$ were evaluated. Finally, for H_2 the parameters $\theta_2 = 0.4$, $\theta_2 = 0.3$, $\theta_2 = 0.2$, and $\theta_2 = 0.1$ were evaluated.

For the *prior* probability the same weight was assigned to two possibilities:

1.- There is an effect of inhibitory control ($H_1 + H_2$), p = 0.5.

2.- There is no effect of inhibitory control (H_θ), p = 0.5.

With respect to possibility number 1, the same probabilistic weight was given to both hypotheses, in such way that $P(H_1) = 0.25$ and $P(H_2) = 0.25$, Meanwhile, each model was assigned an equal proportion of its corresponding hypothesis (p = 0.0625). The *prior* probability of each of the nine models can be observed in Table 1.

Table 1. *Prior* probability for the 9 models.

Model's θ_2	Probability
0.1	0.0625
.2	0.0625
.3	0.0625
.4	0.0625
.5	0.5
.6	0.0625
.7	0.0625
.8	0.0625
.9	0.0625

Note. Each column represents one of the 9 values used as parameter θ_2 for the models, shown in the first row. Second row contains the *prior* for each model.

The same kind of inference was used to evaluate the effect of the experimental conditions where H_θ represents the absence of an effect of the experimental manipulation. H_1 indicates a positive effect of the manipulation over working memory, and H_2 indicates a negative effect.

3. Results

For condition α, the resulting distribution $x^\alpha \sim B(n^\alpha, p^\alpha)$ took the following parameters: $n^\alpha = 2387$, $p^\alpha = 0.5081693$

The model with the highest posterior probability was $\theta_2 = 0.5$, with a probability of $p \approx 1$, Meanwhile, the rest of the models had an exceptionally small probability. These probabilities are shown in figure 5, both in their real scale (A) and logarithmic scale (B).

Under condition β, the resulting distribution $x^\beta \sim B(n^\beta, p^\beta)$ acquired the following parameters: $n^\beta = 2343$, $p^\beta = 0.529236$.

The model with the highest posterior probability was also $\theta_2 = 0.5$, with $p \approx 1$. The probabilities of the different models are shown in Figure 6 (A), with their natural logarithm shown in (B).
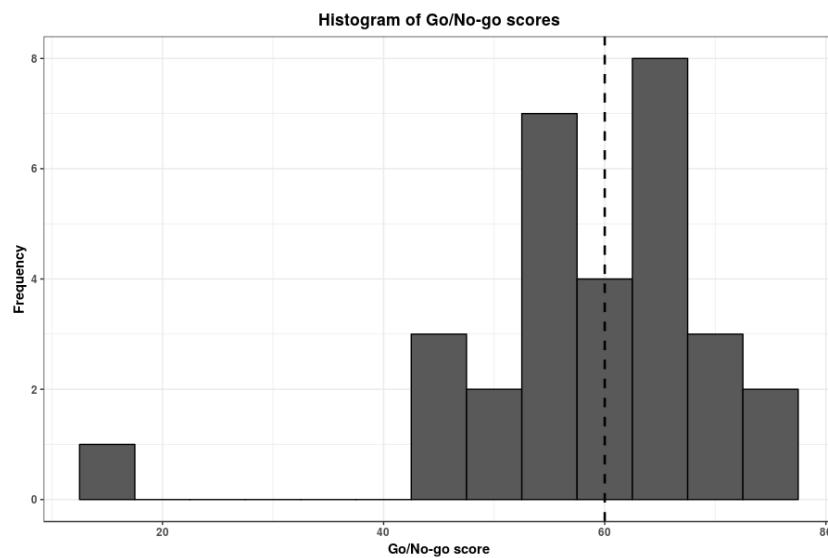

Figure 3. Histogram of scores for the Go/No-Go task.

Vertical dashed line indicates the score threshold for the median split.
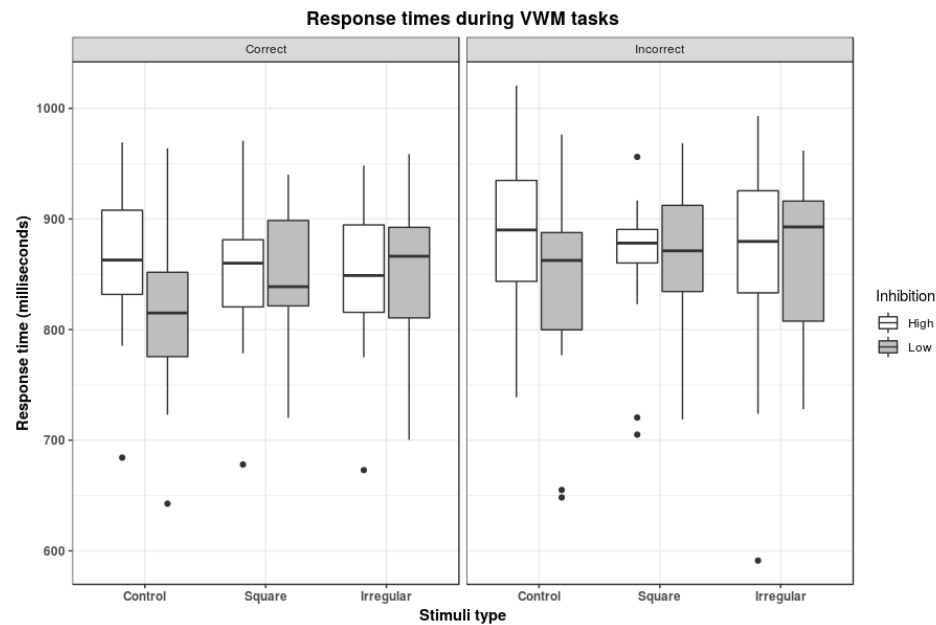
Figure 4. Boxplot displaying the distribution of response times for the VWM task.

Finally, for condition γ, the distribution $x^\gamma \sim B(n^\gamma, p^\gamma)$ had the parameters: $n^\gamma = 2335$, $p^\gamma = 0.5062099$ Once again, the model with the highest posterior probability was $\theta_2 = 0.5$, with $p \approx 1$. This model's probabilities are shown in figure 7.

With the information obtained from the experiment, we updated the probabilities of our hypothesis in each condition: The probability of H_θ was updated and in the form of the posterior probability $\theta_2 = 0.5$. To update the probability of H_1, the posterior probabilities of $\theta_2 = 0.6$, $\theta_2 = 0.7$, $\theta_2 = 0.8$, and $\theta_2 = 0.9$ were added together. The updated probability of H_2 was also the sum of $\theta_2 = 0.1$, $\theta_2 = 0.2$, $\theta_2 = 0.3$, and $\theta_2 = 0.4$. The new probabilities for the different hypothesis are shown in table 2.

Table 2. Descriptive statistics for response times when exposed to each of the three stimuli types.

Response type	Stimuli type	n	Mean	SD	Median	MAD	Min	Max	SE
Correct	Control	30.00	838.83	79.18	841.86	86.44	642.67	969.12	14.46
	Square	30.00	849.79	63.87	856.77	53.23	678.10	970.64	11.66
	Irregular	30.00	849.65	68.17	856.05	59.07	672.96	958.60	12.45
Incorrect	Control	30.00	862.04	88.40	870.93	80.98	648.27	1020.50	16.14
	Square	30.00	861.98	70.89	875.67	38.67	705.06	968.46	12.94
	Irregular	30.00	862.69	87.77	886.23	80.23	591.17	992.93	16.02

Note: SD = Standard Deviation, MAD = Median Absolute Deviation, SE = Standard Error.

Table 3. Response type proportions given Inhibition group and stimuli type.

Inhibition	Stimuli type	Hit	Miss	FA	CR	No response
High	Control	0.19	0.21	0.07	0.35	0.18
	Square	0.19	0.22	0.07	0.36	0.16
	Irregular	0.18	0.22	0.06	0.35	0.19
Low	Control	0.19	0.20	0.09	0.33	0.18
	Square	0.18	0.20	0.08	0.31	0.22
	Irregular	0.20	0.19	0.08	0.32	0.22

Note: FA = False Alarm, CR = Correct Rejection.

Condition α

Figure 5. Posterior probability of the models under condition α.

Values shown are natural logarithms of the posterior probabilities.
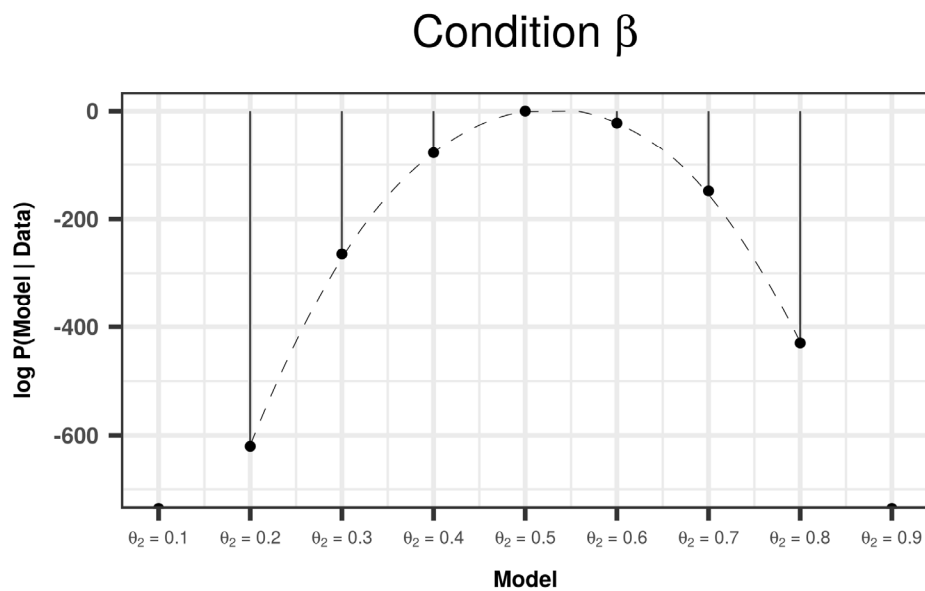
Condition β

Figure 6. Posterior probability of the models under condition β.

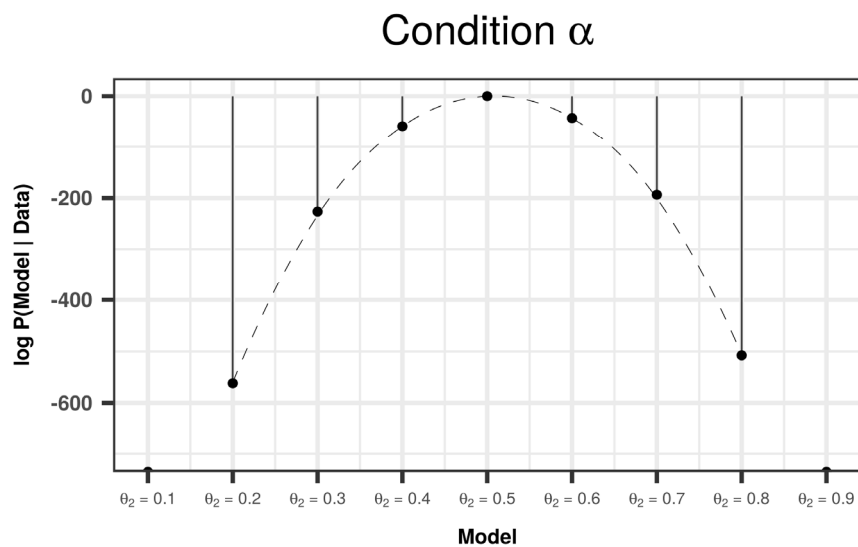Values shown are natural logarithms of the posterior probabilities.
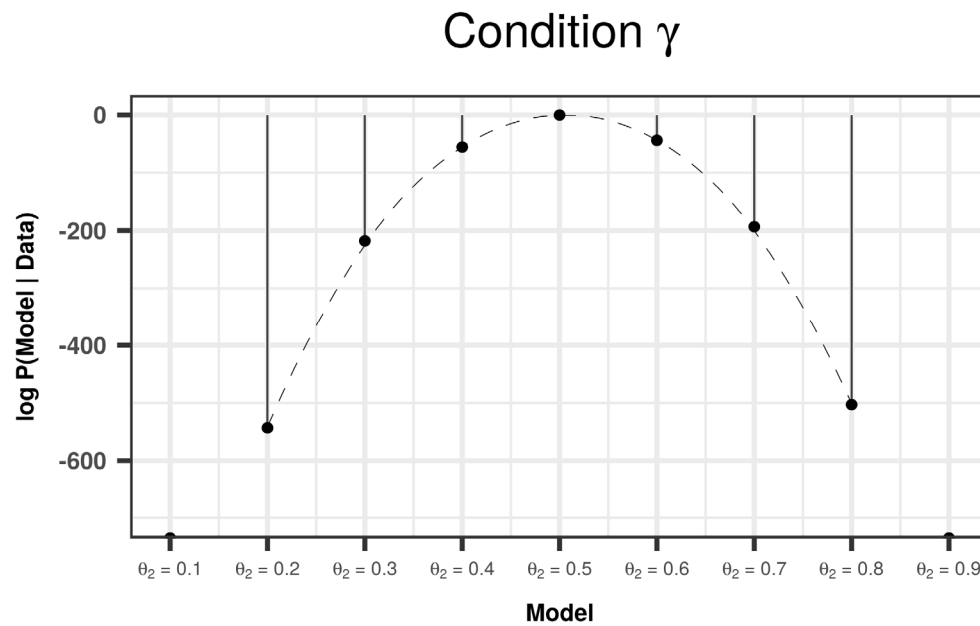
Condition γ

Figure 7. Posterior probability of the models under condition γ.

Values shown are natural logarithms of the posterior probabilities.

Table 4. Posterior probability of the hypotheses under the different experimental conditions.

Condition	Hypothesis	*Prior* probability	Posterior probability
α	H_θ	0.5	≈ 1
	H_1	0.25	1.724676e-18
	H_2	0.25	2.339637e-25
β	H_θ	0.5	≈ 1
	H_1	0.25	1.799750e-09
	H_2	0.25	1.351169e-33
γ	H_θ	0.5	≈ 1
	H_1	0.25	6.564464e-19
	H_2	0.25	5.135146e-24

4. Discussion

Under all experimental conditions the hypothesis with most plausibility given the data observed during the experiment, was H_θ. This indicates the absence of a relationship between inhibitory control and working memory. Our results are in line with those of Redick and collaborators (Redick et al., 2011) .However, these authors studied working memory in its phonetic manifestation, unlike our research. We do not take the attentional account for our results however.

In first place, we assessed young adults, in which clear differences between inhibitory control and WM has been reported (Shing et al., 2010; Wright & Diamond, 2014). Our results may reflect a difference in cognitive processing developed by ontogeny. Our inhibitory Go/No-go task was made of complex polygons differing in color; and our vWM task was base on complex gray black polygons with an interfering frame. In this context we can account for a lack of influences between processes. This absence of correlation may be related to the nature of stimuli, however.

In second place, it is possible that the relationship between working memory and inhibitory control is dependent on working memory's sensory channel. It is also possible that working memory is related mostly to attentional

control(Kane, Bleckley, Conway & Engle, 2001), and in turn, that this capacity itself is not related to inhibitory control for complex visual stimuli, like those used in our study. Regarding the experimental conditions, it has been previously shown that visual stimuli with different characteristics can be clustered together and retained as unitary entities (Luck & Vogel, 1997). There is also evidence showing that the lesser the amount of entities retained in memory, the bigger the probability of answering correctly in working memory tasks (Cowan, 2001). However, no effect of the experimental manipulation was found in the current research, which may indicates that the effect reported by Luck and Vogel has a limit regarding the area in the visual field in which different entities may be clustered (Luck & Vogel, 1997). Otherwise, the four polygons we shown to subjects would have been clustered in at least one of the experimental conditions, which in turn would imply a bigger probability of emitting a correct response (Cowan, 2001).

In our study, Go/No-go task could assess motor inhibition (Friedman & Miyake, 2004), and vWM experimental conditions probably not assessed a motor domain. This interpretation may reflect a stimulus-driven load (remarking items characteristics and spatial position of the target stimuli) for the vWM task, which probably is a different process from the memory-driven inhibition (recalling the instruction for which to respond or not to the stimuli) in the Go/No-go task. This agree with the results in a recent study by Barret and collaborators (Barrett, Shimozaki, Jensen, & Zobay, 2016) showing that the relationship between inhibitory control and WM may work together to reduce interfering information and enhance accuracy rates.

In our Bayesian modeling for the relationship between inhibitory control and WM, for both experimental conditions (β, γ) the hypothesis with greater posterior probability was the null hypothesis H_θ. This not necessary mean a rejection to the approach for which inhibitory control influence WM however. We must recall that previous studies have shown that in young adult behavioral data, like those subjects in our study, both cognitive processes memory and inhibition can be distinguished (Shing et al., 2010).

Our results do not lead to accept the WM like an embedded process of a large independent cognitive system however. It may be that we could not confirm a positive relationship between processes because of the variables of our study task. In this case, We are aware that further research that may include visual and auditory modalities of wMT, as well as forms of interactions with inhibitory demands; and cognitive forms of inhibitory control testing should be undertaken to confirm the veracity of our results, by using a Bayesian analysis.

Declarations of interest

The authors declare that they have no competing interests.

Acknowledgments

References

Atkinson, R.C., & Shiffrin, R.M. (1968). Human Memory: A Proposed System and its Control Processes. In In Kenneth W. Spence and Janet Taylor Spence (Ed.), *Psychology of Learning and Motivation, volume 2* (pp. 89–195). New York: Academic Press.

Baddeley, A. D. (1992). Working memory. *Science*, *255*(5044), 556–559. https://doi.org/10.1126/science.1736359

Baddeley, A.D. (2003). Working memory: Looking back and looking forward. | *Reviews Neuroscience*, *4*(10), 829–839. https://doi.org/10.1038/nrn1201

Baddeley, A. D.(2017). *Exploring working memory. Selected works of Alan Baddeley*. Taylor & Francis Group. https://doi.org/10.4324/9781315111261

Baddeley, A. D., & Hitch, G. (1974). Working Memory. In G. H. B. T.-P. of L. and M. Bower (Ed.) (Vol. 8, pp. 47–89). Academic Press. https://doi.org/https://doi.org/10.1016/S0079-7421(08)60452-1

Barrett, D. J. K., Shimozaki, S. S., Jensen, S., & Zobay, O. (2016). Visuospatial working memory mediates inhibitory and facilitatory guidance in preview search. *Journal of Experimental Psychology: Human Perception and Performance*, *42*(10), 1533–1546. https://doi.org/10.1037/xhp0000239

Beaman, C. P. (2010). Working Memory and Working Attention What Could Possibly Evolve? *Current Anthropology*, *51*, S27–S38. https://doi.org/10.1086/650297

Borella, E., Carretti, B., & De Beni, R. (2008). Working memory and inhibition across the adult life-span. *Acta Psychologica*, *128*(1), 33–44. https://doi.org/10.1016/j.actpsy.2007.09.008

Carriedo, N., Corral, A., Montoro, P. R., Herrero, L., & Rucian, M. (2016). Development of the updating executive function: From 7-year-olds to young adults. *Developmental Psychology*, *52*(4), 666–678. https://doi.org/10.1037/dev0000091

Cassel, J.-C., Cassel, D., & Manning, L. (2013). From Augustine of Hippo's Memory Systems to Our Modern Taxonomy in Cognitive Psychology and Neuroscience of Memory: A 16-Century Nap of Intuition before Light of Evidence. *Behavioral Sciences*, *3*, 21–41. https://doi.org/10.3390/bs3010021

Cowan, N. (1988). Evolving conceptions of memory storage, selective attention, and their mutual constraints within the human information-processing system. *Psychological Bulletin*, *104*(2), 163–191. https://doi.org/10.1037/0033-2909.104.2.163

Cowan, N. (1999). An embedded-processes model of working memory. Models of working memory. In P. Miyake, Akira & Shah (Ed.), *Models of Working Memory: Mechanisms of Active Maintenance and Executive Control* (pp. 62–101). New York.

Cowan, N. (2001). The magical number 4 in short term memory. A reconsideration of storage capacity. *Behavioral and Brain Sciences*, *24*(4), 87–186. https://doi.org/10.1017/S0140525X01003922

Dempster, F. N. (1991). Inhibitory processes: a neglected dimension of intelligence. *Intelligence*, *15*(2), 157–173. https://doi.org/10.1016/0160-2896(91)90028-C

Duell, N., Icenogle, G., Silva, K., Chein, J., Steinberg, L., Banich, M. T., … Chaudhary, N. (2018). A cross-sectional examination of response inhibition and working memory on the Stroop task. *Cognitive Development*, *47*(February), 19–31. https://doi.org/10.1016/j.cogdev.2018.02.003

Engle, R. W. (2002). Working memory capacity as executive attention. *Current Directions in Psychological Science*, *11*(1), 19–23. https://doi.org/10.1111/1467-8721.00160

Friedman, N. P., & Miyake, A. (2004). The Relations Among Inhibition and Interference Control Functions: A Latent-Variable Analysis. *Journal of Experimental Psychology: General*, *133*(1), 101–135. https://doi.org/10.1037/0096-3445.133.1.101

Gomez, P., & Perea, M. (2007). A model of the Go/No-Go Task. *Journal of Experimental Psychology-General*, *136*(3), 389–413. https://doi.org/10.1037/0096-3445.136.3.389.A

Iacobucci, D., Posavac, S. S., Kardes, F. R., Schneider, M. J., & Popovich, D. L. (2015). The median split: Robust, refined, and revived. *Journal of Consumer Psychology*, *25*(4), 690–704. https://doi.org/10.1016/j.jcps.2015.06.014

Kane, M.J., Bleckley, M.K., Conway, A.R.A., & Engle, R. W. (2001). A controlled-attention view of working-memory capacity. *Journal of Experimental Psychology: General*, *130*(2), 169–183. https://doi.org/10.1037/0096-3445.130.2.169

Luck, S. J., & Vogel, E. (1997). The capacity of visual working memory for features and conjunctions. *Nature*, *390*(6657), 279–281. https://doi.org/10.1038/36846

Miller, G.A., Galanter, E. & Pribram, K. H. (1960). *Plans and the structure of behavior*. *Animal Genetics*. Holt, Rinehart and Winston, Inc. https://doi.org/10.1037/10039-000

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., … Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, *108*(7), 2693 LP-2698. https://doi.org/10.1073/pnas.1010076108

Redick, T. S., Calvo, A., Gay, C. E., & Engle, R. W. (2011). Working memory capacity and go/no-go task performance: Selective effects of updating, maintenance, and inhibition. *Journal of Experimental Psychology: Learning Memory and Cognition*, *37*(2), 308–324. https://doi.org/10.1037/a0022216

Repovš, Grega & Baddeley, A. D. (2006). The multi-component model of working memory: Explorations in experimental cognitive psychology. *Neurscoence*, *139*(1), 5–21. https://doi.org/10.1016/j.neuroscience.2005.12.061

Shing, Y. L., Lindenberger, U., Diamond, A., Li, S.-C., & Davidson, M. C. (2010). Memory Maintenance and Inhibitory Control Differentiate from Early Childhood to Adolescence. *Developmental Neuropsychology*, *35*(6), 679–697. https://doi.org/10.1080/87565641.2010.508546

Stone, J. V. (2006). *Bayes' Rule A Tutorial Introduction to Bayesian Analysis*. *Understanding Uncertainty*. https://doi.org/10.1002/0470055480.ch6

Team, R. D. C. (2011). R: A Language and Environment for Statistical Computing.le. Viena: the R Foundation for Statistical Computing. Retrieved from http://www.r-project.org/

Wright, A., & Diamond, A. (2014). An effect of inhibitory load in children while keeping working memory load constant. *Frontiers in Psychology*, *5*(MAR), 1–9. https://doi.org/10.3389/fpsyg.2014.00213

Decision Making during Adolescence:

A Comparison of Jewish and Druze Societies

Dr. Fathi Mohsen Shamma[1] & Dr. Michael Katz[2]

[1] Ministry of education, Israel

[2] Haifa University, Israel

Correspondence: Dr. Fathi Mohsen Shamma, Ministry of education Israel

Abstract

This research compares decision-making between Jewish adolescents and Druze adolescents as it relates to level of autonomy, parents' involvement and the involvement of peers. This is a pioneering research, which tests existing differences between Jewish and Druze adolescents with regards to the factors influencing their decisions.

