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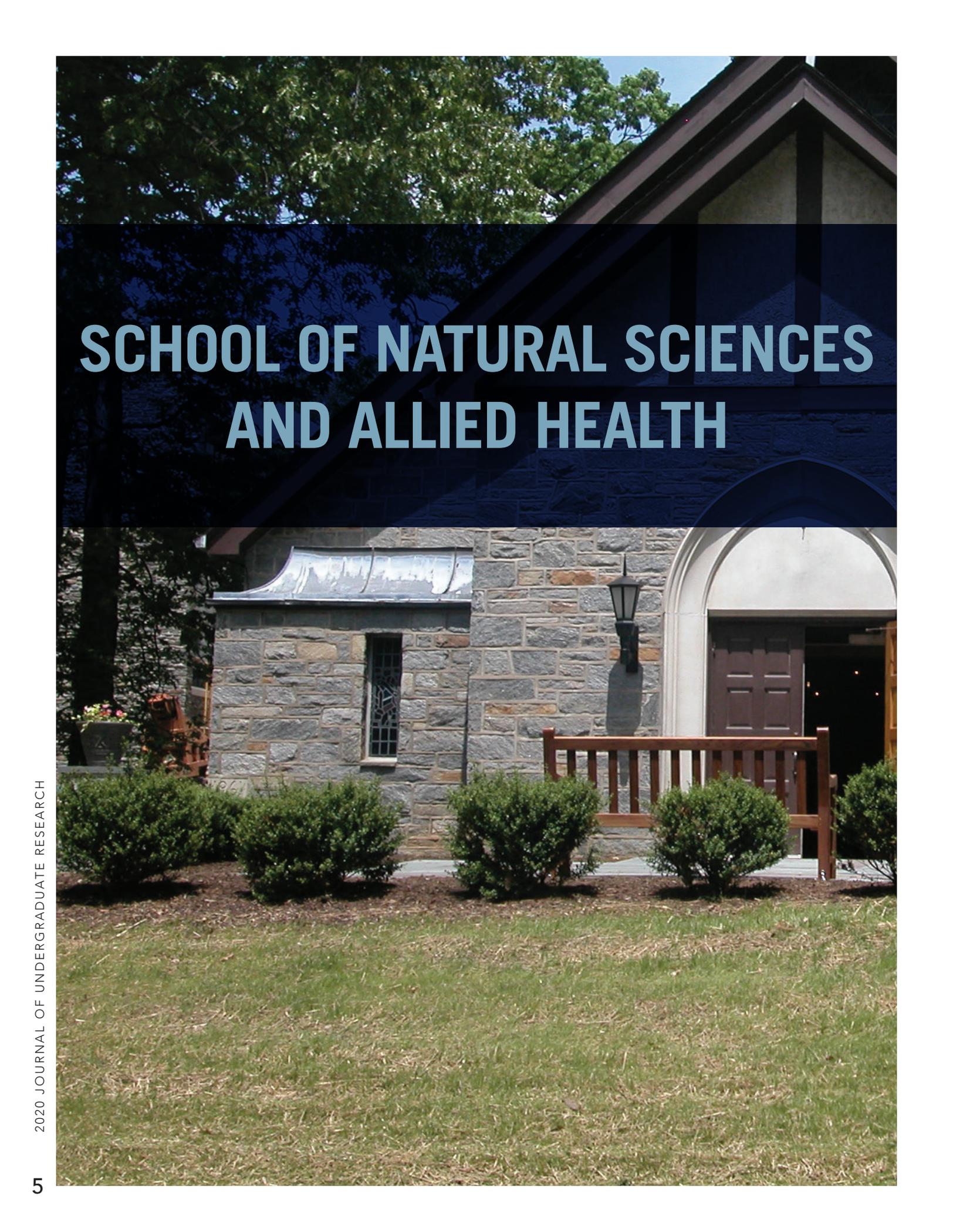
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SCHOOL OF NATURAL SCIENCES AND ALLIED HEALTH

Development of a flow cytometry assay to investigate the antimicrobial effects of protein
extracts purified from *Eisenia hortensis* on the bacterium *Micrococcus luteus*

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Abstract

The objective of this preliminary investigation was to develop a flow cytometry protocol to study the effects on both cell morphology and viability after treatment with a crude antimicrobial protein extract isolated from the earthworm *Eisenia hortensis* using the bacterium *Micrococcus luteus*. The extract was prepared and concentrated using ammonium sulfate precipitation, dialysis, and filtration. Previous results in the lab using this protein extract showed susceptibility to the antimicrobial properties using disk-diffusion and tube-dilution methodologies using *M. luteus* grown in Mueller-Hinton agar and tryptic soy broth, respectively. This study used flow cytometry to monitor changes in cellular morphology using forward scatter (FSC) measurements in a time- and dose-dependent manner following exposure to the protein extract. Propidium iodide (PI), a fluorescent viability dye that binds to DNA, was used to investigate cell death by measuring changes in relative fluorescence intensity detected by the FL-2 photodetector in the flow cytometer. Significant changes in cell size (FSC) and viability (PI uptake) ($p < 0.05$) were observed after exposure to the protein extract at 0.5 mg/ml after 60 minutes. An expected finding was a significant number of cells showed a decrease in FSC after treatment (small cells), consistent with shrinkage associated with cell death. Unexpectedly, there was also a shift in the geometric mean in the FSC of the remaining cell subpopulation not corresponding to the small cell category. Experiments are underway to incorporate deoxyribonuclease following extract exposure to determine if DNA released from dying cells is responsible for apparent aggregation of cells observed in the FSC profiles of this subpopulation. Future studies will also address the minimum concentration