243 subjects aged 15-18 participated in this research. Of these subjects 124 were Jews and 119 were Druze; about half of both groups were boys and half were girls. Each subject filled out a self-report questionnaire that was particularly designed with the factors mentioned above in mind and for this research.

Although no differences were found between Jewish and Druze adolescents in total degree of autonomy or in parents' and friends' involvement in decision-making, the findings partially confirmed research hypotheses.

Keywords: decision-making, adolescence, autonomy, parents' involvement, involvement of peers

1. Introduction

Cultures can be broadly divided into collectivistic cultures and individualistic cultures. Collectivistic cultures are cultures that tend to do things together—cultures that make decisions and carry out activities with the entire community or family in mind. Individualistic cultures are cultures that place a high premium on the individual—they are cultures that stress independence and 'manning' up to take decisions for oneself.

The goal of this study is to determine if the cultural preference of collectivism or individualism affects decision making with adolescents in said culture. Particularly, this study zeroes in on Druze and Jewish cultures and is aimed at determining the difference between how adolescents from each culture arrive at decisions and how certain factors influence the decision making process. These factors are: degree of autonomy, parental influence and peer influence.

The Druze culture is a collectivistic culture, while the Jewish culture is an individualistic culture. This study is paramount and important because it tries to define the extent to which cultures affect the actions and reactions of individual. It also adds to the body of knowledge of science and shows how environmental factors affect the mental and psychological makeup of individuals. Furthermore, it shows if nurture (as opposed to nature) is responsible for how individuals finally end up in life.

If adolescents in a collectivistic culture make decisions differently from adolescents in an individualistic culture, then it may mean that nurture plays a vital and crucial role in how individuals' personality are formed.

This study is also very important because decisions are crucial, especially for younglings. The decisions adolescents make now will go on to define them later on in life. Hence, the factors that affect their decisions and how their decisions are ultimately affected by the culture they grew up in will help determine why certain individuals behave the way they do, and ultimately it will help us to be able to predict (if only cautiously) how certain individuals will make decisions based on the factors being studied here as well as their culture or rather the culture in which they were raised.

2. Theoretical Background

In the literature review presented in this section, there will be a reference to the following topics: decision making in general; the special characteristics of decision making in adults; each of the factors that influence the decision making of adults – degree of autonomy, adolescents' relations with their parents and peers; definitions of individualism and collectivism and typical differences between the two cultures; differences between adolescents in the individualistic culture and adolescents in the collectivistic culture in terms of the autonomic degree they receive, the degree to which their parents and peers are involved in their decision making; the Jewish and Druze cultures and the general differences between them; differences between the Jewish and Druze adolescents and the autonomic degree they receive, the degree their parents are involved in their lives and their relations with their peers.

2.1 Decision Making

Every person makes many decisions every day of their life. Decision making involves a choice between several optional alternatives. Human beings differ in the alternatives they succeed to realize or define as options, in the degree to which they think these alternatives can solve their present problem and to what extent they will evaluate their feasibility. In addition, the ability to develop alternatives and see their efficacy degree evolves throughout time (Poole, Sundberg & Tyler, 1982).

Decision making involves many cognitive processes such as searching and processing information (upon which the details of the alternatives from which they must choose will be based), problem solving (finding a new or creative solution to the present problem), judging (evaluation of the alternatives at hand and choosing the best of them all), learning and memory (Mann, Harmoni & Power, 1989). To some of these decisions there are important consequences on people's lives, function and success.

According to Harren's model (Harren, 1979), which has received a lot of empirical support, most people can be categorized into one of three decision making styles:

1.   Rational, balanced decision making, which means considering all the information at hand and choosing the best alternative – the one where the profit is greater than the loss.

2.   Dependent decision making, which means considering other people's opinions, expectations, and will.

3.   Intuitive, emotional decision making, which means depending on gut feeling.

Later researchers (Philips, Pazieneza & Ferrin, 1984) added another decision making style to this list – **the avoidance style**, which relates to people who try to avoid decision making in each acceptable way, by postponing the decision making or throwing it at other people.

2.2 The Adolescent as a Decision Maker

In every country, adolescents are required to make many important decisions in a wide range of domains and under a wide range of situations (Franken & Muris, 2005). For example, during high school, students are required to decide what school they want to go to and what subjects they want to study. These decisions will affect their future studies and the professional options they will face (Bonnie, Flesher & Cauffman, 2001; Tunistera, Van Sonderen, Groothoff, Van Den Heuvel & Post, 2000).

According to a great number of studies, adolescents give much importance to these study decisions and to career option choices. Freidman's research (1998), which was carried out on Israeli adolescents, found that decisions related to studies occupy adolescents more than other decisions. This is because the decisions a person makes during their adolescence, such as decisions regarding career or profession, might have long-term consequences on their professional future, health, emotional well-being and social position (Gati & Saka, 2001; Germeijs & Verscheuren, 2007).

During adolescence, many cognitive abilities are developed, and they improve the adolescent's ability to make decisions by themselves, such as collecting and processing data, problem solving, judging, memory and learning. Furthermore, during this age, adolescents are well emotionally developed and present more self-control. They have also developed the ability to take responsibility for their own decisions, and have displayed an increased awareness regarding the consequences and risks pertaining to their decisions.

Approximately, it is at the age of fifteen that most adolescents are able to make decisions in the same way adults do, and it is at this age that they show a capability to pick the correct choice and solve problems creatively (Mann, et al., 1989, Lewis, 1989). As a result of this cognitive and psychological development, adolescents feel a strong need for autonomy and independence which is manifested by a stronger need to make decisions by themselves and without other people's involvement (Baiocco, Laghi, & D'Alessio, 2009; Fischoff, 2008;

Halpren-Felsher & Cauffman, 2001; Thunholm, 2004).

Moreover, during adolescence, adolescents become skeptic about their parents' authority in making decisions for them concerning studying habits, friends and leisure activities, and they demand independent decision making (Franken & Muris, 2005).

2.3 Differences between Druze and Jewish Adolescents in Autonomy, Parents' and Friends' Involvement

Due to the fact that the Druze culture is collectivistic while the Jewish culture is individualistic, it is possible to think that Jewish adolescents receive more autonomy and independence in making decisions than Druze adolescents. However, a study that compared 11th graders from both cultures in their parents' parental style surprisingly showed that Druze students reported more autonomy from their parents in making decisions (Seginer, et al., 2007). These findings make sense because although Jewish parents encourage their children's autonomy and see great importance in developing their independence abilities, their lifestyle and family structure decrease the opportunities for their children to make decisions independently. In contrast, Druze adolescents grow up in big families where parents find it difficult to supervise their children's behavior. In fact, parents rely on their adolescent offspring to take an active role in raising the children at home.

Furthermore, the knowledge that in a number of years Druze adolescents would get married and support themselves as well as their new families contributes to their independence. As a result, Druze adolescents gain skills of autonomy and readiness for life faster than their Jewish counterparts, including making crucial decisions (Seginer, 1992; Seginer, et al., 2007). Besides, contrary to what has been found regarding the differences between individualistic and collectivistic cultures in different places in the world, no differences were found between Druze and Jews in Israel in the development of increased sense of autonomy in adolescents during their adolescence years. In both cultures the older adolescents became, the more autonomy they received (Wainrby, 1997).

In the Jewish culture, adolescence often lasts till the late twenties, until adolescents shape their professional, familial, and social identity (Ericson, 1961). Jewish adolescents' relationship with their parents are characterized, in most cases, by support, closeness and warmth, which contribute to adolescents' self-searching process and let them resort to their parents at times of need and adversity (Hareal, et al., 1997; Scharf & Mayseless, 2005; Mayseless, Wiseman & Hai, 1998). Still, according to studies in this field, Jewish adolescents' relationship with their parents in Israel have some problematic aspects especially regarding setting clear borders between parents and their adolescents as well as parents authority over their children (Hareal, et al., 1997; Omer, 2008).

In a number of studies carried out on Jewish adolescents studying in a junior high school (Mayseless, 2001) or in a high school (Scharf & Mayseless, 2001), the participants reported a low level of behavioral control by parents as well as a difficulty in imposing their authority on adolescents. Also, Mayseless' and Scharf's study (2009), which tested different characteristics of Israeli Jewish adolescents' relationship with their parents, showed that only 33% of Jewish adolescents reported an authoritative parental pattern that is manifested in combining between love, warmth and setting clear borders. However, 22% of adolescents reported parental patterns that are characterized by combining parents' excessive involvement in their lives and significant behavioral control including offensive punishment – patterns that create many clashes between adolescents and their parents. About 30% of adolescents reported a yielding parental pattern that is manifested in combining parents' support and warmth and no clear borders—or even without an expectation of obeying laws and authority. In a small number of cases (15%), adolescents reported neglect and offensive parental patterns which do not include warmth or support, do not set clear borders for children and involved offensive and controlling behaviors towards them, including severe punishment, psychological control and clashes (Mayseless & Scharf, 2009).

Because the Druze culture is collectivistic, Druze adolescents see themselves as more obligated than Jewish adolescents to their family's well-being, to the loyalty for their extended family, and to its needs which come before their personal needs (Dana, 1998; Nydel, 1987). This strong obligation mostly creates a sense of belonging in them (Barakat, 1993). As a result, the adolescence period of identity searching is shorter in this culture, and Druze adolescents tend to support themselves and make a family at a younger age (Khieradeen, 2005).

Furthermore, due to the hierarchal familial structure, parents conduct a "bottom to top" connection with their adolescents in the shape of instructions, orders, warnings or threats. This conduct creates in most adolescents an external control focus, whereas they feel that the control over their life is put in their parents' hands, while their personal characteristics – such as skills or self-capabilities have less influence on the process of their lives (Barakat, 1993).

In addition, parents in the Druze culture are considered as a source for consultation and direction while less as an

emotional crutch for adolescents in comparison to the Jewish culture. However, Druze adolescents' relationship with their siblings is close, apparently because these relationships compensate for the lack of emotion in the relationship with their parents (Seginer, et al., 2007). It is important to mention that in the Druze culture there are some differences between fathers and mothers in terms of their relationships and connections with their adolescents. Fathers are the source of power in this culture and they make most of the decisions relatively to mothers. On the other hand, in the Jewish culture, mothers and fathers have similar power and authority in making decisions for their children (Weller, et al., 1995).

Regarding the connection of Druze adolescents to their peers, previous studies show that there are lesser degree of close, friendly and intimate connections between adolescents and their peers with the same age and gender unlike in Jewish culture where it is acceptable. Still, the degree of importance with which adolescents relate to their peers and the extent to which they feel close to them is higher in the Druze culture than in the Jewish culture. Furthermore, Jewish adolescents receive more emotional and social support from their peers especially in cases where their relationship with their parents do not provide them with satisfying warmth and support in relation to the Druze culture. However, in the Arab culture, adolescents' social relationships influence their self-esteem more than in the Jewish culture.

3. Method

The purpose of the study is to check what differences exist between the decision making process of Druze and Jewish adolescents with regards to degree of autonomy as well as the degree to which their parents and friends are involved.

The Hypotheses of the Study

1. Druze adolescents have less autonomy in decision making relative to Jewish adolescents.

2. In the Druze culture, parents are more involved in their adolescents' decision making relative to parents in the Jewish culture.

3. In the Druze culture, friends' involvement in adolescents' decision making is more significant than it is in the Jewish culture.

3.1 Participants

In this study, 243 participants were involved, aging between 15 and 18. 124 of them are Druze (51%) and 119 are Jews (49%). The sample included 131 girls (53.9%) and 112 boys (46.1%).

Jewish students were chosen from schools in Naharya (grades – 10, 11, 12) and from Kfar Havradeem (grades – 9), while Druze students were chosen from schools in Yarka (grades – 9-12), Horfeish (grades – 10 and 11) and Biet-Jan (grades – 12).

The division according to grades was as follows:

Grade 9 – 32   Jews and 28 Druze

Grade 10 – 30 Jews and 32 Druze

Grade 11 – 31 Jews and 34 Druze

Grade 12 – 31 Jews and 25 Druze

Table 1. The rate of boys and girls (in percentages) in the division of the sample according to grades and sectors

Grade	Gender	Sector		Difference
		Druze	Jews	Examination
9	Boys	34.4	53.6	X^2=2.24, n.s.
	Girls	65.6	46.4	
10	Boys	53.3	43.8	X^2=0.57, n.s.
	Girls	46.7	56.3	
11	Boys	41.9	44.1	X^2=0.03, n.s.
	Girls	58.1	55.9	
12	Boys	51.6	48.0	X^2=0.07, n.s.
	Girls	48.4	52.0	
Total	Boys	45.2	47.1	X^2=0.09, n.s.
	Girls	54.8	52.9	

As table 1 shows, no clear differences were found between Druze and Jews in the division of grades of boy and girls.

3.2 The Study Instrument

In order to measure the variables in this study, a questionnaire that contained 30 items was linked (see appendix). The items are measured through Likeret scale in five degrees, and the students are required to rate their agreement degree with each item from 1 (disagree at all) to 5 (quite agree).

3.3 Reliability and Validity

A study is said to be reliable if it has the capability to achieve a uniformity of results when carried out by different investigators. In this study, reliability was ensured by population stratification and sample control to arrive at a sample that accurately represents the population being studied. Furthermore, the reliability of this study was reinforced by sound methodology.

A study instrument is said to be valid if it actually measures the variables for which it was created to measure, while still remaining within the scope of the study. The validity of this study was ensured by the straightforwardness of the questions in the questionnaire as well as putting the participant at ease and encouraging them to be truthful without fear for harm or punishment. Also, the participants were allowed to fill the questionnaires without authority figures present to ensure truthfulness and thereby ensuring the validity of the study instrument.

3.4 Research Limitations

This study included 243 participants, of which 51% were Druze and 49% were Jews. Hence, the sample size utilized in this study is the study's main limitation.

4. Results

First Hypothesis: Adolescents in the Druze culture have less autonomy in making decisions in comparison to their equivalents in the Jewish culture.

For clearly testing the differences between Druze and Jewish adolescents in the autonomy they receive in decision making, test *t* was carried out for independent samples. The results of the analysis are presented in table 2 as follows:

Table 2. The Results of Test *t* in Checking the Differences Between Druze and Jewish Autonomy in Decision Making

Variable	Druze (n=124)		Jews (n=119)		*t*	*df*	*p.value*
	M	**MD**	**M**	**SD**			
Autonomy	3.88	0.61	3.81	0.51	1.01	237	0.31

As the table above shows, no salient differences were found between Druze and Jewish students in the autonomy they receive in making decisions, $t(237)=1.01$, *n.s.* Reviewing the averages shows that both Druze and Jewish students reported moderate autonomy in decision making.

Second Hypothesis: In the Druze culture, parents are more involved in the decision making process of their children than are parents in the Jewish culture.

For clearly testing the differences between Druze and Jewish adolescents in their parents' involvement in decision making, test *t* was carried out on independent samples. In this study, the sectors (Druze and Jewish) were used as an independent variable, while parents' involvement index variable was used as a dependent variable.

The results of the analysis are presented in table 3 as follows:

Table 3. The Results of Test *t* in Checking the Differences Between Druze and Jewish Parental Involvement in Decision Making

Variable	Druze (n=124)		Jews (n=119)		*t*	*df*	*p.value*
	M	**MD**	**M**	**SD**			
Parental Involvement	3.52	0.65	3.41	0.64	1.33	241	0.18

As it appears in table 3, no clear differences were found between Druze and Jewish students in parental involvement in decision making, *t*(241)=1.33, *n.s.* By going over the averages, it appears that the parental involvement degree in both sectors is moderate.

Third Hypothesis: In the Druze culture, friends influence on decision making is more significant than it is in the Jewish culture.

For examining this hypothesis, test *t* was carried out on independent samples for clearly testing the differences between Druze and Jewish adolescents in their friends' involvement in decision making. The results of the analysis are presented in table 4 as follows:

Table 4. The Results of Test *t* in Checking the Differences Between Druze and Jewish Friends Involvement in Decision Making

Variable	Druze (n=124)		Jews (n=119)		*t*	*df*	*p.value*
	M	**MD**	**M**	**SD**			
Friends' Involvement	2.56	0.62	2.52	0.59	0.51	241	0.61

By going over table 4, it appears that there are no clear differences between Druze and Jewish adolescents in their friends' involvement in decision making, *t*(241)=0.51, *n.s*. By examining the averages, it appears that Druze and Jewish adolescents reported a low to moderate involvement of their friends in decision making.

5. Discussion

In this study, a comparison between Jewish adolescents (from the individualistic culture) and Druze adolescents (from the collectivistic culture) was carried out to check the degree of autonomy, parental involvement and peers involvement in decision making. Moreover, in both cultures the differences between both genders in the three factors that influence the process of adolescent' decision making were tested.

The participants were required to fill out a questionnaire regarding the degree of autonomy, their parents' involvement and their friends' involvement in the decisions they make through different domains during their life. This discussion section includes a presentation of the study findings, and for each finding there will be a description of how relevant it is to findings from previous studies which were presented and detailed in the introduction section. In addition, possible explanations that are not compatible with the literature will be suggested to these findings. In the end, the conclusions of the study, its theoretical and practical implications, and its limitations will be presented besides suggestions for future studies.

According to the findings of the study, it appears that the first two hypotheses—adolescents in the Druze culture have less autonomy in making decision and their parents are more involved in this process relatively to the Jewish culture—were inaccurate statements. This is evidenced by the absence of clear statistical differences between Druze and Jewish adolescents in the components of their autonomy degree in decision making. These hypotheses—which were proven to be false based on the results of the tests conducted—were based on the differences between the individualistic culture (as the Jewish culture is defined) and the collectivistic culture (as the Druze culture is defined) in the degree of autonomy and parental involvement in adolescents' decision making.

The individualistic culture emphasizes autonomy, independence, less reliance on others, personal achievements and rendering much importance to personal needs besides directing its adolescents to accomplish these values (Triandis, 1995). In this culture, the familial relations take place in order to help adolescents achieve their

personal goals. Thus, they encourage a gradual decrease in parental involvement in making important decisions as well as they expect adolescents to separate from their original family and build relations outside the family during adolescence (Azaiza, 2005; Cooper et al., 1993).

However, the collectivistic culture emphasizes the importance of the family in individuals' lives and the expectation to put family needs before theirs. This culture encourages people to develop dependency on group members as well as render much importance to the roles they play in society (Markus & Kitayama, 1991; Signer et al., 2007; Triandis, 1995). In this culture, children demand less autonomy, and the increasing degree of autonomy they receive during adolescence is more moderate relative to children from individualistic cultures (Chao & Tseng, 2002; Fuligni, 1998).

In collectivistic cultures, many decisions are made by the fathers while expecting adolescents to accept and obey them. Alternatively, decisions are made in cooperation between adolescents and one of the parents, decisions which are perceived in this culture by adolescents themselves as better decisions than those that they would make independently (Cooper, et al., 1993; Qin, et al., 2009).

Therefore, it is important to state that the findings of this study are not compatible with the above mentioned studies. Nevertheless, this does not mean the findings are faulty because a few other studies agree with the findings of this study. In fact, in some other studies, very similar results to the ones realized in this study were arrived at, where there were no differences between Druze and Jews in Israel in developing an increasing sense of autonomy during adolescence (Winryb, 1997).

Furthermore, although Jewish parents believe more in giving autonomy to their adolescents, studies over the years have shown inconsistent findings in this regard. Therefore the results of this study are not queer nor are they peculiar. In some of the studies conducted, a reversed difference was found between Druze and Jewish. In other words, Druze adolescents received more independence from their parents relative to Jewish adolescents. For example, one of the studies showed that due to the Druze lifestyle, their family size and the age at which they get married, Druze adolescents receive more independence in decision making relative to Jewish adolescents (Signer, et al., 2007).

Another reason for the results realized in this study not particularly lining up with already established literature as presented in the literature review section is change. Of course, through the years and decades the Druze society has undergone change. Such changes are manifested in the fact that many Druze people express a combination of their self-perception as an independent entity with personal autonomy and rights and a self-collectivistic perception (Winryb, 1997). As a result, many Druze adolescents demonstrate more independence and are allowed less parental involvement in making important decisions relative to what is often obtainable in collectivistic cultures.

Besides testing the general differences between the two groups when it comes to autonomy, the differences in the degree of autonomy between the two groups were also carried out too for specific decisions.

It was found out that Druze adolescents reported more autonomy in decision making related to their studies, and they reported making more important decisions without consulting with anyone relative their Jewish adolescents' counterparts. On the other hand, Jewish adolescents reported that they share with their parents crucial and important decisions especially decisions related to their professional future more than do Druze adolescents. These findings are contrary to the previous mentioned studies which show that adolescents from collectivistic cultures tend to consult with their parents as well as make decisions in cooperation with their family.

It is possible to link these differences with the young age at which they get married as well as with their lifestyle and the expectation to build a family and start their life as mature people at an early age (Winryb, 1997). As a result of the latter, they might be required to adapt to make decisions alone during adolescence.

Another possible explanation to the findings of this study is the expectation in the collectivistic Druze culture to see its adolescents obligated to their family well-being and putting their familial needs before their personal needs (Dana, 1998). Personal decisions regarding studies or career might be perceived in such families as subverting the familial needs and will not gain support by family members. Hence, this might inform adolescents' preference to make decisions alone in order not to be negatively influenced by their family as well as not to feel remorse regarding their choices. In contrast, the individualistic Jewish culture renders much importance to adolescents' personal, educational and occupational achievements. Thus Jewish adolescents feel more comfortable to share with their parents such issues, while their parents are willing to be more involved and influence decisions which are perceived as meaningful and important for the adolescents' future (Mayseless, 2005).

Concerning times and places of recreation, Druze adolescents' parents were more involved in decisions related to outfit or to times and places of recreation, while Jewish adolescents feel more autonomy in making such decisions. Such findings might be explained in several ways. First, according to previous studies, individualistic cultures encourage children to behave assertively and independently while giving them the opportunity to choose with whom to connect according to their needs and will. Thus children in these cultures expect to make decisions independently in domains they see under their authority and are related to their social lives such as outfit and ways of spending time (Chen, et al., 2006; Fulligni & Eccles, 1993). However, collectivistic cultures encourage less autonomy in adolescents and assert that it is the parents' especially the fathers' responsibility to make all the decisions for the adolescents, including personal decisions while adolescents must obey them (Tseng & Cheng, 1992).

Another explanation for these findings is the general and social differences between the two cultures. For example, there are more diversified and nearby places of recreation in the Jewish culture relative to the Druze culture and Jewish adolescents can go out without escort in a more acceptable way. On the other hand, for most of the Druze adolescents, places of recreation are far from their residences, and they have to deal with practical considerations when deciding to go out. Furthermore, due to the parents' bad economic situation, they might find it difficult to support their adolescents' recreation.

In the end, it is important to mention that the lack of findings in differences between Druze and Jews in their autonomy and parental involvement in decisions making is derived from the combined influence of different domains. In other words, it might be that because in the Jewish culture less autonomy in making decisions related to studies was found, but a reversed finding was shown regarding outfit and recreation. These effects neutralized each other, which created a lack of effect in the general scale.

The third hypothesis in this study—friends' involvement in adolescents' decision making in the Druze culture is significantly higher than in the Jewish culture—was disproved because no statistical differences in friends' involvement between Druze and Jewish adolescents were found in the general measurement. However, when considering specific decisions some differences were found between both cultures.

The hypothesis of this study was derived from previous studies which showed that adolescents from collectivistic cultures spend much time with their friends and appreciate their opinions and support more than adolescents from individualistic cultures (Fuligni, et al., 1999). Furthermore, due to the emphasis put on mutual dependence, loyalty and conformity, the quality of peoples' relationships with their peers, social pressure and friends' have significant influences on adolescents' demeanor. In contrast, in individualistic cultures, connections with friends are mainly important in contexts of personal achievements and as a way to strengthen adolescents' self-esteem as well as to provide them with their psychological needs (Chen, et al., 2006). As mentioned above, contrary to these findings, no differences were found in this study between Druze and Jewish adolescents in the general scale of friends' involvement in their decision making.

In order to explain these findings, it is important to mention that according to previous studies, there ia less social closeness and intimate connections among Druze adolescents of the same age and gender than is accepted in the Jewish culture (Sharbany, 2006). Moreover, according to previous studies, although it is important for adolescents in the collectivistic culture to share with their friends what is happening with them, they receive from their friends' practical help. On the other hand, adolescents from individualistic cultures receive from their friends more psychological support and emotional sharing (Chen, et al., 2006). As a result, Druze adolescents might share with their friends the general process of decision making, but not specifically, while they eventually make the final decision alone. On the other hand, in the Jewish culture, intimate relations between adolescents and their peers are more acceptable, and they tend to share with their friends in a more detailed way decisions they should make, while allowing a wider involvement in this process (Sharabany, 2006).

This study supports the latter finding by showing how Druze adolescents reported that they seldom make decisions without consulting with their friends. It means that Jewish and Druze adolescents might share with their friends the process of decision making differently, but their degree of influence on their decisions is eventually the same. In a more profound examination of the findings, some differences were found between the two groups in the way they defined their friends' involvement, but there is no clear evidence that the degree of their friends' involvement is different between them. Jewish adolescents mentioned that they share with their friends decisions related to their professional future, while Druze adolescents reported that they seldom make decisions without consulting with their friends, and that they prefer to receive direction by their friends when making decisions related to their future. It is possible to link these findings with the differences mentioned above

in the way that social connections in individualistic cultures are mainly meant for helping people to gain personal achievements such as career and studies (Patel, et al., 2008; Mann, et al., 1989).

However, in the collectivistic culture, much importance is given to adolescents' relationship with their friends, and they constitute a more significant part of their life relative to individualistic cultures (Chen, et al., 2006; Fuligni, 1999). As a result, friends are more involved in the process of decision making in all regards. In addition, it is important to mention that collectivistic cultures give less importance to personal progress in areas such as career or studies, while putting a greater emphasis on achievements that contribute to the family and society such as building a new family (Chen, et al., 2006).

Furthermore, as a result of the differences described between social relations in the Jewish and Druze cultures and due to the findings of this study, we can hypothesize that the lack of differences found in the general measurement of friends' involvement in the two groups is derived from the differences between them in specific decisions where adolescents' friends are involved in their decisions and the way of expressing difference in this involvement. Due to the differences between the two cultures, it is possible that Jewish adolescents share with their friends the whole decision making process – all their dilemmas and the emotions that such a process creates – but eventually due the emphasis put on independence in this culture, they feel they make the decision alone without their friends' involvement, except for the domain of career which is perceived as the most important.

However, Druze adolescents feel they need their friends' involvement and approval to make decisions in all domains especially those relating to the future, but apparently they share with them the decision process only in a diminished rational way and not comprehensively. A continual study is needed to examine this issue more profoundly for understanding the differences between Druze and Jews in their relationship with friends and the extent of sharing with their friends the decisions they make.

Moreover, as earlier stated in the introduction, the importance of this study is to ultimately define the extent to which culture affects the actions and reactions of individual by looking at two cultures and how cultural ideologies frame the decision making processes of adolescents under the influence of said cultures. Based on the findings of this study, culture has no influence on the decision making process.

However, looking at individual results and averages, there are observable differences. Nevertheless, generally there is no statistically clear difference with the decision making process of adolescents in the collectivistic culture of the Druze and the individualistic culture of the Jews. This means that Druze adolescents and Jewish adolescents made decisions pretty much in the same way. And this may be attributed to the fact that the world is now a global village, and there really are no more boundaries anymore with the advent of smart phones and the Internet.

Since Druze and Jewish adolescents who come from cultures with clearly defined ideologies would act the same way, it stands to reason that they must have been collectively influenced by some other force—maybe western culture. Hence, it is important to study how western culture has informed the actions and reactions of adolescents from cultures with clearly defined ideologies—ideologies that do no necessarily define with the ideologies of the western world.

6. Conclusion

The Druze culture is a collectivistic culture, while the Jewish culture is an individualistic culture. This study has shown that these cultural ideologies do no necessarily influence the general decision making process of adolescents in the culture, especially as it relates to degree of autonomy, parent's influence and peer influence. Nevertheless, when it comes to specific scenarios, cultural ideologies was seen to play vital roles in how adolescents made their decision. However, in a general sense, there was no observed cultural difference in adolescents' decision making process.

References

Baiocco, R., Laghi, F. & D' Alessio, M. (2009). Decision Making Style Among Adolescents: Relationship with Sensation Seeking and Locus of Control. *Journal of Adolescence*, *32*, 963-976. https://doi.org/10.1016/j.adolescence.2008.08.003

Bampus, M.F., Crouter, A.C. & McHale, S.M. (2001). Parental autonomy granting during adolescence: Exploring gender differences in context. *Developmental Psychology*, *37*, 163-173. https://doi.org/10.1037/0012-1649.37.2.163

Barakat, H. (1993). *The Arab world: Society, culture and state*. Berkely, CA: University of California Press.

Barber, B.K., Stolz, H.E., Olsen, J.A., Collins, W.A. & Burchinal., M. (2005). Parental support, psychological

control and behavioral control: Assessing relevance across time, method and culture. *Monographs of the Society for Research in Child Development*, *70*(4), 1-147.

Baumrind, D. (2005). Patterns of parental authority and adolescent autonomy. *New Direction for Child and Adolescent Development*, *2005*(108), 61-69. https://doi.org/10.1002/cd.128

Bonnie, L., Flesher, H. & Cauffman, E. (2001). Costs and benefits of decision-making competence in adolescents and adults. *Applied Developmental Psychology*, *22*, 257-273. https://doi.org/10.1016/S0193-3973(01)00083-1

Brown, B. (2004). Peer groups and peer cultures. In S.S., Feldman & G.R., Eliot (Eds), At the threshold: *The developing adolescent* (pp. 171-196). Cambridge, MA: Harvard University Press.

Daddis, C. (2011). Desire for increased autonomy and adolescents' perceptions of peer autonomy: "Everyone else can; Why Can't I". *Child Development*, *82*(4), 1310-1326. https://doi.org/10.1111/j.1467-8624.2011.01587.x

Fischoff, B. (2008). Assessing adolescent decision making competence. *Developmental Review*, *28*(1), 12-28. https://doi.org/10.1016/j.dr.2007.08.001

Florian, V., Mikulincer, M. & Weller, A. (1993). Does culture affect perceived family dynamics? A comparison of Arab and Jewish adolescents in Israel. *Journal of Comparative Family Studies*, *XXIV*(2), 189-201.

Franken, I. & Muris, P. (2005). Individual differences in decision making. *Personality and Individual Differences*, *39*, 991-998. https://doi.org/10.1016/j.paid.2005.04.004

Fulligni, A.J. & Eccles, J.S. (1993). Perceived parent-child relationships and early adolescents' orientation toward peers. *Developmental Psychology*, *29*, 622-632. https://doi.org/10.1037/0012-1649.29.4.622

Fuligni, A.J. (1998). Authority, autonomy and parent-adolescent conflict and cohesion: A study of adolescents from Mexican, Chinese, Filipino and European backgrounds. *Developmental Psychology*, *34*(4), 782-792. https://doi.org/10.1037/0012-1649.34.4.782

Fuligni, A.J., Tseng, V. & Lam, M. (1999). Attitudes toward family obligations among American adolescents with Asian, Latin American and European Background. *Child Development*, *70*(4), 1030-1044. https://doi.org/10.1111/1467-8624.00075

Gati, I. & Saka, N. (2001). High school students' career related decision-making difficulties. *Journal of Counseling and Development*, *79*, 331-340. https://doi.org/10.1002/j.1556-6676.2001.tb01978.x

Germeijs, V. & Verschueren, K. (2007). High school students career decision making process: Consequences for choice implementation in higher education. *Journal of Vocational Behavior, 70*, 223-241. https://doi.org/10.1016/j.jvb.2006.10.004

Gutman, L.M. & Eccles, J.S. (2007). Stage-environment fit during adolescence: Trajectories of family relations and adolescent outcomes. *Developmental Psychology, 43*(2), 522-537. https://doi.org/10.1037/0012-1649.43.2.522

Halpern-Felsher, B.L. & Cauffman, E. (2001). Costs and benefits of a decision: Decision making competence in adolescents and adults. *Journal of Applied Developmental Psychology*, *22*(3), 257-273. https://doi.org/10.1016/S0193-3973(01)00083-1

Harren, V.A. (1979). A model of career decision-making for college students. *Journal of Vocational Behavior*, *14*, 119-133. https://doi.org/10.1016/0001-8791(79)90065-4

Laursen, B. & Collins, W.A. (2009). Parent-child relationships during adolescence. In R.M., Lerner & L. Steinberg (Eds*.), Handbook of adolescent psychology* (3rd ed., pp. 3-42). Hoboken, NJ: Wiley.

Lewis, C., (1981). How adolescents approach decisions: changes over grade seven to elven and policy implications, *Child Development*, *52*,538-544. https://doi.org/10.2307/1129172

Lytton, H. & Romney, D.M. (1991). Parents' differential socialization of boys and girls: A meta-analysis. *Psychological Bulletin*, *109*, 267-296. https://doi.org/10.1037/0033-2909.109.2.267

Mann L., Harmoni, R. & Power, C. (1989). Adolescent decision making: The development of competence. *Journal of adolescence*, *12*(3), 265-278. https://doi.org/10.1016/0140-1971(89)90077-8

Mayseless, O., Wiseman, H. & Hai, I. (1998). Adolescents' relationship with father, mother and same gender friend. *Journal of Adolescent Research*, *13*(1), 101-123. https://doi.org/10.1177/0743554898131006

Mikulincer, M., Florian, V. & Weller, A. (1993). Attachment styles, coping strategies and Post Traumatic

Psychological Distress. *Journal of Personality and Social Psychology*, *64*, 817-826. https://doi.org/10.1037/0022-3514.64.5.817

Norma, J.,et al., (2012), Father- and Mother –Adolescent decision making in Mexican origin families. *Journal Youth adolescence*, *41*, 460-473. https://doi.org/10.1007/s10964-011-9660-8

Nydell, M. (1987*). Understanding Arabs: A guide for Westerners*. Yarmouth, ME: Intercultural Press.

Perez, J.C. & Cumsille, P. (2012). Adolescent temperament and parental control in the development of the adolescent decision making in a Chilean sample, *Journal of Adolescence*, *35*, 659-669. https://doi.org/10.1016/j.adolescence.2011.09.002

Phillips, S.D., Pazienza, N.J. & Ferrin, H.H. (1984). Decision making and problem-solving appraisal. *Journal of Counseling Psychology*, *31*(4), 479-502. https://doi.org/10.1037/0022-0167.31.4.497

Poole, M.E., Sundberg, N.D. & Tyler, L.E. (1982). Adolescents' perceptions of family decision-making and autonomy in India, Australia and the United States. *Journal of Comparative Family Studies*, *XIII*(3), 349-357.

Qin, L., Pomerantz, E.M. & Wang, Q. (2009). Are gains in decision-making autonomy during early adolescence beneficial for emotional functioning? The case of the United States and China. *Child Development*, *80*, 1705–1721. https://doi.org/10.1111/j.1467-8624.2009.01363.x

Scharf, M. & Mayseless, O. (2001). The capacity for romantic intimacy: Exploring the contribution of best friend and marital and parental relationships. *Journal of Adolescence*, *24*, 379-399. https://doi.org/10.1006/jado.2001.0405

Seginer, R. (1992). Sibling relationships in early adolescence: A study of Israeli Arab sisters. *Journal of Early Adolescence*, *12*, 96–110. https://doi.org/10.1177/0272431692012001006

Seginer, R. Halabi-Kheir, H. (1998). Adolescent passage to adulthood: Future orientation in the context of culture, age and gender. *International Journal of Intercultural Relations*, *22*(3), 309-328. https://doi.org/10.1016/S0147-1767(98)00010-8

Seginer, R. & Lilach, E. (2004). How adolescents construct their future: The effect of loneliness on future orientation. *Journal of Adolescence*, *27*(6), 625-643. https://doi.org/10.1016/j.adolescence.2004.05.003

Seginer, R., Shoyer, S., Hossessi, R. & Tannous, H. (2007). Adolescent family and peer relationships: Does culture matter? *New Directions for Child and Adolescent Development*, *116*, 83-99. https://doi.org/10.1002/cd.190

Sharabany, R. (2006). Peer relationships and intimate friendships among Arab and kibbutz children in Israel. In X. Chen, D.C. French & B. Schneider (Eds.), Peer relationships in cultural context (pp. 452-478). New York, NY: Cambridge University Press. https://doi.org/10.1017/CBO9780511499739.020

Smetana, J.G. (2004). Culture, autonomy and personal jurisdiction in adolescent-parent relationship. *Advances in Child Development and Behavior*, *29*, 51-86. https://doi.org/10.1016/S0065-2407(02)80051-9

Thunholm, P. (2004). Decision making style: Habit, style or both*? Personality and Individual Differences*, *36*, 931-944. https://doi.org/10.1016/S0191-8869(03)00162-4

Triadis, H.C. (1995). *Individualism and collectivism*. Boulder, CO: Westview Press.

Tunistra , J., Van Sonderen, F.L.P., Groothoff, J.W, Van Den Heuvel, W.J.A. & Post, D. (2000). Reliability, validity and structure of Adolescent Decision Making Questionnaire among adolescents in the Netherlands. *Personality and Individual Differences*, *28*, 273-285. https://doi.org/10.1016/S0191-8869(99)00096-3

Wainryb, C. & Turiel, E. (1994). Dominance, subordination and concepts of personal entitlements in cultural contexts. *Child Development*, *65*, 1701-1722. https://doi.org/10.2307/1131289

Wang, Q., Pomerantz, E.M. & Chen, H. (2007). The role of parents' control in early adolescents' psychological functioning: A longitudinal investigation in the United States and China. *Child Development*, *78*(5), 1592-1610. https://doi.org/10.1111/j.1467-8624.2007.01085.x

Weller, A., Florian, V. & Mikulincer, M. (1995). Adolescents' reports of parental division of power in a multicultural society. *Journal of Research on Adolescence*, *5*(4), 413-429. https://doi.org/10.1207/s15327795jra0504_2

Winryb, C. (1997). The mismeasure of diversity: Reflections on the study of cross-cultural differences. *New Directions for Child and Adolescent Development*, *76*, 51-65. https://doi.org/10.1002/cd.23219977606

APPENDIX

Table 5. Averages and Standard Deviations for Parents' Involvement Items in Decision Making Among Druze and Jews

Num.	Statement	Druze (n=124)		Jews (n=119)	
		M	SD	M	SD
2	It is important to listen to my parents' opinion when making an important decision.	4.46	0.79	4.42	0.78
4	I share my parents with every decision I make.	3.48	1.07	3.27	1.10
9	I seldom make decisions without consulting with my parents.	3.23	1.22	3.33	1.17
12	Often, my parents don't have an influence on my decisions.	2.30	0.99	2.08	0.90
13	I prefer to receive guidance by one of my parents in making decisions related to my future.	3.72	1.06	3.68	1.12
18	I always feel a need to receive an approval for my decisions.	3.25	1.12	2.97	1.16
21	I make decisions after accepting my parents' solutions.	3.42	0.98	3.36	0.86
23	I share my parents with crucial decisions.	4.05	0.89	4.31	0.90
24	I share my parents with decisions related to my professional future.	3.87	0.99	4.17	0.92
26	My parents have an influence on decisions I make that relate to my outfit.	2.95	1.04	2.40	1.07
29	My parents decide for me where and with whom to spend time.	2.60	1.15	1.74	0.85
Parents' Involvement – Variables Index		3.52	0.65	3.41	0.64

Table 6. Averages and Standard Deviations for Friends Involvement Items in Decision Making Among Druze and Jews

Num.	Statement	Druze (n=124)		Jews (n=119)	
		M	SD	M	SD
3	It is important to listen to my friends' opinion when making an important decision.	3.20	1.01	3.29	0.88
5	I share my friends with every decision I make.	2.80	1.05	2.92	1.04
7	I seldom make decisions without consulting with my parents.	2.49	1.03	2.81	1.07
8	If have the support of a friend, I make high-quality decisions.	3.27	0.92	3.07	0.88
10	I seldom make decisions without consulting with my friends.	2.78	1.12	2.48	1.03
11	I make decisions after accepting my friends' solutions.	2.60	0.86	2.66	0.82
15	My friends decide for me where and when to spend time.	1.59	0.75	1.76	0.78
16	I prefer to receive guidance by one of my friends in making decisions related to my future.	2.03	0.96	1.71	0.69
17	Usually, my friends have an influence on decisions I make that relate to my outfit.	2.15	1.09	2.11	1.00
30	I share my friends with decisions related to my professional future.	2.44	1.01	2.61	1.01
Friends' Involvement –Variables Index		2.56	0.62	2.52	0.59

Table 7. Averages and Standard Deviations for Autonomy Items in Decision Making Among Druze and Jews

Num.	Statement	Druze (n=124)		Jews (n=119)	
		M	SD	M	SD
1	I decide alone in what school to study and what subjects to study.	3.74	0.92	3.79	0.99
6	At home, I feel independent to make decisions related to my professional future.	4.20	0.90	4.01	0.89
14	I prefer to make to decisions related to the times and places of recreation on my own.	3.42	1.25	3.92	0.98
19	I feel confident in making decisions related to my studies in school alone.	4.05	0.98	3.61	1.04
22	The final decision is always mine and I take responsibility on it.	4.38	0.88	4.28	0.89
25	I decide when to do my homework as well as when to study for exams.	4.39	0.87	4.48	0.78
27	I feel confident in making any decision related to me.	4.20	0.86	4.09	0.90
28	I am consistent in making important decisions alone without consulting with anyone.	2.69	1.12	2.25	0.92
Autonomy – Index Variable		3.88	0.61	3.81	0.51

Living but Leaving: Therapy in Light and Right of Life and Death in Traditional-Cum-Contemporary Societies

Dr. Geoffrey Wango[1] & Dr. Gidraph Wairire[2]

[1] Department of Psychology, University of Nairobi, Kenya

[2] Department of Sociology and Social Work, University of Nairobi, Kenya

Correspondence: Dr. Geoffrey Wango, Department of Psychology, University of Nairobi, Kenya

Abstract

Dealing with death can be demanding and anxiety provoking for counselling practitioners. There is need to focus on therapeutic strategies aimed at assisting persons deal with loss and grief. This paper explores the concept of death in traditional-cum-contemporary societies, particularly within the prevailing context of increasing death rates due to natural factors, accidents, and disease. In this paper, five themes were identified through narrative analysis. These are: individual understanding of death, socio-cultural communal meaning of death, role of religion, development in science and advancement in information seen as vital in understanding of death, and application in counselling and therapeutic support services. Overall emphasis in this paper is the need for therapists and social workers to understand death in both the prevailing culture and transcending into modern discourse in order to find meaning in life.

Keywords: death, perception of death, counselling, traditional-cum-contemporary society

1. Background

Dealing with death can be a demanding experience loaded with anxiety for clients seeking counselling. This is highly significant in dealing with bereavement after the latest Diagnostic Statistical Manual [DSM-5] (American Psychiatric Association, 2013) removed the bereavement exclusion. Subsequently, an exception could only be made for clients with major depressive disorder (MDD) in certain cases; for example, if the patients were psychotic, suicidal, or severely impaired. The main reason is the fact that depressive syndromes in the context of bereavement are not fundamentally different from depressive syndromes after a major loss (Zisook et al., 2012). But at the same time, the DSM-5 (American Psychiatric Association, 2013) takes cognizance of two significant aspects, specifically for this paper: (1) there are substantial differences between bereavement and major depressive disorder; and, (2) an expectable or culturally approved response to a common stressor or loss, such as the death of a loved one, is not a mental disorder. Subsequently, there is an utmost need among counselling practitioners to focus on therapeutic strategies aimed at assisting persons deal with loss, grief and bereavement.

Therapists are part of the community of clients; they work with clients in their own setting. Imbedded and espoused as is life, death too is inevitable and for most people, the emotional impacts of the negative experiences of death far outweigh positive experiences of life. However, there is also ambivalence about evolving perception of death especially with advancement in medicine and technology in which the role of professionals, such as medical doctors, surgeons, mental health service providers including clinicians, psychologists, social workers and the clergy can assist clients dealing with death related issues including loss, grief and bereavement. In addition, synthesizing research on death is often precluded in traditional-cum-contemporary societies thus hindering social, health and scientific progress as well as societal impetus to integrate effective therapy to deal with loss and grief. Yet within the life and death dichotomy that exemplifies our existence, life success hinges on the ability to overcome and respond constructively to the fear and anxiety of death. The paradox of death is a challenge that clients must learn to accept, for death is inextricably interwoven into our lives.

This paper hinges on enhanced understanding of the causes, consequences and underpinnings of death. Effective therapy must therefore explore and focus towards attaining a comprehensive understanding of the phenomena encountered in professional practice, such as the concept of death in traditional-cum-contemporary societies. The use of the concept 'traditional-cum-contemporary societies' is intended to mean that the societies are largely in

transition and that they have aspects of traditional combined with contemporary systems. An examination of these systems involves an exploratory stance and openness to the complexity of death, particularly within the prevailing context of increasing deaths as a result of natural factors, accidents, illness and disease. Five themes were identified through narrative analysis and they are aligned with the topics in this paper as follows:

Table 1. Thematic Perspectives and Conceptualisation

	Theme	Topics in Paper
1	Individual conceptualisation of death	Deal or dealing with death: The Meaning and Value of Life and Death
2	Socio-cultural understanding of death	Death and meaning of life in Socio-cultural and Communal context: The concept of life in traditional society living
3	Role of religion and faith based perspectives of life and death	
4	Development in science and information technology seen as vital in understanding of death	Death in Clinical Practice: The Meaning and Value of life vis-à-vis death print
5	Counselling and therapeutic support services in traditional-cum-modern societies	Our existence-life and death, our undeniable destiny and a thrilling future
		Distance yet so aptly Present: Therapeutic Practitioners, Practice and Death

It should be noted that there are variations in the community perspectives of life and death. This is essentially because various societies even among traditional societies have diverse customs. Notwithstanding all factors, the concept of life and death also serves as a means of understanding the way of life, psychology and philosophies of various communities.

2. Hermeneutic Phenomenology Approach

The hermeneutic phenomenology approach adopted in this paper transcends the socio-cultural and historical structure and allows a psychological reorientation of the life - death experience (Dobrosavljev, 2002; Dreyfus, 1991; Laverty, 2003; Trisel, 2015). Sloan and Bowe (2014) posit that phenomenology is an examination of the human experience and subsequent behaviour. Also, the focus in hermeneutic phenomenology is not to control human experience such as life and death; instead, the approach aims at understanding experiences from the personal vantage point (Kafle, 2013). The focus on the personal experience allows both an exploration of that experience as well as an analysis of the socio-cultural structures. In the context of this paper, the hermeneutic approach considers the weaving between traditions (culture, customs and religion) and modernity, while at the same time accepting the need for the authentic self in context. This approach seeks to uncover the traditions about life and death, as well as champion a genuine vantage to deal with the finitude of death.

Further, the hermeneutic approach requires that participants have an understanding of self (Malet, 2013). In essence, this is not about the dominant culture nor is it an imposition upon the individual or community. Consequently, there is a sense of understanding about life and death at both individual and community levels, and this is inculcated in the cultural (traditions and religion) perspectives of various communities in Africa. This understanding includes self and community. It is based on a sense of understanding of their experiences (Nicholl, Loewenthal, & Gaitanidis, 2016). Therefore, hermeneutics describes the interpretation of life and death experience (Sloan & Bowe, 2014). This is because the life and death experience are a result of the cultural phenomena and counsellors and social workers have a major role in assisting clients deal with death.

Hermeneutic phenomenology approach considers individual lived experiences. Subsequently, this paper strives to expound the life – death phenomena and the extent to which caregivers (clinical psychologist, counsellors, psychiatrists, psychologists, social workers) respond to subsequent grief. Phenomenology enables a focus on the phenomena such as life and death, the events being examined, as well as the nature of their meaning (Finlay, 2009; Kafle, 2013). Using the hermeneutic phenomenology (van Manen, 2007) as our framework of reference, we have attempted to develop several themes regarding the life - death experience and made some efforts to appropriately contextualize them in the traditional-cum-contemporary society. Additionally, by acknowledging the traditional experiences about life and death, we have made some attempts to re-cast experiences into modernity and thus seek their integration in therapeutic practice, rather than simply highlight the modern

technological advancement which would have been deemed superior and the more predominant culture. Instead, the hermeneutic phenomenological approach offers a balance in developing a culturally informed practice for counselling and social work practitioners. It is therefore possible to hopefully reintroduce strategies arising out of a meaning of the life death experience.

3. Deal or dealing with death: The Meaning and Value of Life and Death

As a counselling psychologist and a social worker, it is challenging, if not impossible for us to discuss death arising out of the untenable position of life vis-à-vis death. This is because of the precariousness (that is both in value and mystery) of life that underlies all clinical disciplines including clinical psychology, counselling, psychiatry, psychology, psychotherapy and social work. It is even more admonishing to discuss death in the more traditional societies. This is not because death was rare or non-existent in traditional living. On the contrary, the number of deaths in the more traditional societies in developing countries has increased tremendously due to fatal accidents, diseases such as HIV and AIDS and cancer among others, suicide, war, terrorist attacks and other natural factors. Yet death still remains a mystery. The fear and anxiety as to why death hits so hard and leaves wanton devastation, loss and grief on people may be found in seeking a meaning and value of life and death. A counselling psychologist, social worker and other persons seeking the meaning and value of death is somehow albeit trying to strike a deal for dealing with death. Finding the meaning and value of life and death would require several philosophical realms, including culture, religion and underpinnings in philosophy. This is our starting point though it is not possible to explore all the philosophies and their interpretations and implications.

The preservation of life is a paramount clinical goal and as Byock (2002) states, perhaps and understandably, for clinicians death is the enemy to be conquered. Clinicians need to be joined by others such as counsellors and social workers. So how do we deal with death, or is death already a deal, which takes us to the title of this paper; living or leaving, life or death, right or light. But death and death anxiety are complex constructs (Dadfar & Lester, 2017; Firestone & Catlett, 2016; Pashak et al., 2018). Death anxiety is the dread of death, the associated emotions linked with death (Dadfar & Lester, 2017; Rice, 2009) also referred to as thanatophobia (fear of death) and necrophobia (fear of death or the dead), the anguish, actual and/or anticipated loss (Byock, 2002; Dadfar & Lester, 2017; Peters, Cant, Payne et al., 2013).

There must be a balance between life (being) and death (finitude). This is because although life and death appear as two opposite or contrasting ideas, they are somehow connected though seemingly opposed to each other. In addition, each of them is an entity that contains multiple sub-levels. This can be demonstrated as follows:
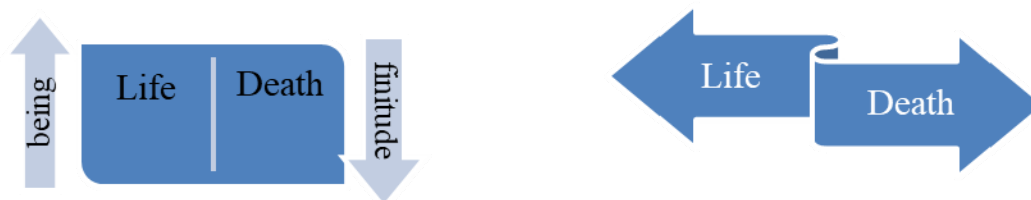
Figure 1. Life Death mutual complementarity

It is evident that being is life, and the finitude of life is death. Nonetheless, one can argue that life and death are on two opposite (opposing) ends. Counselling psychologists along with clinicians and others including social workers must therefore ask what death represents (Nzioka, 2000), including seeking a meaning for life, because as long as there is life on one end, death is anticipated on the last end.

Psychologists including Sigmund Freud and Viktor Frankl as well as others (Becker, 1973; Heidegger, 1962, 1976; Young, 2003) have investigated the meaning of life and death. Byock (2002: 279) summarises the phenomenon of death:

> *Phenomenologically, death is nonbeing. The essential nature of life entails activity, purpose, and making order from disorder. Death is the antithesis of life. Nonlife is inactive, and despite its stillness, death is chaos. Life generates its own meaning. In contrast, on its face death appears devoid of meaning and value.*

For the purpose of this paper, we have focused on the psychology and philosophical attributes of death in traditional-cum-contemporary societies. This includes a meaning of life as well as examining the certainty about

death. We must accept that life itself is meaningful to all societies, but the certainty of death is somewhat different because of diverse interpretations. Nevertheless, it is apparent that the fact of death profoundly impacts on all human beings. Perhaps our focus then should be, and will be informed by the understanding of the meaning of life and how death 'fits' in the mix. We call it mix because although it may be ignored (rather assumed), life has an unknowable relationship with death; life and death exist in mutual complementarity (*Figure 1*) – for we live and die, we are either alive or dead. Byock (2002: 279) concludes as follows:

> *Death is central to the meaning and value of human life as experienced by individuals and by communities. Death does not give meaning to life, but does provide the backdrop against which life is lived.*

This relationship between life and death is essential to our understanding of therapeutic relationship and has a profound effect in the client-counsellor relationship in traditional societies where death is a mystery and has a lot of anxiety. In fact, at times death appears as pure darkness and yet we refuse to shed light on it. For counselling psychology, social workers and other helping professionals, death need not be as enigmatic especially with the development of knowledge on loss and bereavement as postulated by Elisabeth Kübler-Ross (Kübler-Ross & Kessler, 2005).

The fear of death is relatively sturdy and hence the emotions are powerful. There is not one organ or gland that is distinctively 'responsible for' emotion, including strong emotions associated with death. The entire brain is involved, but the signals that form emotions are integrated and interpreted by parts of the limbic system. This may explain the various emotional outlets associated with loss and death such as crying, shaking, numbness, shock and anger (Kübler-Ross & Kessler, 2005). Yet fear is a feeling experienced when individual encounters or think about anything or anyone that can harm them. Fear is characterized by its orientation to the future because of the threat (sometimes with no means of escape to avoid it such as death in old age or serious ailment), and hence death is so fearful to the extent that it can be a preoccupation. This could explain why many people are both cautious and conservative about death; death acquires a functional value in that it is a permanent feature since it is a part of life but again is not set off too easily or too slowly since it is not as predictable. Thus, it is possible that death may not be as apparent in young ages though increasingly threatening (and thus more afraid) in acute cases such as ailing health or old age. This is why death causes both fear and anxiety. Fear and anxiety are seemingly similar, yet they are important to differentiate especially in psychology (American Psychiatric Association, 2000) because these emotions can transform into certain behaviours including over use of defence mechanisms. This is what obscures the recognition of the reality of death. In addition, fear and anxiety are essential to the dynamics of emotional illness and hence the death anxiety (Byock, 2002; Dadfar & Lester, 2017; Peters, Cant, Payne et al., 2013; Rice, 2009) needs to be linked to positive mental health (Holtmaat et al., 2018; Keyes, 2005; Ryff & Singer, 1998).

Psychology must therefore illuminate life, and hence provide sufficient knowledge to assist in giving a purpose to life and in turn assist in overcoming fear and anxiety associated with death. This is by explaining life and death, and in therapy assisting to resolve the life-death crisis. Death then is in the background of life, and death from this perspective must not overcome life but give value to our human experience. Psychology illuminates death to make it relevant and approachable in terms of the meaning, purpose and value of life. Similarly, social work must illuminate the social wellbeing within which this life thrives, the environment and essential factors for assisting individuals experiencing or affected by the trauma of death and associated grief. Death can then be understood in emotional and logical conceptualization. But first, we must understand death and approach it from several perspectives, that is, cultural and communal, individual, religious and communal perspectives. The next section looks at the traditional (particularly African) concept of death.

4. Death and Meaning of Life in Socio-Cultural and Communal Context: The Concept of Life in Traditional Society Living

African traditional societies had a philosophical orientation to life that incorporated religion, culture and traditions (Mbiti, 1969; Wango, 2015). The individual was a part of the community to which she or he belonged; everyone was a member as an individual and as part of the community. Religion and tradition were intimately interwoven. Therefore, life and death are a part of the religion and tradition, the individual and the community.

Due to this interconnectedness between culture (traditions) and religion (faith and spiritualism), the African concept of life, death and the hereafter is closely linked to, and influenced by this traditional – religion dichotomy (*Figure 2*). In general, life is considered important while death is not considered as a natural event but tends to be seen as, or 'caused' by some external forces such as witches, spirits or curse.

Traditions and Religion

- Knowledge, beliefs and customs (this includes convictions and expectations)

- Values and norms, ethics and morals (community living, individual and communal life)

- Means of transition of culture (traditions and customs) and religion (spiritualism), that is, oral narratives, songs and dances, proverbs, riddles and short sayings, art and shrines
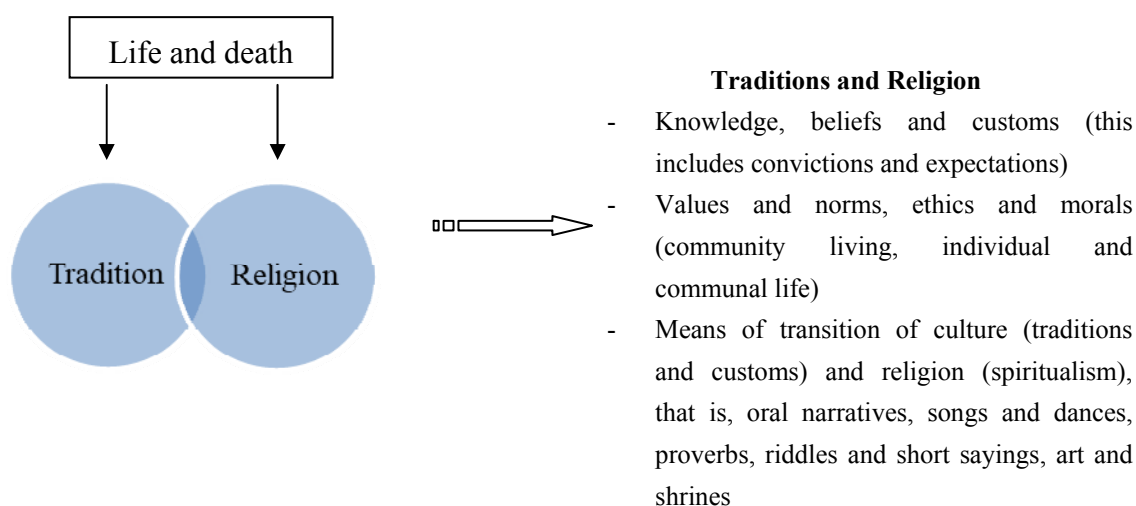
Figure 2. Traditional Psychological Philosophical Conceptualisation of Religion and Tradition

The concept of life and time in traditional societies, including Africa has been researched on in a number of perspectives (Asuquo, 2011). The concept of time plays a pivotal role in the way a society derives its values, beliefs and conceptions. One of the areas where time is of importance is when analyzing people's perceptions on death and afterlife (Asuquo, 2011; Mbiti, 1969; Wango, 2013, 2015). This is because time and timeliness merges with religion (faith, beliefs and the supernatural power of God), communal living (the us-ness, that is, one-ness), life and hereafter (children, ancestors and the spirit world). These aspects are components though related to each other. This connection can be demonstrated as follows:

Table 2. Rationalization of Religion and Traditions with God, Spirits, Communal Living and Life here and after

God	Ancestors, spirit world	Communality living, one-ness, us-ness	Children, life and hereafter
Supreme being, creator of the universe, sustains all universe, supernatural, has complete control (no science or rationale).	Closer to God, 'heralders' – gone ahead of us, keeps link with spiritual world, watches over humans.	- Respect and reverence for supreme being. - Communal living with one another. - Rituals and rites of passage.	Children are a blessing and mark life hereafter. They link with the spirit world through naming of child/ren to 'keep contact' with spiritual world.
Revered, not seen, glory cannot be behold.	The ancestors play an important role in the communal life. They are not cut off from the living, for they may still reveal themselves in dreams or appear to their living relatives to guide or correct them.	- Person lives in harmony with others in the community. - Observance of taboos, traditions and customs. - Curses and misfortunes befall anyone who fails to adhere.	Curses and misfortunes are a mark of failure to adhere to the will of the gods (such as lack of children, still birth, death).

This relationship between God, the spirit world, community and life and hereafter (*Table 2*) is based on certain rules and regulations and is also part of rhythm or cycle of life. Njoku (2002) proclaims that life is a communal affair which involves a relationship and communion between humans, God, ancestors, divinities, other community members. This is aligned to Mbiti (1969) who notes that to be human is to belong to the society, and

the whole community, and thus involved through effective participation in the beliefs, ceremonies, rituals and festivals of that community. It is possible to argue that there is a hierarchical order in supremacy (Asuquo, 2011; Njoku, 2002; Mbiti, 1969). This can be demonstrated as follows:
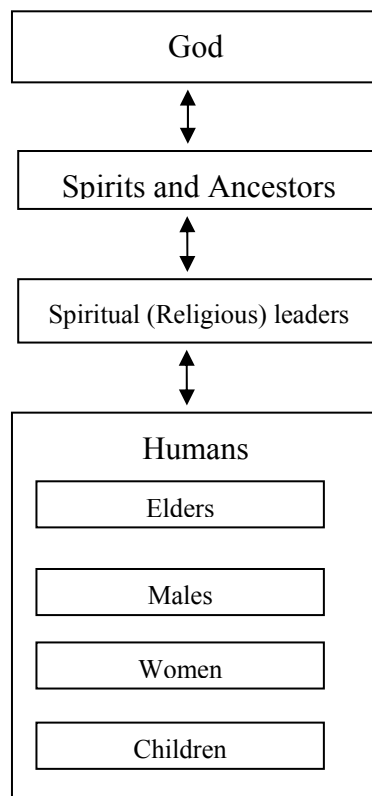

Figure 3. The Hierarchical order of Power and Influence, Dominion and Connectedness

While God is the Supreme Being, spirits and ancestor have an influence as were the spiritual leaders though with varied (lowered) influence. Humans were last in the pecking order, and still, elders had an upper hand, while males had higher preference over females with children at the lower end of the lope.

The aspects of living and individual life went through several phases from birth to death and this is in agreement with several scholars on traditional African philosophy such as Asuquo (2011), Njoku (2002), Mbiti (1969) and Wango (2013). Fuchs and Pallagrosi (2018:289) succinctly puts it thus:

> Phenomenological philosophy has explored the concept of time as a basic structure of the human self. According to its perspective, human beings are time producing organisms, and their awareness of being is imbued with the sense of a lived duration of experience.

Hence the concept of human life is in direct relation to time; it is also subsumed that everyone went through the stages of life – an implied common stance. These include: puberty, initiation, marriage, procreation, old age, death and life in the hereafter (*Figure 4*). Death marked entry into the community of the departed and finally entry into the company of the spirits. Still, the living and the departed were in continuous connection. This process can be outlined as follows:
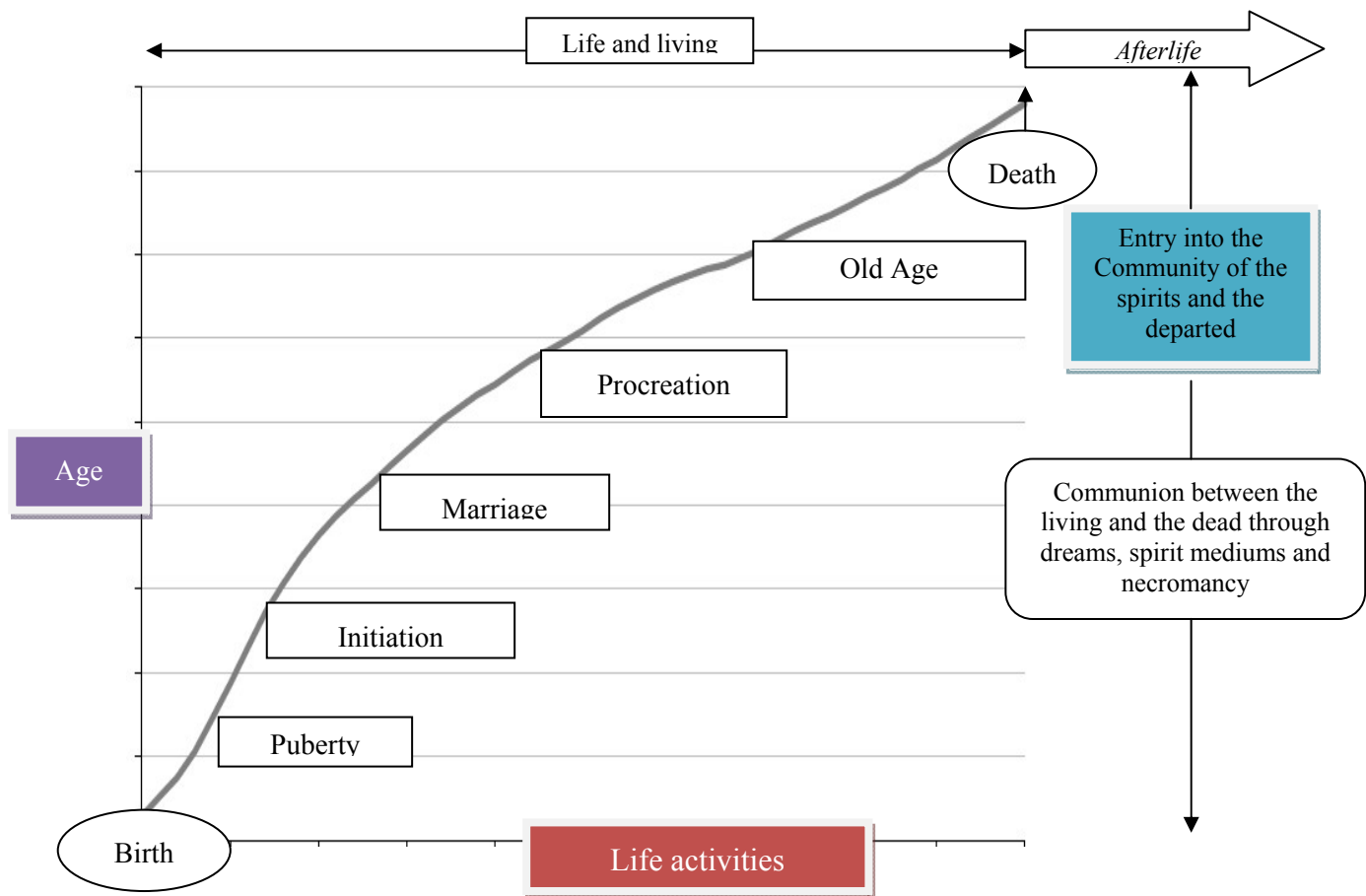
Figure 4. Time pivotal role: Life through Phases in Traditional Societies

It is evident that time in life is a series of events that starts at birth and culminates in death. Communion between the living and the dead was in several ways, particularly in naming to perpetuate life as well as through dreams and spirit. In several instances, the dead if mistreated and/or unhappy continued to appear to the living in dreams and in form of spirits. Psychologically it can be argued that the appearance in form of memory was assumed to be real rather than phenomenological representation in the human brain.

The concept of time (time now and conceptualising the future) plays a pivotal role in the way a society derives its values, beliefs and conceptions (Byock, 2002; Marava, 2015; Tillich, 1959) and hence life and death are directly linked to time as well as the people's philosophy (*Figure 4*). In the traditional context, the phenomenon of events may be natural, a rthymnic pattern or perchance… the diagram therefore explicates how we transcend the lifespan, and thus living and enduring trace of oneself, and at the same time adding meaning to one's life and communal living. This explains why certain rituals and traditions are virtuous actions (call them norms) in that they have and add meaningfulness to life and our finitude. We think that meaning of life comes in various degrees that have proportionate interconnectedness between traditions, religion and modernity.

Equally important to note is that in nearly all the stages expounded above, a common activity that takes place is rearing phase which may be seen as recurring across the stages. Through this, the virtues that help give meaning to life are implanted in individuals through the socialisation process. It is through this that the philosophical ideals that make life more meaningful get rooted in individuals and in their communities. Religion, traditions, norms and beliefs are passed on across generations through the same process which to a certain extent, becomes cyclical.
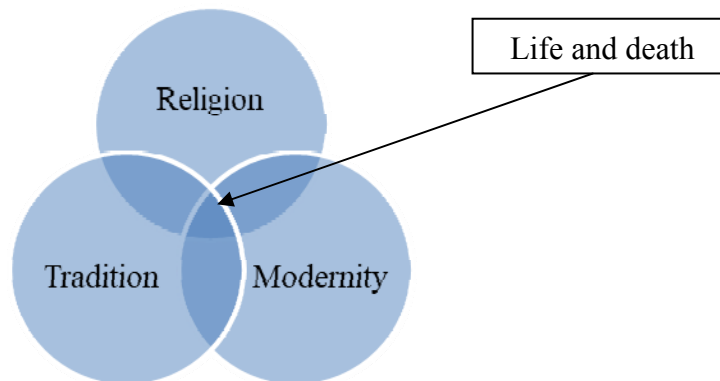
Figure 5. Death's proportionate interconnectedness with Tradition, Religion and Modernity

At the end of it all, physical life always ends at death. But death in the traditional concept is also a transition which involves transformation from the physical into the spiritual as the dead continue to live as ancestors. It follows logically that God (or the spirits) who created life also takes it through death when the time is up. The problem with this viewpoint is that it does not clearly explain whether it is God who causes premature and undesirable deaths such as those caused by suicide, war and violence, illness and accidents. Moreover, and while at it, philosophically traditional societies could debate if God deliberately inflicted such pains and sorrows that death often brings. Our guess is that this religious philosophy could be contrasted with the modern Christian faith in which God is seen as a loving father. But embedded in this life and death is also whether death is timely or caused by someone or circumstances. Subsequently, several communities had rigorous cleansing ceremonies in case someone killed another person, or worse still committed suicide. This is because though traditional societies could have somehow accepted or grasped suicide by accepting moments of frustration, failure and despair, suicide was not embraced. This was chiefly because life was revered, and hence a person could not beckon death through killing self or other (suicide or killing a relative or neighbour) – death was highly discouraged, and was an abomination.

4.1 Death in Clinical Practice: The Meaning and Value of Life Vis-À-Vis Death Print

The ordinary interpretation of the advancement in technology and medicine has been two-fold: that death is inevitable; and, a search for prolonging life and preventing death. This is interesting because it places the inevitability of death with the need for a cure as well as requirements for care and compassion for the most ill, elderly and dying (mortality awareness or visibility to avoid death?). This ends up as a paradox for psychologists, social workers and informal care-givers who must then reckon with therapeutic practices that must be found to comprehensively assist in such belated fate. We have the medical clinics, hospitals, hospice, nursing homes, old age residences, drugs and life-sustaining technologies but death is immune to all, a finitude. Freud (1920) is often quoted as saying that the aim of all life is death, and that inanimate things existed before living ones. Yet, and still, death has a lot of fear and anxiety, albeit arising out of the almost uncertainty of death. Crist (2018:8) elucidates the fear and anxiety in death as follows:

> *Anxiety is closely linked then to our human tendency to strive to grasp this mystery of death. Yet, it is not the knowledge of death which causes this striving but something more fundamental that causes us to "repress the thought of death."*

Gadamer (1996) like Crist (2018) unpacks this tension, namely, the role anxiety plays in our striving for an understanding of the mystery of death, while never being able to fully comprehend this profound relationship between anxiety, life, and death. Our explanation in terms of clinical practice and the advancement in medicine and information technology most probably arises from a denunciation of death – certainly we want to prolong life and reduce the pain and grief associated with death. What then is the possibility of eliminating death? Various scholars such as Heidegger (1962; 1976), Becker (1973) and Young (2003) extensively discuss this denial of death, or what is called the "illusion of immortality. In medical practice the challenges and inevitability of death is a renewed disposition that medical professionals and would be patients ought to take cognizance. This is evident in medical explanations of the process of death. Therefore, the tension about death arises majorly out of our interpretation of life, and because of our fear and anxiety about death. Yet death is part of our human existence.

Counselling and psychology particularly in the more traditional societies need to develop the client's own understanding of life in a meaning-making system (MSS) that has coping capacities such as resilience alongside the careful application of science, medical and information technology. Practitioners must be aware that cultural values and religious beliefs (*Figures 1* and *2*) tend to complicate both understanding and public discussion about death. Thus, many people are clearly skeptical about death even when it is too imminent. Subsequently, a wide range of fears about death are common among many people – they are both individual and communal. Evidently, many people provide infrequent, often inadequate, hurried and poor quality explanations for death. The inadequacy of information leads to general fear and anxiety. Yet, a positive intervention can best be done by dispelling myths about death in order to prevent unnecessary fear and anxiety.

Despite the colossal and impressive advancement in science and technology, impressive innovations in medicine and pharmacy, death remains a part of us. The feeling of uncertainty and anxiety of death has probably increased in modern society than in the more traditional societies. Psychologists and philosophers could as well pose the more logical statement - that traditional societies had resigned to the fate of death, and pose the more poignant question – is the modern society preoccupied with life and hence the desire to overcome death? This is most fascinating taking cognizance of our present world that is largely based on the more positive rational science and modern logic. The various institutions, caring services and programming including medical clinics, hospitals, hospice, nursing homes, home based care and comprehensive health care are highly significant even towards the end-of-life care. After all, death still has the final laugh as all attempts to trounce it are invalid. The role of clinicians and professionalism is best captured by Byock (2002:287) in a paper on 'the meaning and value of death' who concludes so appositely by summarising the precarious role of professionals with a caution

> *Acting on behalf of society, the clinical professions bear critical responsibilities for caring for those who are dying and bereaved. However, overreliance on professionals as a means of denying or distancing ourselves from death and grief can diminish the fullness and richness of living and erode the experience of meaning and value in our lives. Beyond acknowledging and honouring basic obligations, individuals, families and communities have the capacity to respond to the ultimate problem of death in a creative manner including the performance of rituals that reflect and advance values of human worth, dignity, and enduring connection. The clinical professions can lead by setting standards for excellence and by providing care that is not only competent but unabashedly loving. In so doing meaning and value is created by direct intention.*

As a counselling psychologist and a social worker contextualized in a traditional-cum-contemporary societies, we too would humbly suggest an ideologist of positivism based on traditions, religion and science. This, in our view, would encompass the totality of our human evolution (in terms of culture, religion, information, science and technological advancement) thus imparting a truthfully normal arrangement of our human mind-set in order to establish harmony between philosophy and psychology. This involves a reconstruction of society characteristic of modernism based on traditions and religion, a rather realistic viewpoint.

4.2 Our Existence-Life and Death, Our Undeniable Destiny and a Thrilling Future

The phenomenon of death transcend beyond the immediate and long term experience, for while there is engagement in time, death has a continual presence but no end point. Death is both infinite and recurrent, and thus an ever evolving process and circumstance. In conversations on death we may find the rational (and perhaps the irrationality) of death in the leverage of everydayness of life. In that case, the more traditional societies must explore our lives (particularly our everyday experiences in a modern world) and our future and in turn discuss death – this is part of our being. It would be futile to pretend that we are immune to death, or that we are not aware of it. Jirásek, Oborný and Hurych (2018:3) expound this reality:

> *So, we are included in the question about our being. We ask because of ourselves and from the position of our situation. And, if our being is temporal, then the categorical determination of all human experience is done by its temporality. Our being is included in the present. The past means throwingness (we are thrown into the life situations which were not selected by us). The future means the possibility of scheduling (we can decide what we focus on and which way we want to live in).*

It is perhaps justified as argued by Jirásek, Oborný and Hurych to say that we need to authentically engage our own anxiety about death. This would awaken in us the truth and reality of the mystery of life and death in order to comprehend our situation, no matter how temporal life is. Life and death, the fear and anxiety, and perhaps the misfortunes of immortality are interlinked with our traditional-cum-contemporary psychology in that our life is greatly a study of ourselves. Death is a part of our circumstances, just as life remains connected with us, and just as we aim in various ways such as philosophy and psychology to expand our knowledge of ourselves and our

world. This requires a transformation of understanding death as converse of life to continuity as demonstrated below:

Figure 6. Life < > death to life (start)   death (stop/ cease)
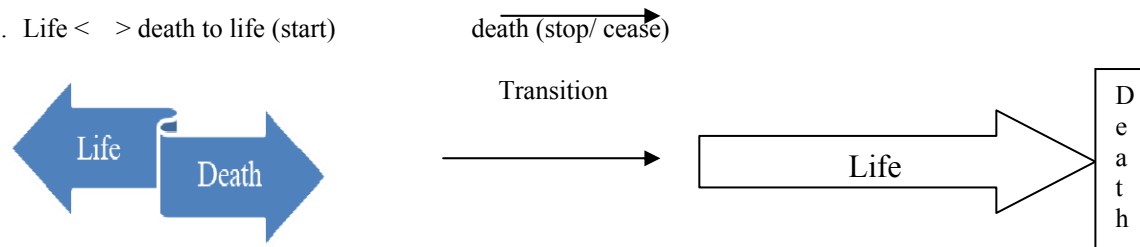
The new transformation involves a change in attitude in which people understand and accept that life culminates in death. The time pivotal roles (*Figure 4*) are thus synchronised with the life death process and logic, rather than fear and anxiety about death. This way, counselling practitioners will be able to assist clients to absorb the loss perpetuated by death. Subsequently, clients can adapt to the changes death unleashes in unique ways. On the other hand, social workers must be prepared to provide psycho social support for such clients in order for them to face the realities of death and subsequent loss from a much stronger position. The unique collaboration between counsellors, social workers and medical practitioners will in turn provide a strong holistic approach for effective handling of death and its resultant outcomes not only for clients who are dying but for bereaved families agonising at the loss and trauma of death.

Let us be philosophical and ask: what can we say or do, about death? This is because admittedly, we have a present (life and death as inevitable) and a future (death-that awaits us); this is our way of being. Therefore, an understanding of the process of life and death is fundamental for increasing our understanding of both our existence and our being human. The importance becomes even more urgent when one realizes the topic of death is one of a kind, especially for many people who do not want to reckon with the reality of death leave alone talk about it. Yet, our perception (consciously or unconsciously) of life and death is part of our existence. Jirásek, Oborný and Hurych (2018:4) summarize it thus:

> *The perception of our mortality and relating to our very last limit enable us to schedule our possibilities of being. Any experience which is chosen this way gives evidence about the way how we manage our possibilities and how we exist in the authentic way. Only this terminality (knowledge of existence of our death) can help us to reach a better understanding of ourselves and a possibility to recognize the modus of our freedom. We are free in our being and in a care of it, in the possibilities how to schedule our lives, and in the modes of experience which we choose. If we fall into the "world of things" (a focus on "what is spoken", "what is on", "what is recommended" – that means falling into "the They") we could not consider the "authentic" experience because we would not be related to the ontologic being but just to the ontic one.*

This is a near reality cryptic reflection on our existence. It signifies an inextricable life-death connection. It is correct to state that we are alive, nevertheless there is a sequence, consequence that puts a 'but', death. Death has a powerful influence on our lives and that of others and it is in the everydayness of our lived experience, a showing of relational play in life and living, happiness and sadness, joy and disappointment and this is summed up in life and death, culminating often in pain and sorrow. We would all possibly want to avoid death, but philosophically, death does not want to avoid us – it awaits us, it sits right at the end of the tunnel sometimes waving at us, or vibrates like a wild storm or quietly waits like a crocodile in still deep waters. The end results are the same, the inevitability of death. Death is multi-faceted, it has the imminence within which lies the fear and anxiety. In all, it is unavoidable and thus a part of life rather than the end of it. But again, we cannot annihilate the human spirit; instead, we must continue to exist thus edifying our human mortality.

In the final section of this paper, we suggest an extension on knowledge from current competencies to coping (*Figure 7*).

4.3 Distance yet so Aptly Present: Therapeutic Practitioners, Practice and Death

As earlier mentioned, dealing with death in our contemporary societies is a venture that is multi-disciplinary in several aspects for holistic outcomes in managing potential effects and implications of death including grief, loss and emotional instability. Medical personnel including doctors, nurses and other clinicians who handle patients at different stages of their illness require other caregivers and practitioners such as counsellors, psychologists

and social workers for holistic intervention and social support of their patients and/or clients particularly those battling physical illness or even those who may be terminally ill.

Counselling psychologists and general counselling practitioners must be able to frame and respond to questions and concerns about death. we would like to posit death as far as modern medicine is concerned in four related ways: (1) The need to preserve life (medicine, drugs and information technology – physiological, social, spiritual, philosophical and psychological); (2) Prolonging of life (if not an escape from death – physiological and philosophical); (3) Eradication of pain (reduction of pain and suffering - physiological); and, (4) Coping with the pain of death (fear, anxiety and stress - social, spiritual, philosophical and psychological). Of course, the four are all in the same realm and this signifies an inextricable life-death connection and thus it is perhaps best to state that counselling psychologists will be preoccupied with the feelings and emotions. Jointly and in collaboration with the medical personnel, counselling practitioners and social workers must embrace a concise effort to define health and wellness and in turn identify and clarify the art of coping and healing from the modern science of medicine. In this regard, Crist (2018:7) opines that health is not a state of utter stillness, immovability, or inactivity; rather it is a general feeling of well-being. It is a rhythm of life, a continuous movement in which equilibrium is disrupted and must re-establish itself, and manifests its own robustness when we are able to manage these disruptions but not without pain:

> Health, however, is not a state of utter stillness, immovability, or inactivity, rather it is a general feeling of well-being, whereby we are open to new things, ready to embark on new enterprises and, forgetful of ourselves, scarcely notice the demands and strains which are put on us. This is what health is. However, because health involves a condition of an active, engaging, and rewarding kind of being in the world, health becomes something concealed from us and difficult to pin down. What reveals our own health to us are precisely those recalcitrant matters which intrude into our human experience of life. Health, then, is a rhythm of life, a continuous movement in which equilibrium is disrupted and must re-establish itself, and manifests its own robustness when we are able to manage these disruptions without a complete numbing of pain.

Health in this instance is a kind of open and engaging sensibility towards life, and of course death. We do want to proclaim death as both threatening and disruptive but again, death is a finitude and thus modern science should not be construed as decreeing existentialism. Incidentally, health and wellness are related to coping and healing because they have a complementarity component. All in all, psychologists must be wary of the modern medicine's combative disposition towards (or doing away with) pain, suffering and of course death. In that case, the shift in focus and healthy living amidst death must take cognizance of the psychological variables, as well as the transition going on in society and in the world but at the end bring about amicable understanding of both life and death. This transformation is represented in *Figures 6* and *7*.

Social workers on their part will largely provide a conducive environment where clients with terminal illness or those about to die can be provided psycho-social and palliative care in a dignified manner but not as people condemned by their current state of illness. Social workers can also be handy for the families of such clients by giving them hope and inspiring them not to focus or concentrate so much on the helplessness of their situation but be pillars of support and a hope of changing their desperation into a turning point for their ailing family member(s). In addition, social workers can serve as strong advocates for the rights of the ailing client and/or their mourning families in the event their loved one is no more. The rights of clients in physical illness and their grieving families can best be championed by social workers for a comprehensive well-being, recovery or acceptance of the reality should death be the final outcome of physical illness. The social dimensions of illness and death is thus a major focus for social workers dealing with illness, loss and grief, death and bereavement. Linking up such affected clients with corresponding or needed resources is another critical role of a social worker. A good example of such a resource are pastoral teams to provide the client with the much needed pastoral and/or spiritual care which can further enhance ongoing interventions to cope with the realities of looming death or grief and mourning following bereavement. The competencies are illustrated in *Figure 7*.

```
┌──────────────────────────┐                    ┌──────────────────────────────┐
│ Adherence to Cultural    │                    │ Understanding of Life and    │
│ (tradition and religion) │                    │ Death                        │
│ norms and values         │                    │ - Physiological and          │
│ Competencies             │                    │   psychological              │
└──────────────────────────┘                    │   competencies               │
                                                 │ - Modernity (new world       │
┌──────────────────────────┐                    │   order, including culture   │
│ Psychological Variables  │                    │   and religious              │
│ - Personality            │                    │   interpretations)           │
│ - Community values and   │    ┌─────────────┐ │ - Adjustment behaviours      │
│   norms                  │    │Modernization,│ │   including emotional        │
│ - Community understanding│    │Nationalization││   regulation                 │
│   of life and death      │    │and           │ │ - Current competencies       │
│ - Past and Present       │    │Internalization│└──────────────────────────────┘
│   behavioural            │    └─────────────┘
│   competencies           │
│ - Traditional (societal) │    ┌──────────────────────────┐
│   philosophy             │    │ Advancement in medicine  │
│ - Emotional construct    │    │ and information          │
│   (fear and anxiety,     │    │ technology               │
│   death anxiety)         │    └──────────────────────────┘
└──────────────────────────┘
```

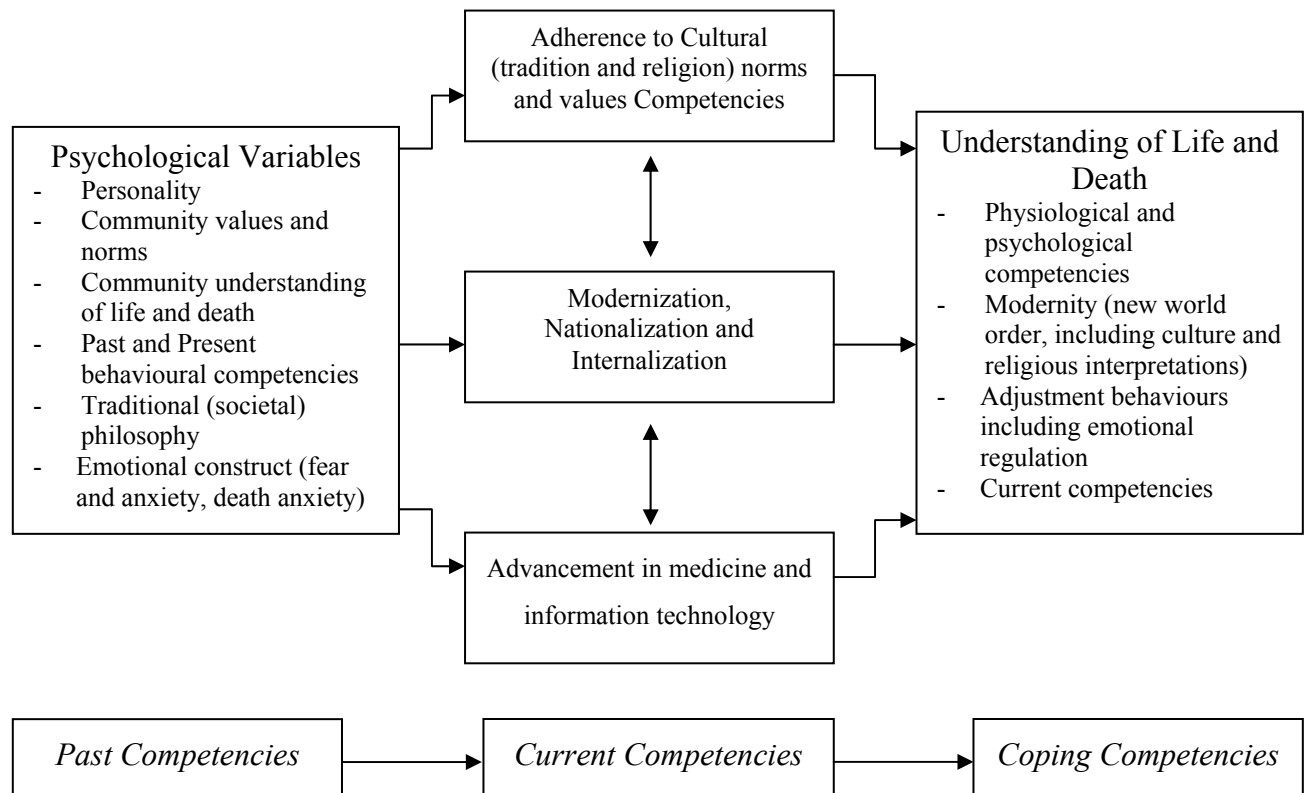| Past Competencies | → | Current Competencies | → | Coping Competencies |

Figure 7. Behavioural Competencies of Life and death in Traditional-cum-Contemporary Societies

The suggested shift in behavioural competencies of life and death from past to current and into coping is a modification and not an alternation. Emotional constructs such as fear and anxiety (in this instance death anxiety) is incrementally improved to emotional regulation to enable deal with anxiety disorders. This is because we do not want to prescribe to the community how to cope with (life and) death but simply expurgate on the going-on in society. Again, this is within the hermeneutic phenomenological framework of interpretation of life and death experience rather than a historical description but within the cultural phenomena. As background, it is still important to highlight that communities varied: they have different histories, traditions, beliefs, contexts and contemporary dynamics. These conditions will affect their conceptualization (and of course susceptibility to) death and thus vulnerability to certain psychological impacts. There are also the personality differences while other factors such as religion and resilience will also differ among individuals. Hence, a traditional-wide analysis risks over generalizing and over simplifying the complex web of life and death as specifics underlying causal, effect and symptomatic dealings require additional interpretation.

Before we conclude, we wish to highlight the fact that the increasing number of psychological and social interventions involving mental health have led to positive mental health (Holtmaat et al., 2018; Keyes, 2005; Ryff & Singer, 1998). Purposeful positive mental health in this instance in dealing with life and death, is a construct that appropriately is multifaceted and should incorporate knowledge competencies in all sectors (including tradition, religion and modernity, *Figure 5*). This new construction which is a transition (*Figures 6* and *7*) can be represented as follows:
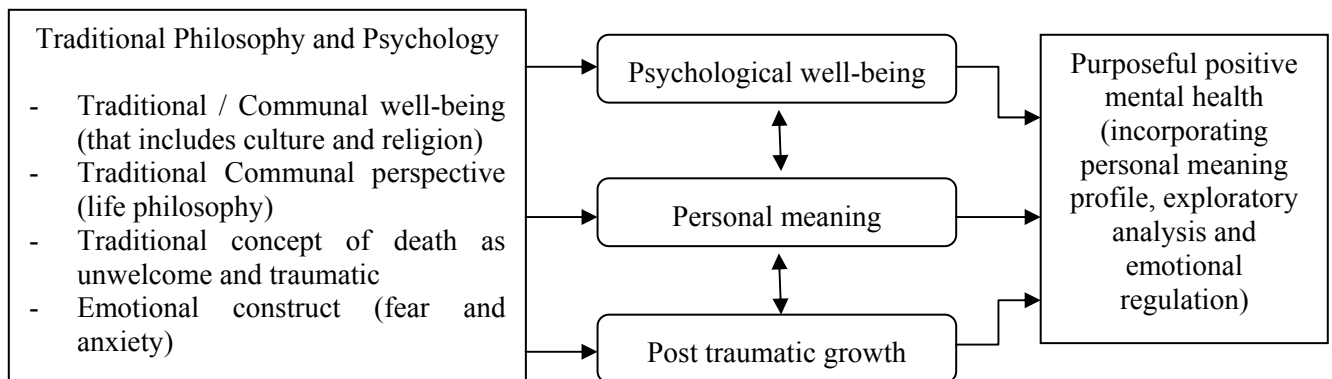
Figure 8. Modern Construct of Purposeful Positive Mental Health

Such knowledge of need for psychological well-being and enhanced personal meaning integrates post traumatic growth. It is important for both practitioners in counselling psychology and social workers as well as their clients for the purpose of redesigning effective coping strategies (*Figure 7* and 8) with strengthened regulations on positive mental health. This enables a more general focus on the quality of life rather than an emphasis on psychological distress, an adjustment to life as well as an experiencing of a sense of meaning in life and death.

There is need for distributing collective ownership of the life-death process as basic obligations and discharging them in a proportional modern fashion to professionals. The modern society approach would include clinical professions (doctors, surgeons, nurses) as well as helping professionals that include therapists, social workers and other care-givers. The conscious motivation is comprehensive health care (CHC) that recognizes various needs such as physiological (medical), psychological (counselling), social (social workers), spiritual (clergy) and general well-being (informal care givers) in order to provide the best care possible. The purpose is to enable positive mental health outcomes even in the most difficult circumstances such as death. Death then is not so distanced, and counselling psychologists and social workers can then be strong enough to philosophically embrace and practically assist clients facing the reality of death.

5. Conclusion

This paper has attempted to rationalize the traditional African concept of life and death (that includes the hereafter) and the present modernized (in the context of medical and information advancement, new religion such as Christianity or otherwise) notion of life and death. The aim is to enable an understanding of loss and grief as well as ease the grieving process. In the past, people were born and died at home with their families nearby. Most people died in their own beds. Death was considered a natural part of the life cycle. Today most deaths occur in hospitals or hospice; the dying is often surrounded by medical personnel instead of family members. Death has become a remote but constant subject that many people would prefer to avoid discussing. Modernization and internationalization include a new form of education, scientific and technological advancement globalization, urbanization, other (new) religions and these in turn seem to be modifying and affecting the African concept of life, death and the hereafter Using the hermeneutic phenomenology, it is noted that the dominant (traditional) culture has utmost control of the mind and society, and thus an impact on life and death processes.

Firstly, it can be deduced that both the traditional (predominantly African) concept of life and death has aspects of interception with modern, particularly Christianity based on certain point's basis of life as follows: (a) God is the originator of life; and, (b) life does not end at death. Death is a transition and transformation from the physical into the spiritual world. Secondly, there are aspects of diversity in that in the African traditional concept, the ancestors are still involved in the communal lives of their people which is different in Christianity. This is because the traditional communal living involving societal relationships is replaced by a communion with God in Christianity. Thus, traditional societies are based on certain religious traditions, beliefs and laws that contend death in such magnitude that it becomes difficult to individual understanding.

There is a direct relationship between life and death and this can be explained by means of a phenomenological shift in which psychologists and philosophers assist any attempt to conceal the structure of the two as too

distinctive phenomenon. In order to effectively carry out such a healthy procedure, it is necessary to get rid of the fears, anxiety and myths about death that only conceals its structure from our consciousness, and instead create a false illusion about death. Additionally, medical and information technology adds to this illusionary notion that life can be prolonged, and death can be avoided – to the extent this is logical and realistic should be applauded and is noteworthy. In this connection, we especially in the traditional-cum-contemporary societies need to embrace the concept of death as 'the other' part of life, in fact the culmination of life.

Death becomes a referent, a prototype that reproduces itself in several of patterns of our life, of a sensual given – existence rather than hidden, a reality and not an illusion. At the same time, it is both necessary and possible to give life a meaning and promote healthy living thus differentiating between death as final and untimely events leading to death. This is a transformative form of phenomenological reduction of life and death and not the suspicion of the destructiveness rather than the destiny of life. This denotes a new (reviewed) structure of consciousness which is a form of reflexive acts of consciousness not related to the fear of death; it is content in context, and not circumstantial. Such a form of consciousness and realization of the imminent (finitude) of death is by itself fulfilling in that it changes the perception of the life – death content.

In our own view, this involves both studies and carrying out incessant phenomenological shifts in the orientation of death, in the form of consciousness and in a life meaning-generating construction. This is the workings of philosophy and psychology that interacts with social life. Studies of life and death will adopt a holistic and multidisciplinary approach that encompasses the critical care giving professions for clients and families dealing with death related issues. Such professions include counselling psychology and social work both of which can intervene jointly or at different points in time during the period for which the client is under their care. In essence therefore, there is need to strengthen corresponding counselling and social work intervention skills for effective handling of death related needs and issues. This must be done keeping in mind the fact that the clients involved still have their dignity and respect which must be prioritized and honoured even as interventions for their situation unfolds.

Acknowledgments

Declaration of Interest

References

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders DSM - 5*. Washington, D C: American Psychiatric Association. https://doi.org/10.1176/appi.books.9780890425596

Asuquo, O. O. (2011). A rationalization of an African concept of life, death and the hereafter. *American Journal of Social and Management Sciences*, *2*(1), 171 - 175. https://doi.org/10.5251/ajsms.2011.2.1.171.175

Becker, E. (1973). *The Denial of Death*. New York: The Free Press.

Byock, I. (2002). The Meaning and Value of Death. *Journal of Palliative Medicine*, *5*(2), 279 - 288. https://doi.org/10.1089/109662102753641278

Crist, A. (2018). A Hermeneutic Approach to Pain: Gadamer on Pain, Finitude, and Recovery. *Journal of Applied Hermeneutics, Article*, *10*, 1 - 11.

Dadfar, M., & Lester, D. (2017). Religiously, Spirituality and Death Anxiety. *Austin Journal of Psychiatry and Behavioural Sciences*, *4*(1), 1061.

Dobrosavljev, D. (2002). Gadamer's hermeneutics as practical philosophy. *Philosophy, Sociology and Psychology*, *2*(9), 605 - 618.

Dreyfus, H. (1991). *Being-in-the-world: A commentary on Heidegger's Being and Time, Division I*. Cambridge, Ma: MIT Press.

Finlay, L. (2009). Debating phenomenological research. *Phenomenology & Practice*, *3*(1), 6 - 25.

Firestone, R. E., & Catlett, J. (2016). *Beyond death anxiety: Achieving life-affirming death awareness*. New York: Springer Publishing Company.

Frankl, V. (1986). *The Doctor and the Soul*. trans. Richard and Clara Winston. New York: Vintage Books.

Fuchs, T., & Pallagrosi, M. (2018). 'Phenomenology of Temporality and Dimensional Psychopathology'.

Springer International Publishing AG, part of Springer Nature 2018, 287- 300. https://doi.org/10.1007/978-3-319-78202-7_10

Gadamer, H-G. (1996). *The enigma of health: The art of healing in a scientific age* (J. Gaiger & N. Walker, Trans.). Stanford, CA: Stanford University Press.

Heidegger, M. (1962). *Being and Time*. trans. John Macquarrie and Edward Robinson. New York: Harper Collins.

Heidegger, M. (1976). *What Is Called Thinking? (Trans. Fred D. Wieck and J. Glenn Gray)* New York: Harper.

Holtmaat, K., van der Spek, N., Lissenberg-Witte, BI, Cuijpers, P., & Verdonck-de Leeuw, IM. (2018). Positive mental health among cancer survivors: overlap in psychological well-being, personal meaning, and posttraumatic growth. *Support Care Cancer,* https://doi:org 10.1007/s00520-018-4325-8.

Jirásek, I., Oborný, J., & Hurych, E. (2018). The authentic and inauthentic sport in the hermeneutic and phenomenological perspectives. *Acta Facultatis Educationis Physicae Universitatis Comenianae*, *58*(1), 1 - 11. https://doi.org/10.2478/afepuc-2018-0001

Kafle, N. P. (2013). Hermeneutic phenomenological research method simplified. *Bodhi: An Interdisciplinary Journal*, *5*(1), 181 - 200. https://doi.org/10.3126/bodhi.v5i1.8053

Keyes, C. L. M. (2005). Mental Illness and/or Mental Health? Investigating Axioms of the Complete State Model of Health. *Journal of Consulting and Clinical Psychology*, *73*(3), 539 - 548. https://doi.org/10.1037/0022-006X.73.3.539

Kübler-Ross, E., & Kessler, D. (2005). *On grief and grieving: Finding the meaning of grief through the five stages of loss*. New York, N.Y.: Scribner.

Laverty, S. M. (2003). Hermeneutic phenomenology and phenomenology: A comparison of historical and methodological considerations. *International Journal of Qualitative Methods*, *2*(3), 21 - 35. https://doi.org/10.1177/160940690300200303

Malet, P. M. (2013). Attestation and response: Reflection from a hermeneutical phenomenology of capabilities. *Trans/Form/Ação*, *36*(1), 137 – 164. https://doi.org/10.1590/S0101-31732013000100009

Marava. (2015). African Philosophy on the Concept of Time and Its Influence on the View of Death and Afterlife – A Zimbabwean Perspective. *International Journal of Philosophy and Theology*, *3*(2), 87 - 97.

Mbiti, J. S. (1969). *African Religions and Philosophy*. London: Heinemann.

Nicholl, E., Loewenthal, D., & Gaitanidis, A. (2016). 'What meaning does somebody's death have, what meaning does somebody's life have?' Psychotherapists' stories of their work with suicidal clients. *British Journal of Guidance & Counselling*, *44*(5), 598 - 611. https://doi.org/10.1080/03069885.2015.1089430

Njoku, F.O.C. (2002). *Essays in African Philosophy, Thought and Theology*. Owerri: Clacom,

Nzioka, C. (2000). The social meanings of death from HIV/AIDS: An African interpretative view. *Culture, Health & Sexuality*, *2*(1), 1 - 14. https://doi.org/10.1080/136910500300831

Pashak, T. J., Justice, M. D., Burns, B. R., Lahar, K. L., Handal, P. J. & Creech, C. (2018). Separation of Church and Trait: Trait Death Anxiety is Universal, Distressing, and Unbuffered by Worldview in Emerging Adults. *Journal of Religion and Health*, 1 - 18. https://doi.org/10.1007/s10943-018-0623-1

Peters, L., Cant, R., Payne, S., O'Connor, M., McDermott. F., Hood, K., Morphet, J., & Shimoinaba, K. (2013). How death anxiety impacts nurses' caring for patients at the end of life: A review of literature. *Open Nursing Journal*, *7*, 14 - 21.

Rice, J. (2009). *The relationship between humor and death anxiety*. Department of Psychology, Missouri Western State University.

Ryff, C. D., & Singer, B. (1998). The contours of positive human health. *Psychological Inquiry*, *9*(1), 1 - 28. https://doi.org/10.1207/s15327965pli0901_1

Sloan, A., & Bowe, B. (2014). Phenomenology and hermeneutic phenomenology: The philosophy, the methodologies, and using hermeneutic phenomenology to investigate lecturers' experiences of curriculum design. *Quality & Quantity*, *48*(3), 1291- 1303. https://doi.org/10.1007/s11135-013-9835-3

Tillich, P. (1959). The eternal now. In: Feifel, H (Ed): *The Meaning of Death*. New York: McGraw-Hill.

Trisel, B. A. (2015). Does Death Give Meaning to Life? *Journal of Philosophy of Life, 5(2), 62 -81.*

van Manen, M. (2007). Phenomenology of practice. *Phenomenology & Practice*, *1*(1), 11 - 30.

Wango, G. M. (2013). *A Synchronic Hermeneutic Phenomenological approach to Counselling Psychology in Contemporary Traditional Societies*. Nairobi: University of Nairobi.

Wango, G. M. (2015). *Counselling Psychology in Kenya: A Contemporary Review of the Developing World*. Nairobi: Kenya Literature Bureau.

Young, J. (2003). *The Death of God and the Meaning of Life.* London: Routledge.

Zisook, S., Corruble, E., Duan N., et al. (2012). The bereavement exclusion and DSM - 5. *Depress Anxiety*, *29*, 425 - 443. https://doi.org/10.1002/da.21927

Copyrights

Pilot Study on the Relationship of Test Anxiety to Utilizing Self-Testing in Self-Regulated Learning

Sophia C. Weissgerber[1] & Marc-André Reinhard[1]

[1] Institute of Psychology, University of Kassel, Holländische Str. 36-38, 34127 Kassel, Germany

Correspondence: Sophia C. Weissgerber, Institut für Psychologie, Universität Kassel, Holländische Str. 36-38, 34127 Kassel, Germany. E-mail: sophiaweissgerber@gmail.com

Abstract

Whether or not test-anxious students leverage the power of testing as potent learning tool is unclear. In a pilot study we investigated the relation of test anxiety to the utilization of testing activities and academic performance in self-regulated learning. We hypothesized that increased cognitive test anxiety would relate to less self-reported use of self-testing in favor of repetition strategies, and thus relate in turn to lower self-reported exam grades. To examine this idea, we created a scale contrasting self-testing and repetition strategies, which showed sufficient preliminary reliability and validity. The findings support our notion with respect to the cognitive interference component of test anxiety: More interference was associated with less self-testing, and the link of interference with exam grades was fully mediated by the reported degree of self-testing. Although our findings are preliminary and limited in generalizability due to small sample size and lack of factor analysis of the created scale, the results hint at one potential reason why test-anxious students may underperform. Consequently, educators might motivate their test-anxious students to rely more on effective study approaches.

Keywords: test anxiety, self-testing, testing activities, testing effect, retrieval practice, exam grades

1. Introduction

Recitation, testing-effect, practice testing, retrieval practice, and test-enhanced learning are all labels pertaining to the same remarkable memory phenomenon: actively recalling rather than passively repeating information aids in long-term retention (e.g., McDaniel, Roediger, & McDermott, 2007). Consequently, retrieval beats restudying, and implications are clear: learners should apply re-testing instead of re-reading when information is to be remembered long-term. From a practical point of view, the phenomenon's effectivity (meta-analytic average weighted $g = .61$; Adesope, Trevisan, & Sundararajan, 2017; $g = .50$; Rowland, 2014) and broad applicability to educational settings makes it a promising candidate to boost learning throughout all educational sectors (Roediger & Karpicke, 2006).

The testing-effect is empirically-well supported and robust across varying study conditions (e.g. with and without feedback; Adesope, Trevisan, & Sundararajan, 2017). Although some researchers argue that testing is not beneficial for complex materials (Van Gog & Sweller, 2015), this concern is not shared by others (Karpicke & Aue, 2015). Even transfer and deductive inferences can be fostered under certain circumstances (Eglington & Kang, 2016; Smith & Karpicke, 2014). Moreover, testing holds indirect advantages, such as monitoring what has and has not been learned to guide future studying (Dunlosky, Kubat-Silman, & Hertzog, 2003), and it facilitates the acquisition of future material (Pastötter & Bäuml, 2014). Consequently, multiple researchers emphasize testing's value for learning, and they advocate a move away from a means of formal assessment to a potent learning tool (e.g. McDaniel, Roediger, & McDermott, 2007; Roediger, Agarwal, Kang, & Marsh, 2010).

The advantage of testing however can be attenuated when testing is accompanied with performance pressure during retrieval (Hinze & Rapp, 2014), and the mnemonic effectivity seems to be reduced for learners with test-anxiety ((Tse & Pu, 2012). *Test anxiety* as state and/or trait phenomenon occurs before and during test-taking (for a review see Zeidner, 2014) and encompasses negative *physio-emotional* and cognitive reactions like *worry* (concerns about one's test performance), *lack of confidence* (low self-expectations), and *interference* (intrusive and disturbing thoughts that disrupt task-specific information processing; cf. Hodapp, Rohrmann & Ringeisen, 2011). To which degree learners with test anxiety may choose to utilize the testing effect in their self-directed studying has not yet been directly investigated.

Research on the testing-effect has only recently begun to stimulate an interest in self-regulated aspects of learning. Within this new research avenue, the link of engaging in testing activities to academic achievement is underexplored. The integration of test anxiety's influence on the link between self-testing (Note 1) and achievement is pending. Thus, it is not only unclear to which degree students with higher levels of test anxiety use self-testing, but also how this translates to their academic achievement. Until now, this relationship was *indirectly* covered by broader research on learning strategies, without explicitly focusing on self-testing. The goal of the present study is to twofold. First, we aim to directly investigate whether test anxiety relates to the self-reported use of self-testing activities. Second, we examine whether and how test-anxiety may be related to exam performance via self-testing activities.

1.1 Effectivity and Use of Testing in Self-Regulated Contexts

The benefits of testing for personal learning may be crucially tied to the learner itself, because when organizing the 'how-to' of studying, the learner may insufficiently apply self-testing. Students learning activities often involve extensive highlighting and underlining, note taking, summary writing, and frequent re-reading (e.g. Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Hartwig & Dunlosky, 2012). The activities also encompass flashcards, quizzes, answering test questions, solving exercise problems, and completing practice exams (e.g. Karpicke, Butler, & Roediger, 2009). Both sets of activities can be seen to reflect a decision to either repeat or retrieve information, and of course, repetition and testing are often alternated. Moreover, retrieval or testing is often used to check one's understanding (Karpicke, Butler, & Roediger, 2009). Which of these study approaches do students report to utilize more, and how does it affect memory and performance?

Self-testing in flashcard-style is favored over re-reading for simple materials (Wissman, Rawson & Pyc, 2012) and a half-half split was effective for memory (Kornell & Son, 2009). Students often start self-testing later in the learning phase and stop prematurely, which negatively affected long-term memory, while repetitions were unrelated (Karpicke, 2009). For more complex content, re-rereading is the most frequent strategy (Karpicke, Butler, & Roediger, 2009). Self-testing (quizzes/practice testing) is also applied (Kornell & Bjork, 2007), although the amount varies up until a half-half split (Bartoszewski & Gurung, 2015; Susser & McCabe, 2013). Nevertheless, self-testing is never the prime method. While greater levels of self-testing with practice problems and quizzes were positively related to higher academic achievement (Gurung, 2005; Hartwig & Dunlosky, 2012; Morehead, Rhodes, & DeLozier, 2016), re-reading was not (Bartoszewski & Gurung, 2015). Note, the association of self-testing and academic achievement was weak; nevertheless, a reduced frequency of self-testing in favor of re-reading should decrease its merit for learning and achievement. The question then arises: How might test anxiety affect decisions for self-testing or repetition activities and achievement?

1.2 Test Anxiety, Study Strategies, and Academic Performance

If a learning situation is seen as threatening by test anxious-students, they may adopt rote learning (Fransson, 1977) and less deep learning (Helmke & Tuyet, 1999). Deep learning strategies foster a thorough understanding, while surface learning strategies aid rote learning (e. g. Biggs, 2003). Deep-learning can be linked to better grades (Zhang, 2000; but see also Campbell & Cabrera, 2014). Moreover, direct detrimental effects of test anxiety on performance have been shown by a plethora of studies (Hembree, 1988; Seipp, 1991; overall $r = -.20$.). Thereby, the meta-analytic association between performance and worry ($r = -.29$) is much stronger than between performance and emotionality ($r = -.15$; Seipp, 1991). The cognitive aspects of test-anxiety play an important role in the explanation of the negative anxiety-performance link: either short-term by working memory impairments in the test situation or by mechanism unfolding long-term like avoidance of evaluative situations and study deficits (cf. Carey, Devine, & Szücs, 2016), as described in the following.

1.3 Test Anxiety's Influence on the Use and Effectivity of Self-testing and Achievement in Self-Regulated Learning

Test anxiety is characterized by a propensity for higher degrees of worry, self-doubt, and interfering thoughts. If a highly test-anxious learner is engaging in self-testing, older interference accounts postulate cognitive impairments by intrusive worries evoked during the self-test situation, which hinder retrieval (Sarason, 1980) and attentional allocation (Wine, 1971). Newer accounts hold that trait test anxiety interferes with attentional control (Eysenck, Derakshan, Santos, & Calvo, 2007) and efficient cognitive processing in working memory, especially with inhibition (Berggren & Derakshan, 2013). Since self-testing entails retrieval practice and retrieval itself is impaired by unwarranted thoughts and worries due to working memory taxation (Hayes, Hirsch, & Mathews, 2008), retrieval practice itself becomes less effective, if not compensated by higher working-memory capacity (Tse & Pu, 2012; Owen, Stevenson, Hadwin, & Norgate, 2012). Simultaneously, interfering thoughts reduce the cognitive capacity available to work on the test problems at hand, acting like

extraneous cognitive load leaving less working-memory capacity to the processing of the concurrent learning task (Richard, French, Keogh, & Carter, 2000; Sweller, Ayres, & Kalyuga, 2011). Moreover, test anxiety can negatively impact performance by greater distractibility to task−irrelevant material (Keogh & French, 200; Unsworth, Spillers, Brewer, & McMillan, 2011). Deficient attentional and cognitive processing as well as increased distractibility therefore reduce the efficiency in performing the ongoing self-testing activity. Cognitive processing inefficacy may go along with greater retrieval problems and difficulties to correctly answer test questions, which may stimulate premature termination of self-testing.

Experiences difficulties or incorrect answers can feed negatively into self-perceptions (Schunk & Ga, 1982), triggering avoidance motivations with respect to the failure-inducing activity (Heimpel, Elliot, & Wood, 2006; McGregor & Elliot, 2002). The result would be a lower propensity to engage in further self-testing and to switch to other learning strategies, such as repetition (Wittmaier, 1972). For example, some studies have demonstrated that highly test anxious learner study extensively but often use highly repetitive activities that are less effective (Cassady, 2004; Culler & Holohan, 1980).

The adoption of less effective study habits intersects with deficit accounts (Birenbaum, & Nasser, 1994; Naveh-Benjamin, McKeachie & Lin, 1987), which emphasize impairments related to domain-specific abilities and study habits in the learning phase (for a discussion of deficits during test preparation phase see also Cassady, 2004). The initial acquisition of the learning content is lessened due to cognitive interference when uncompensated by higher abilities, impairing conceptual encoding and representations of the learning materials (Mueller & Courtois, 1980; Naveh-Benjamin, 1991). The consequence is a deficient mastery of the content (Birenbaum & Pinku, 1997), which would be revealed in future self-tests. As students often use self-testing to diagnose their learning instead of improving it (Kornell & Son, 2009), the subsequent utilization of self-testing would heighten one's meta-cognitive awareness of poor learning. For test-anxious students, increased meta-cognitive awareness could heightening the saliency of failure, which may be experienced as an aversive cognition. The meta-cognitive awareness of a potentially upcoming failure intensifies the threat-potential to one's self-efficacy and thus lowers motivation to self-test to protect one's self-concept (Hancock, 2010; Roick & Ringeisen, 2017). In this respect, learners with lower competence expectations for successful performance tend to adopt avoidance goals perceiving evaluative situations as threatening events to be avoided (Cassady, 2004). "The perception of a testing event as threatening impacts student performance in the preparation phase generally through the engagement of ineffective preparatory strategies driven by feelings of helplessness, attempts to avoid or reduce the occurrence of failure […]. Naturally, ineffective strategies during the preparation phase will lead to eventual failure in test performance." (Cassady, 2004, p. 572).

As the previous literature on self-testing and memory suggests, premature termination and insufficient use or processing efficiency as well as avoidance of self-testing lowers its effect on memory and performance. This is especially detrimental, as highly test-anxious students would need, as compensation, higher frequencies of self-testing rather than less. A deficient mastery of the learning contents may perpetuate lower domain-specific abilities (Cassady & Johnson, 2002), feeding into further avoidance of test events.

In summary, the previous argumentation stresses deficits related to the cognitive component of test-anxiety (interference, worries, low confidence). On the one hand, it suggests that test anxiety may be associated with cognitive deficits during self-testing. On the other hand, it suggests that text anxiety is associated with further deficits in the study approach (for example, an avoidance of self-testing, premature termination of self-testing and the use of repetition strategies). Therefore, the effectivity of self-testing and the degree of usage as a study strategy should be related to the cognitive component of test anxiety. Less usage and an underutilization or adoption of alternative repetition approaches should be negatively related to exam performance. We hypothesize the following: 1) students with higher levels of cognitive test anxiety should be less prone to use self-testing as personal study strategy; 2) students with higher levels of cognitive test anxiety should have worse exams grade due to decreased self-testing (mediation).

To examine our hypotheses, we created a scale that covers the various ways (e.g., collaborative testing) that students might apply testing when learning; there was no ready-to-use instrument since the exploration of testing in self-regulated learning is a new research line. Thus, like the few existing surveys on the use of testing as personal learning tool, we had to create our own items. We constructed the items in line with the scheme of laboratory research, contrasting the testing condition with the repetition condition (e.g., re-reading or summaries). Although we were inspired by existing items in previous surveys (see Introduction), we had to compile or own, because not all formulations were specific enough, for example, 'make and use flashcards,' or 'do practice problems' (Susser & McCabe, 2013) does not specify the use as a test tool. 'Use' could also be understood as

inscribing flashcards with short summaries to re-read. 'Do' does not exclude the option of preparing with worked-out practice problems that are already solved (like case studies).

2. Method

2.1 Participants and Procedure

Participants ($N = 81$; 27 males; average age of 23.62, $SD = 4.97$; 60% were in the 2nd semester/freshman) signed up for a study advertised to be about learning strategies, personality, and exam grades via the internal study platform (SONA) at the University of Kassel (Germany). After registration, participants received an internal online link to the survey platform, where participants completed the survey. Almost all participants were psychology students ($n = 73$) and were compensated with partial course credit.

At the beginning, participants were asked to list all exams they completed in the previous semester, which was intended to help students to remember their study behaviors; they were also asked to record the achieved exam grades at the end of the study. We then inquired about learning strategies via our constructed self-testing scale (ST-scale, see below), followed by other items (e.g., generation, spaced/interleaved learning), which we included for distraction (and for reasons not relevant to the present study: replication of a previous published relationship of NFC and goals orientations with learning activities by the first author). Thereafter, items of the German Learning Strategy Inventory LIST (Schiefele & Wild, 1994) followed, which served to validate our newly constructed scale. We embedded the measurement of students' test anxiety (PAF; Hodapp, Rohrmann & Ringeisen, 2011) within other questionnaires (e.g. need for cognition, goal orientations). Finally, we listed all exams participants had indicated at the beginning of the study. We emphasized that it is important for the study to completely and truthfully enter received exam grades, or to indicate if the grade was not yet known to them. The survey concluded with demographic questions.

2.2 Measures

Self-testing scale (STS). We constructed various items to assess the degree to which students used self-testing or relied on re-reading/non-testing activities (see Table 1 in the Appendix for the items; Cronbach's $\alpha = .76$). For example, "I used quiz and exercise questions at the end of a chapter to… A) re-read the respective text passage B) simulate an exam." All items were measured on 7-point scales (-3 = only A, -2 = mostly A, -1 = rather A, 0 = A equally as B, 1 = rather B, 2 = mostly B, 3 = only B) with an additional answer option of 'neither A nor B' (coded as missing). The items were constructed to contrast two learning strategies: A(= repetition/non-testing) and B(= self-testing) mirroring experimental research contrasting rereading or other activities (e.g. note-taking: Rummer, Schweppe, Gerst, & Wagner, 2017) with testing (cf. Kornell, Rabelo, & Klein, 2012). Due to some of the items being reversely formulated, they were recoded in a way that -3 to -1 represented the degree of re-reading/non-testing, while 1 to 3 represented the degree of self-testing. Zero served as the midpoint and represented the use of both strategies to a similar extent. The items were presented in randomized order in one block.

German Learning Strategy Inventory (LIST). The inventory (Wild & Schiefele, 1994) distinguishes three groups of strategies – cognitive, metacognitive, and resource management strategies, which are comprised of several subscales: organization ($\alpha = .83$), elaboration ($\alpha = .81$), repetition ($\alpha = .63$), planning ($\alpha = .77$), monitoring ($\alpha = .66$), regulation ($\alpha = .78$), effort ($\alpha = .70$), time management ($\alpha = .86$), and joint learning ($\alpha = .87$). All items were measured on 5-point scales (1 = very seldom, 5 = very often). Psychometric properties were described by Wild and Schiefele (1994).

Test anxiety (PAF). We used the German version of the test anxiety inventory (PAF; Hodapp, Rohrmann & Ringeisen, 2011), which encompasses four facets: Lack of confidence ($\alpha = .89$), worry ($\alpha = .82$), emotionality ($\alpha = .89$), interference ($\alpha = .83$). All items were answered on 4-point scales (1 = almost never to 4 = almost always). The psychometric properties are described by Hodapp, Rohrmann, and Ringeisen (2011).

Exam grades. Exam grades ranged from 1.0 (A+), 1.3(A), 1,7 (A-) and so forth to 4.0 (D-); 5.0 (F) as a failing grade was recoded to 4.3 to preserve the mathematical distance between grades.

For each person, we computed the mean grade of all reported exam grades to represent the averaged exam performance in this semester. Note, most of the samples had completed three ($n = 39$) or four ($n = 11$) exams, while 13 students had not completed any exams in the previous semester and therefore did not report any exam grades. The most frequently reported exams were developmental psychology ($n = 38$), general psychology ($n = 42$), and quantitative methods ($n = 43$).

3. Results

Prior to testing our hypotheses, we examined the validity of our newly created scale on the use of self-testing versus repetition/non-testing. We correlated (two-tailed) the sub-scales of the established learning strategy inventory (LIST; Wild & Schiefele, 1994) with our created instrument. It would speak to the scale's validity to observe a) a negative relationship with the LIST-subscale of repetition and b) a positive relationship to the sub-scales of monitoring and regulation, because students often use testing for monitoring reasons (Kornell & Son, 2009), which can help to regulate their learning (Fernandez & Jamet, 2017) as well as c) no relationship to organization, planning, or study time, which are aspects that tap more into management and scheduling. The results support the convergent and discriminant validity of our scale (see Table 1). We found the negative correlation with repetition ($r = .37$, $p < .001$) and the anticipated positive correlations with monitoring ($r = .48$, $p < .001$) and regulation ($r = .23$, $p < .05$). Our repetition vs. self-testing scale was not related to organization, planning, or study time, all ps = ns. Like the monitoring ($r = -.46$, $p < .001$).   The regulation ($r = -.43$, $p < .001$) sub-scale (related to testing aspects) of the established inventory and our ST-scale ($r = -.42$, $p < .001$) were both associated with the averaged exam performance as outcome variable; the coefficients are comparable in size and direction, supporting the criterion validity.

Table 1. Bivariate Correlations, Means, and Standard Deviations of the Self-Testing Scale (STS) and the Learning Strategy Inventory (LIST)

	Variable	1	2	3	4	5	6	7	8	9	10	11	M	SD
1.	STS ($N = 81$)	--											0.46	0.75
2.	Organization ($N = 81$)	.10	--										3.15	0.82
3.	Elaboration ($N = 76$)	.32**	.16	--									3.45	0.63
4.	Repetition ($N = 76$)	-.35**	.02	-.25*	--								3.36	0.60
5.	Planning ($N = 81$)	.06	.26*	.07	.18	--							3.37	0.67
6.	Monitoring ($N = 76$)	.47***	.35**	.26*	-.12	.06	--						3.26	0.61
7.	Regulation ($N = 81$)	.24*	.40***	.25*	.14	.15	.56***	--					3.83	0.55
8.	Effort ($N = 76$)	.22†	.27*	.20†	.14	.14	.42***	.59***	--				3.58	0.61
9.	Time ($N = 76$)	.00	.14	.01	.09	.59***	.07	.12	.19†	--			2.67	1.00
10.	Peer learning ($N = 76$)	.22†	.23*	.09	-.26*	.26*	.36***	.14	.12	.28*	--		2.89	0.76
11.	Grades ($N = 64$)	-.42***	-.07	-.17	.21	-.34**	-.46***	-.43***	-.40**	-.47***	-.43***	--	2.30	0.85

Note. Bivariate correlation coefficients are based on Spearman's Rho. † $p = .10$, * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed). Grades: higher numbers denote worse averaged exam grades.

Given a satisfactory reliability (Note 2) score of $\alpha = .76$ and support for internal validity, we scrutinized the relationship between test anxiety, learning strategies, and exam performances. Table 2 shows the correlations (two-tailed) of the test-anxiety inventory and all test anxiety sub-scales with our self-testing scale (ST-scale) and its association with the averaged exam grades achieved. In line with Hypothesis 1, test anxiety indeed related to the degree to which students reported to utilize self-testing as a learning strategy: Overall increased levels of test-anxiety covary with a decreased use of self-testing in favor of repetition/non-testing strategies, $r = -.23$, $p < .05$. When considering the sub-dimensions of test anxiety, as expected, the interference component was moderately and negatively related to the ST-scale, $r = -.40$, $p < .001$, explaining 20% of the variance in the

degree of reported self-testing. The more interference is experienced, the less self-testing is chosen as a learning strategy. The subscales worry, $r = -.15$, $p = .18$, and lack of confidence, $r = -.18$, $p = .12$, were not related to the ST-scale. On a descriptive level, however, they also show a similar trend. The subscale of emotionality was not associated with the ST-scale, $r = -.04$, $p = .72$.

Table 2. Bivariate Correlations, Means, and Standard Deviations of Test Anxiety Inventory, Test Anxiety Sub-scales, Self-Testing Scale (STS) and Averaged Exam Grades

	Variable	1	2	3	4	5	6	7	M	SD
1.	Test anxiety inventory [a] (N = 80)	--							2.34	0.36
2.	Test anxiety inventory [b] (N = 80)	.94***	--						2.22	0.53
3.	Lack of confidence (N = 80)	.43***	.63***	--					2.43	0.70
4.	Worry (N = 80)	.71***	69***	.28*	.--				2.70	0.64
5.	Emotionality (N = 80)	.77***	.83***	.56***	.34**	--			2.08	0.76
6.	Interference (N = 80)	.64***	.75***	.63***	.29**	.49***	--		1.88	0.63
7.	STS (N = 80)	-.23*	-.24*	-.18	-.15	-.04	-.40***	--	0.46	0.75
8.	Grades (N = 64)	-.02	.02	.13	-.05	-.14	.26*	-.42***	--	2.30	0.85

Note. Bivariate correlation coefficients are based on Spearman's Rho. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed). Grades: higher numbers denote worse averaged exam grades. [a] Test anxiety inventory (Hodapp, Rohrmann & Ringeisen, 2011) with all 4 sub-scales. [b] Test anxiety inventory without the sub-scale lack of confidence, because some models on the link of anxiety and performance see low competence as a cause of test anxiety and low performance (Carey, Hill, Devine, & Szücs, 2016).

When considering the relationship of test anxiety and learning approaches to the performance criteria, we found that the undifferentiated test anxiety inventory was unrelated to the averaged achieved exam grades in the previous semester, $r = -.02$, $p = .87$. Notably, when considering all subscales, only cognitive interference was associated with exam performances, $r = .26$, $p < .05$. As postulated, the more interference is experienced during exam preparation, the worse the averaged exam performances. However, unlike expectations, the cognitive components of worry and lack of confidence showed no associations. Thus, only the interference component will be considered for Hypothesis 2.

Hypothesis 2 assumes a mediational model by which the cognitive aspects of test anxiety, the ST-scale, and the exam performances are all intertwined. In accordance with this notion, a regression analyses with anxiety-driven interference should predict the degree to which self-testing is reported as a learning strategy during the exam preparation. In turn, the used learning approach should predict the average achieved exam performances (see Figure 1). Conducting regression analyses and a Zobel-test (Note 3), we examined whether a full or partial mediation model was supported.

First, we tested all direct effects: The direct effect of interference on the ST-scale (mediator) was significant, $B = -.43$, $t(78) = -3.57$, $p < .001$, 95% CI [-.68, -.19], $sr^2 = .14$; Model 1, $F(1, 78) = 12.77$, $p < .001$, $R^2 = .14$. The direct effect of the ST-scale (mediator) on averaged exam performances was also significant, $B = -.46$, $t(62) = -3.37$, $p = .001$, 95% CI [-.74, -.19], $sr^2 = .15$; Model 2, $F(1, 62) = 11.37$, $p = .001$, $R^2 = .16$. Similarly, the direct effect of interference on averaged exam grade was significant, too, $B = .35$, $t(62) = 2.16$, $p < .05$, 95% CI [.03, .68], $sr^2 = .07$; Model 3, $F(1, 62) = 4.68$, $p < .05$, $R^2 = .07$.

Second, we tested whether a full or partial mediation model was supported by looking at the direct effect of the interference sub-scale when controlling for the mediator ST-scale. We found that the direct effect of the

interference sub-scale on averaged exam performance is rendered non-significant, $B = .19$, $t(61) = 1.14$, $p = .26$, 95% CI [-.14, .52], $sr^2 = .02$, Model 4, $F(2, 61) = 6.37$, $p < .01$, $R^2 = .17$, when controlling for the mediator ST-scale in the regression model. In contrast, the effect of the mediator ST-scale remained significant, $B = -.40$, $t(61) = 2.75$, $p < .01$, 95% CI [-.70, -.11], $sr^2 = .10$, Model 4, $F(2, 61) = 6.37$, $p < .01$, $R^2 = .17$.

The pattern of results suggested full mediation, supported by the Sobel-test statistic (Soper, 2018), $Z_{Sobel} = 2.24$, $p = .026$ (two-tailed). Higher reported levels of anxiety-induced interference are associated with lower degrees of reported self-testing, which is associated with worse academic achievement (represented by averaged exam grades in this semester). Consequently, Hypothesis 2 was partly supported with respect to the cognitive interference component (but not worry or lack of confidence).
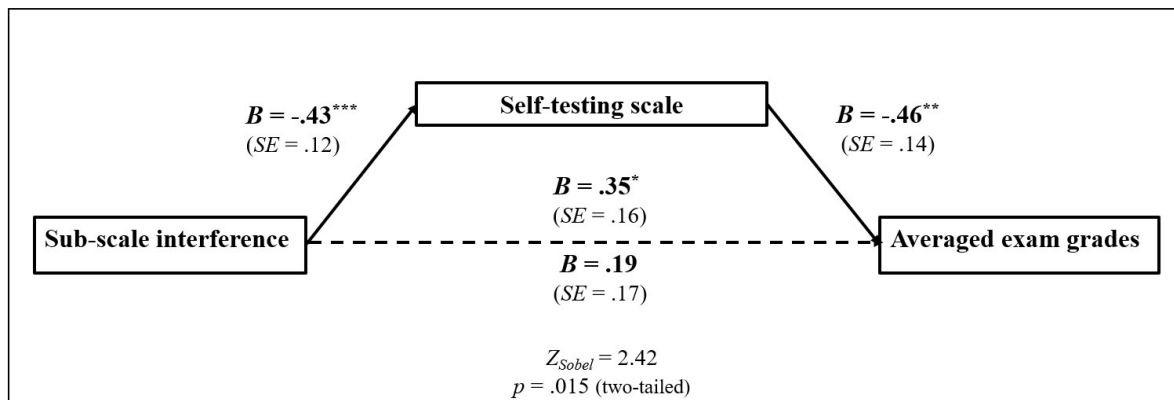

Figure 1. Full mediation of test anxiety induced interference on averaged exam grades by self-testing. Self-testing scale: higher number represent more self-testing. Averaged exam grade left in its original form: higher numbers denote to worse exam grades. With respect to averaged exam grades, $n = 62$.

4. Discussion

Is test anxiety related to the degree of utilizing self-testing strategies (e.g., practice problems, mock exams, collaborative testing, retrieval practice) and achieved exam grades in self-regulated learning? We argued that cognitive aspects of test anxiety go along with multiple deficits while self-testing (cf. interference accounts; e.g. Eysenck, Derakshan, Santos, & Calvo, 2007) and throughout the learning phase (cf. deficit models, e.g. Birenbaum, & Nasser, 1994), in line with processual accounts (cf. Cassady, 2004). In short, cognitive interference while self-testing may reduce processing efficiency, for example by imposing an unfavorable cognitive load on working memory or deficient attentional regulation. Retrieval difficulties and errors as self-concept threatening meta-cognitive feedback of may lead to premature termination and an avoidance of self-testing. Moreover, worries and low competence beliefs in evaluative situations also trigger avoidance reactions of the anxiety inducing activity (self-testing). Consequently, students are less prone to use self-testing and may switch to less anxiety-evoking strategies like repetition, which may not prove as effective.

Based on the rationale above, we predicted that students with higher levels of cognitive test anxiety should report less utilization of self-testing as a personal learning strategy (H1) and as a result, report worse exams grades (H2). Supporting our notion, we found that test-anxious students with higher levels of cognitive interference reported less usage of self-testing and lower averaged exam grades. This relationship was fully mediated, meaning the reduced frequency of self-testing relative to less efficient activities like repetition accounted for the lower exam grades by higher anxiety-related interference. The reduced frequency of self-testing in favor of other activities may be one mechanism underlying the negative test anxiety-performance link.

We did not find a significant relationship between self-testing and the cognitive component lack of confidence nor between self-testing and the cognitive component of worry. This may be due to the small sample size and/or that these components of test anxiety may play a lesser role with less sizable influences. The small sample size is also a caveat with respect to the newly constructed scale, which was not sufficient to conduct factor analyses to explore its structure. However, the scale preliminarily shows sufficient reliability and good discriminant and convergent validity. The obtained relationship of our scale with averaged exam grades can also be interpreted as an indication of predictive validity. A deficient instrument would not meaningfully relate to the expected relationships. Although the scale has room for improvement, it demonstrates construct validity. The creation of this instrument was necessary, because no instrument exists (to our knowledge) that specifically focused on a

variety of self-testing activities (e.g., quizzes/flashcards/test problems/mock exams/practice tests/collective testing) relative to repetition/non-testing activities students may use when learning.

An aspect worth mentioning concerns the replication of the association between self-testing and academic achievement in real-world educational settings. So far, few studies have assessed how self-testing with quizzes/practice problems and flashcards related to GPA (see introduction: Hartwig & Dunlosky, 2012; Morehead, Rhodes, & DeLozier, 2016). However, GPA reflects cumulated achievements for various academic performances, like essays, for which self-testing may not be useful. It is possible, therefore, that the effect of self-testing on GPA is underestimated. Actual exam grades may be more accurate, which to date, have barely been examined. In line with this idea, we found a stronger association ($r^2 = .18$) when comparing our obtained association to the previous studies with GPA (Hartwig & Dunlosky, 2012: $r^2 \approx .08$; Morehead et al. 2016: $r^2 \approx .03$) and exam performance in introductory courses (Gurung, 2005; Bartoszewski & Gurung, 2015; both $r^2 \approx .08$). A comparison of both correlations indicates a small difference of Cohen's $q = .17$ (Cohen, 1988). We sampled a wider range of exam performances and included multiple aspects (e.g., collaborative testing; Wissman & Rawson, 2018), with more specific questions about the use of self-testing. This may have potentially contributed to the improved association. However, it also could be simply methodologic (e.g., we have a small and homogenous sample of a selective group).

The (meta-analytic) weighted mean effect size g of testing compared to re-studying is .51, stemming from regulated contexts like laboratory or classroom (Adesope et al., 2017). A transformation of our obtained r to d yields $\approx .93$ (Cohen, 1988). Interestingly, the effect of self-testing may be higher in self-regulated learning contexts than in regulated contexts. To put it another way, for personal learning, self-testing could be even more important, but this is preliminary.

Another flaw of the present study concerns the correlational nature and the reliance on self-report: Students' retrospective judgments about learning activities may not accurately represent actual learning but remembered learning. Maybe test anxiety influences the remembered degree of self-testing and not the actual use. It is therefore necessary to observe actual choices of test-anxious students and effects on performance criteria, especially with respect to establishing the causal influence of the mediator. Nevertheless, the study is an important, albeit limited, attempt to explore whether test anxiety negatively influences the use of self-testing activities and academic achievements in self-regulated learning.

This notion is interesting for theoretical and practical reasons, for example, theoretically with respect to meta-cognitions. While students often tend towards overconfidence, this bias seems to be reduced in test-anxious students leaning towards under confidence (Miesner & Maki, 2007). This may have interesting consequences for calibration accuracy and ongoing meta-cognitive processes and subsequent self-regulation decisions (e.g., change study strategy, spent less time, etc.). Think-aloud protocols could help to illuminate dynamics between meta-cognitions and study decisions (cf. Fernandez & Jamet, 2017). These self-regulation processes may be one cause for the well-established negative test anxiety-performance link, which speaks to the practical reasons: advising students with test anxiety about how to improve their test preparation and their test-taking skills.

Intervention could entail encouragement to utilize self-testing for those with deficient study habits or desensitization/habituation to testing situations for a reduction of cognitive interference (Mowbray, 2012; Naveh-Benjamin, 1991). Promising training programs, coaching, or therapies in groups or individual settings exist and use biofeedback, relaxation, or skill-building interventions (for an overview see Von der Embse, Barterian & Segool, 2013), as well as mindfulness techniques (Carsley, Heath, & Fajnerova, 2015).

Could the decreased motivation to use self-testing on their own by test-anxious students be counteracted by making testing an integral part of a course? In the classroom, Agarwal and colleugues (2016) showed that practice testing can be especially advantageous for students with lower working memory. While Brewer and Unsworth (2012) did not obtain a moderation by working memory capacity, they found that weaker students with lower memory abilities and lower general-fluid intelligence profited more from testing (but see also Pan, Pashler, Potter, & Rickard, 2015). Moreover, Messineo, Gentile, and Allegra (2015) showed that the negative link of test anxiety on performance in class is stronger for re-reading materials; thus, re-testing acted as a buffer for more test anxious students. Testing must take place, however, under low-threat conditions, such as low performance pressure (Khanna & Cortese, 2016).

It may be worthwhile to offer voluntary, ungraded self-testing options, for example, by e-learning as an integral part of a course, and to encourage its usage by those with a propensity to avoid self-testing. In this respect, the benefits of self-testing should be emphasized for test-anxious students: Repeated low-stakes testing can help to

habituate to the testing situation and reduce test anxiety (e.g. Nyroos, Schéle & Wiklund-Hörnqvist, 2016). In conclusion, students and instructors would both be well-advised to increase the frequency of testing activities.

References

Adesope, O. O., Trevisan, D. A., & Sundararajan, N. (2017). Rethinking the use of tests: A meta-analysis of practice testing. *Review of Educational Research, 87,* 659–701. https://doi.org/10.3102/0034654316689306

Agarwal, P. K., Finley, J. R., Rose, N. S. & Roediger, H. L. (2016). Benefits from retrieval practice are greater for students with lower working memory capacity, *Memory,* 25(6), 764–771. https://doi.org/10.1080/09658211.2016.1220579

Bartoszewski, B. L., & Gurung, R. A. R. (2015). Comparing the relationship of learning techniques and exam score. *Scholarship of Teaching and Learning in Psychology*, *1*(3), 219–228. https://doi.org/10.1037/stl0000036

Berggren, N., & Derakshan, N. (2013). Attentional control deficits in trait anxiety: why you see them and why you don't. *Bio Psychology, 92(3),* 440–446. https://doi.org/10.1016/j.biopsycho.2012.03.007

Biggs, J. (2003). *Teaching for quality learning at University* (2nd ed.). London: The Society for Research into Higher Education & Open University Press.

Birenbaum, M., & Nasser, F. (1994). On the relationship between test anxiety and performance. *Measurement and Evaluation in Counseling and Development, 27,* 293–301. https://doi.org/10.1016/j.sbspro.2011.04.372

Birenbaum, M. & Pinku, P. (1997). Effects of test anxiety, information organization, and testing situation on performance on two test formats. *Contemporary Educational Psychology, 22,* 23–38. https://doi.org/10.1080/096582196388960

Brewer, G. A., & Unsworth, N. (2012). Individual differences in the effects of retrieval from long-term memory. *Journal of Memory and Language, 66,* 407–415. https://doi.org/10.1016/j.jml.2011.12.009

Campbell, C. M., & Cabrera, A. F. (2014). Making the mark: Are grades and deep learning related? *Research in Higher Education*, *55*(5), 494–507. https://doi.org/10.1007/s11162-013-9321-8

Carey, E., Hill, F., Devine, A., & Szücs, D. (2016). The chicken or the egg? The direction of the relationship between mathematics anxiety and mathematics performance. *Frontiers in Psychology*, *6*, 1–6. https://doi.org/10.3389/fpsyg.2015.01987

Carsley, D., N, Heath, L. & Fajnerova, S. (2015). Effectiveness of a classroom mindfulness coloring activity for test anxiety in children. *Journal of Applied School Psychology, 31,* 239–255. https://doi.org/10.1080/15377903.2015.1056925

Cassady, J. C. (2004). The impact of cognitive test anxiety on text comprehension and recall in the absence of external evaluative pressure. *Applied Cognitive Psychology, 18*(3), 311–325. https://doi.org/10.1002/acp.968.

Cassady, J. C., & Johnson, R. E. (2002). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology*, *27*(2), 270–295. https://doi.org/10.1006/ceps.2001.1094.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Dunlosky, J., Kubat-Silman, A. K., & Hertzog, C. (2003). Training monitoring skills improves older adults' self-paced associative learning. *Psychology and Aging*, *18*(2), 340–345. https://doi.org/10.1037/0882-7974.18

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14*(1), 4–58. https://doi.org/10.1177/1529100612453266

Eglington, L. G., & Kang, S. H. K. (2016). Retrieval practice benefits deductive inference. *Educational Psychology Review, 30(1),* 215–228. https://doi.org/10.1007/s10648-016-9386-y

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion, 7*, 336–353. https://doi.org/10.1037/1528-3542.7.2.336

Fernandez, J. & Jamet, E. (2017). Extending the testing effect to self-regulated learning. *Metacognition Learning, 12,* 131–156. https://doi.org/10.1007/s11409-016-9163-9

Fransson, A. (1977). On qualitative differences in learning: IV-effects of intrinsic motivation and extrinsic test anxiety on process and outcome. *British Journal of Educational Psychology*, *47*(3), 244–257. https://doi.org/10.1111/j.2044-8279.1977.tb02353.x

Gurung, R. A. R. (2005). How do students really study (and does it matter)? *Teaching of Psychology, 32,* 367–372.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis.* (2nd Ed.). New York: The Guilford Press.

Hayes, S., Hirsch, C., & Mathews, A. (2008). Restriction of working memory capacity during worry. *Journal of Abnormal Psychology, 117,* 712–717. https://doi.org/10.1037/a0012908.

Hancock, D. R. (2010). Effects of test anxiety and evaluative threat on students' achievement and motivation. *The Journal of Educational Research*, *94*(5), 284–290. https://doi.org/10.1080/00220670109598764

Hartwig, M. K., & Dunlosky, J. (2012). Study strategies of college students: Are self-testing and scheduling related to achievement? *Psychonomic Bulletin & Review*, *19*(1), 126–134. https://doi.org/10.3758/s13423-011-0181-y

Heimpel, S. A., Elliot, A. J., & Wood, J. V. (2006). Basic personality dispositions, self-esteem, and personal goals: An approach-avoidance analysis. *Journal of Personality*, *74*(5), 1293–1320. https://doi.org/10.1111/j.1467-6494.2006.00410.x

Helmke, A., & Tuyet, V. T. A. (1999). Do Asian and Western students learn in different way? An empirical study on motivation, study time, and learning strategies of German and Vietnamese university students. *Asia Pacific Journal of Education*, *19*(2), 30–44. https://doi.org/10.1080/0218879990190204

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research*, *58*(1), 47–77. https://doi.org/10.3102/00346543058001047

Hinze, S. R., & Rapp, D. N. (2014). Retrieval (sometimes) enhances learning: Performance pressure reduces the benefits of retrieval practice. *Applied Cognitive Psychology, 28*(4), 597–606. https://doi.org/10.1002/acp.3032

Hodapp, V., Rohrmann, S. and Ringeisen, T. (2011). *Prüfungsangstfragebogen PAF-S. Hogrefe Verlag, Gottingen.*

Karpicke, J. D. (2009). Metacognitive control and strategy selection: Deciding to practice retrieval during learning. *Journal of Experimental Psychology: General*, *138*(4), 469–486. https://doi.org/10.1037/a0017341

Karpicke, J. D., & Aue, W. R. (2015). The testing effect is alive and well with complex materials. *Educational Psychology Review,27,* 317–326. https://doi.org/10.1007/s10648-015-9309-3

Karpicke, J. D., & Blunt, J. R. (2011). Retrieval practice produces more learning than elaborative studying with concept mapping. *Science*, *331(6018)*, 772–775. https://doi.org/10.1126/science.1199327

Karpicke, J. D., Butler, A. C., & Roediger, H. L. (2009). Metacognitive strategies in student learning: Do students practise retrieval when they study on their own? *Memory*, *17*(4), 471–479. https://doi.org/10.1080/09658210802647009

Khanna, M. M., & Cortese, M. J. (2016). The benefits of quizzing in content-focused versus skills-focused courses. *Scholarship of Teaching and Learning in Psychology, 2(1),* 87–97. https://doi.org/10.1002/acp.968

Keogh, E., Bond, F. W., French, C. C., Richards, A. & Davis, R. E. (2004). Test anxiety, susceptibility to distraction and examination performance. *Anxiety, Stress & Coping, 17(3)*, 241–252. https://doi.org/10.1080/10615300410001703472

Kornell, N., & Bjork, R. A. (2007). The promise and perils of self-regulated study. *Psychonomic Bulletin & Review*, *14*(2), 219–224. https://doi.org/10.12691/education-5-8-5

Kornell, N., & Son, L. K. (2009). Learners' choices and beliefs about self-testing. *Memory*, *17*(5), 493–501. https://doi.org/10.1080/09658210902832915

McDaniel, M. A., Roediger, H. L., & McDermott, K. B. (2007). Generalizing test-enhanced learning from the laboratory to the classroom. *Psychonomic Bulletin & Review*, *14*(2), 200–206. https://doi.org/10.3758/BF03194052

McGregor, H. A., & Elliot, A. J. (2002). Achievement goals as predictors of achievement-relevant processes prior to task engagement. *Journal of Educational Psychology, 94(2),* 381–395.

https://doi.org/10.1037/h0043445

Messineo, L., Gentile, M., & Allegra, M. (2015). Test-enhanced learning: analysis of an experience with undergraduate nursing students. *BMC Medical Education, 15,* 182. https://doi.org/10.1186/s12909-015-0464

Miesner, M. T. & Maki, R. H. (2007). The role of test anxiety in absolute and relative metacomprehension accuracy. *European Journal of Cognitive Psychology,* 650–670. https://doi.org/10.1080/09541440701326196

Morehead, K., Rhodes, M. G., & DeLozier, S. (2016). Instructor and student knowledge of study strategies. *Memory*, *24*(2), 257–271. https://doi.org/10.1080/09658211.2014.1001992

Mowbray, T. (2012). Working memory, test anxiety and effective interventions: a review. *The Australian Educational and Developmental Psychologist*, *29*(02), 141–156. https://doi.org/10.1017/edp.2012.16

Mueller, J. H., & Courtois, M. R. (1980). Test anxiety and breadth of encoding experiences in free recall. *Journal of Research in Personality*, *14*(4), 458–466. https://doi.org/10.1016/0092-6566(80)90004-5

Naveh-Benjamin, M. (1991). A comparison of training programs intended for different types of test-anxious students: Further support for an information-processing model. *Journal of Educational Psychology*, *83*(1), 134–139. https://doi.org/10.1037/0022-0663.83.1.134

Naveh-Benjamin, M., McKeachie, W. J., & Lin, Y.-g. (1987). Two types of test-anxious students: Support for an information processing model. *Journal of Educational Psychology*, *79*(2), 131–136. https://doi.org/10.1037/0022-0663.79.2.131

Nyroos, M., Schele, I., & Wiklund-Hornqvist, C. (2016). Implementing Test Enhanced Learning: Swedish Teacher Students' Perception of Quizzing. *International Journal of Higher Education, 5(4),* 1–12. https://doi.org/10.5430/ijhe.v5n4p1

Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2014). When does anxiety help or hinder cognitive test performance? The role of working memory capacity. *British Journal of Psychology, 105*(1), 92-101. https://doi.org/10.1111/bjop.12009

Pastötter, B., & Bäuml, K.-H. T. (2014). Retrieval practice enhances new learning: the forward effect of testing. *Frontiers in Psychology*, *5*, 1–5. https://doi.org/10.3389/fpsyg.2014.00286.

Pan, S. C., Pashler, H., Potter, Z. E., Rickard, T. C. (2015). Testing enhances learning across a range of episodic memory abilities. *Journal of Memory and Language, 83,* 53–61. https://doi.org/10.1016/j.jml.2015.04.001

Richards, A., French, C. C., Keogh, E. & Carter, C. (2000). Test-Anxiety, inferential reasoning and working memory load. *Anxiety, Stress & Coping, 13(1),* 87-109. https://doi.org/10.1080/10615800008248335

Roediger, H. L., Agarwal, P. K., McDaniel, M. A., & McDermott, K. B. (2011). Test-enhanced learning in the classroom: Long-term improvements from quizzing. *Journal of Experimental Psychology: Applied*, *17*(4), 382–395. https://doi.org/10.1037/a0026252

Roediger, H. L., & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, *17*(3), 249–255. https://doi.org/10.1111/j.1467-9280.2006.01693.x

Roick, J., & Ringeisen, T. (2017). Self-efficacy, test anxiety, and academic success: A longitudinal validation. *International Journal of Educational Research*, *83*, 84–93. https://doi.org/10.1016/j.ijer.2016.12.006

Rowland, C. A. (2014). The effect of testing versus restudy on retention: A meta-analytic review of the testing effect. *Psychological Bulletin*, *140*(6), 1432–1463. https://doi.org/10.1037/a0037559

Sarason, I. G. (1980). *Test anxiety*. Hillsdale, N.J.: L. Erlbaum Associates.

Schunk, H. D.,& Gaa, J. P. (1981). Goal-setting influence on learning and self-evaluation. *The Journal of Classroom Interaction,16*(2),38-44. https://doi.org/10.1080/10573560390143094

Seipp, B. (1991). Anxiety and academic performance: A meta-analysis of findings. *Anxiety Research*, *4*(1), 27–41. https://doi.org/10.1080/08917779108248762

Smith, M. A., & Karpicke, J. D. (2014). Retrieval practice with short-answer, multiple-choice, and hybrid tests. *Memory, 22,* 784–802. https://doi.org/10.1080/09658211.2013.831454

Soper, D.S. (2018). Sobel Test Calculator for the Significance of Mediation [Software]. Available from http://www.danielsoper.com/statcalc

Susser, J. A., & McCabe, J. (2013). From the lab to the dorm room: Metacognitive awareness and use of spaced study. *Instructional Science, 41(2),* 345–363. https://doi.org/10.1007/s11251-012-9231-8.

Sweller, J., Ayres, P. L., & Kalyuga, S. (2011). *Cognitive load theory.* New York: Springer.

Tse, C.-S., & Pu, X. (2012). The effectiveness of test-enhanced learning depends on trait test anxiety and working-memory capacity. *Journal of Experimental Psychology: Applied*, 18(3), 253–264. https://doi.org/10.1037/a0029190

Unsworth, N., Spillers, G. J., Brewer, G. A., & McMillan, B. (2011). Attention control and the antisaccade task: A response time distribution analysis. *Acta Psychologica, 137,* 90–100. https://doi.org/10.1016/j.actpsy.2011.03.004

Van Gog, T., & Sweller, J. (2015). Not new, but nearly forgotten: the testing effect decreases or even disappears as the complexity of learning materials increases. *Educational Psychology Review, 27, 247–264.* https://doi.org/10.1007/s10648-015-9310-x

von der Embse, N., Barterian, J., & Segool, N. (2013). Test anxiety interventions for children and adolescents: A systematic review of treatment studies from 2000–2010. *Psychology in the Schools, 50,* 57–71. https://doi.org/10.1002/pits.21660

Wild, K.-P. & Schiefele, U. (1994). Lernstrategien im Studium: Ergebnisse zur Faktorenstruktur und Reliabilität eines neuen Fragebogens. *Zeitschrift für Differentielle und Diagnostische Psychologie, 15,* 185–200. https://doi.org/10.1026/0049-8637.37.1.17

Wine, J. (1971). Test anxiety and direction of attention. *Psychological Bulletin*, *76*(2), 92–104. https://doi.org/10.1037/10037-000

Wissman, K. T., & Rawson, K. A. (2018). Collaborative testing for key-term definitions under representative conditions: Efficiency costs and no learning benefits. *Memory & Cognition, 46(1), 148–157* https://doi.org/10.3758/s13421-017-0752-x

Wissman, K. T., Rawson, K. A., & Pyc, M. A. (2012). How and when do students use flashcards? *Memory*, *20*(6), 568–579. https://doi.org/10.1080/09658211.2012.687052

Wittmaier, B. C. (1972). Test anxiety and study habits. *The Journal of Educational Research*, *65*(8), 352–354. https://doi.org/10.2466/pr0.1967.20.3.975

Zeidner, M. (2014). *Test anxiety: The state of the art.* Heidelberg: Springer.

Zhang, L. F. (2000). University students' learning approaches in three cultures: An investigation of Biggs's 3P model. *The Journal of Psychology*, *134*(1), 37–55. https://doi.org/10.1080/00223980009600847

Notes

Note 1. Self-testing in this paper refers to students' use of activities that check one's understanding and mastery of the learning content and/or practicing retrieval of the content from memory.

Note 2. Since only a limited number of participants signed-up and participated, we regret not being able to perform factor analyses to test the structure of the scale. We think however that this pilot study entails interesting findings worth not to vanish in a file-drawer, especially given the scarce literature on test anxiety and (self-)testing.

Note 3. For readers preferring the mediation test statistics with the SPSS PROCESS procedure version 3.0 (Hayes, 2018), see Appendix Table 2 to Table 6.

Appendix

Table 1. Items of the Self-testing Scale (STS)

Self-testing items	Mean (SD)	Frequency			
		more repetition	equal	more testing	neither
1. To remember learning content of classes/slides/texts… A I repeatedly re-read (or listened/or watched) the learning contents …B I repeatedly tested myself regarding the learning contents	-.04 (1.22)	28	30	23	0
2. To remember the subject matter, I…A…(re-) copied the important contents multiple times and created summaries. B…rehearsed the important contents from memory over and over again	0.21 (1.49)	23	32	26	0
3. For my exam preparation, I met with fellow students or learning groups, to…A…check the contents and the understanding of the subject matter. B…share the reprocessing of the material to several persons **(R)**	1.90 (1.20)	2	2	46	21
4. For my exam preparation, I met with fellow students or learning groups, to…A…exchange learning materials and to complete contents. B…reciprocally test ourselves regarding the learning contents	0.21 (1.70)	20	20	23	18
5. For my exam preparation, I met with fellow students or learning groups, to…A…collate the contents and its understanding. B…split die material to several persons for a joint summary **(R)**	2.08 (.89)	0	3	57	21
6. To memorize the subject matter, I…A…repeated and re-read summaries, slides and relevant passages as much as possible. B…created my own exercise and exam questions and answered them	-0.99 (1.45)	43	19	9	0
7. I used flashcards, to…A…re-read the content multiple times. B…retrieve the contents from memory repeatedly	0.94 (1.37)	6	17	36	27
8. I used test- and exercise questions at the end of a chapter, to…A…re-read the concerning text passage as repetition. B…simulate an examination	0.31 (1.44)	23	15	32	11
9. I used test- and exercise questions at the end of a chapter, that did not have any solution or right answers, to…A…create and write down the correct answers directly based on the text. B…test my understanding without consulting the text while answering the questions	0.66 (1.32)	12	17	33	19
10. I prepared for the exam by…A…repeating slides, important texts, or exercises as much as possible. B…checking my understanding of the slides, texts or exercises with several tests	-0.82 (1.32)	49	18	12	2
11. I learned by…A…solving test questions, exercises or previous exams. B…memorizing correct answers of test question, exercises or previous	0.78 (1.50)	9	24	43	5

exams questions **(R)**					
12. Quizzes and mock exams …A I used during studying for actual learning of the materials …B I used after studying to check my mastery over the materials	0.62 (1.47)	17	22	42	0
13. In my exam preparation, I…A…worked through many similar and preferably known exercises to memorize the solutions. B…solved many different and preferably unknown exercises to check my understanding	0.53 (1.40)	18	20	35	8
14. Questions, exercises or tests about the subject matter…A…I read B…I solved myself	0.74 (1.48)	14	22	45	0
15. I used the model answers of test questions …A…to compare my own answers with the model answers. B…learn the model answers by heart (R)	0.89 (1.34)	8	17	50	6

Note. Items were translated into English by the authors and originally in German language. The (R) indicates items that were reversely phrased. Higher numbers reflected self-testing, while lower numbers reflected repetition/non-testing, the 0 of the scale meant both strategies were used equally often.

Mediation analyses by PROCESS procedure

Reported values below based on the PROCESS procedure by Hayes (2018).

Table 2. Regression of the Interference Sub-Scale Predicting Scores on the Self-testing Scale (STS)

Dependent variable STS

Variable	B	SE B	t	p	95 % CI
Constant	1.22	.27	4.51	.000	.67, 1.76
Interference	-.40	.14	-3.01	.004	-.67, -.14

Note. $F(1, 62) = 9.07$, $p < .01$, $R^2 = .13$

Table 3. Regression of the Interference Sub-Scale and STS predicting Averaged Exam Grades

Dependent variable Averaged Exam Grades

Variable	B	SE B	t	p	95 % CI
Constant	2.11	.36	5.84	.000	1.39, 2.83
Interference	.19	.17	1.14	.257	-.14, .52
ST-scale	-.4	.15	-2.75	.008	-.70, -11

Note. $F(2, 61) = 6.37$, $p < .01$, $R^2 = .17$; averaged exam grades is left in its original form with higher values meaning worse grades.

Table 4. Total Effect of Interference on Averaged Exam Grades

B	SE B	t	p	95 % CI
.35	.16	2.16	.034	.03, .68

Table 5. Direct Effect of Interference on Averaged Exam Grades

B	SE B	t	p	95 % CI
.19	.17	1.14	.257	-.14, .52

Note. Averaged exam grades are left in its original form with higher values meaning worse grades.

Table 6. Indirect Effect of Interference on Averaged Exam Grades via STS

B	Boot SE	Boot 95 % CI
.16	.17	.04, .32

Note. Bootstrapping based on 10000 samples. Averaged exam grades are left in its original form with higher values meaning worse grades.

Reviewer Acknowledgements

International Journal of Psychological Studies wishes to acknowledge the following individuals for their assistance with peer review of manuscripts for this issue. Their help and contributions in maintaining the quality of the journal are greatly appreciated.

International Journal of Psychological Studies is recruiting reviewers for the journal. If you are interested in becoming a reviewer, we welcome you to join us. Please find the application form and details at http://recruitment.ccsenet.org and e-mail the completed application form to ijps@ccsenet.org.

Reviewers for Volume 10, Number 4

Angelique Anne Scharine, U.S. Army Research Laboratory, United States

Anjolii Diaz, Ball State University, United States

Daniel Mateos-Moreno, University of Karlstad, Sweden

Duhita Mahatmya, George Mason University, United States

Duston Morris, University of Central Arkansas, United States

Gary Popoli, Stevenson University, United States

Haibin Li, University of Sydney, Australia

Joey Man Yee Kwok, California Southern University, United States

Julia Penn Shaw, SUNY - Empire State College, United States

Julie Campbell, Illinois State University, United States

Karen Murphy, Griffith University, Australia

Mei-Hsiang Tsai, National University of Tainan, Taiwan

Mickey Langlais, University of Nebraska – Kearney, United States

Mihaela Rus, Ovidius University, Romania

Tsu-chia Julia Hsu, Lunghwa University of Science and Technology, Taiwan

Call for Manuscripts

Published by the Canadian Center of Science and Education, *International Journal of Psychological Studies (IJPS)* is an international, double-blind peer-reviewed, open-access journal with both print and online versions. *IJPS* encourages high-quality submissions. In order to carry out our non-discrimination principles, we use a double-blind system of peer review. *IJPS* covers the entire spectrum of research including the following topics: general psychology, cognitive psychology, neuropsychology, developmental psychology, educational psychology, as well as social psychology. The journal is published in both printed and online versions.

We are seeking submissions for forthcoming issues. All manuscripts should be written in English. Manuscripts from 3000–8000 words in length are preferred. All manuscripts should be prepared in MS-Word format, and submitted online, or sent to: ijps@ccsenet.org

Paper Selection and Publishing Process

a) Upon receipt of a submission, the editor sends an e-mail of confirmation to the submission's author within one to three working days. If you fail to receive this confirmation, your submission e-mail may have been missed.

b) Peer review. We use a double-blind system for peer review; both reviewers' and authors' identities remain anonymous. The paper will be reviewed by at least two experts: one editorial staff member and at least one external reviewer. The review process may take two to three weeks.

c) Notification of the result of review by e-mail.

d) If the submission is accepted, the authors revise paper and pay the publication fee.

e) After publication, a PDF version of the journal is available for download on the journal's website, free of charge.

Requirements and Copyrights

Submission of an article implies that the work described has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the authorities responsible where the work was carried out, and that, if accepted, the article will not be published elsewhere in the same form, in English or in any other language, without the written consent of the publisher. The editors reserve the right to edit or otherwise alter all contributions, but authors will receive proofs for approval before publication.

Copyrights for articles are retained by the authors, with first publication rights granted to the journal. The journal/publisher is not responsible for subsequent uses of the work. It is the author's responsibility to bring an infringement action if so desired by the author.

More Information

E-mail:　ijps@ccsenet.org

Website:　ijps.ccsenet.org

Paper Submission Guide:　http://ijps-author.ccsenet.org

Recruitment for Reviewers:　http://recruitment.ccsenet.org

International Journal of Psychological Studies
Quarterly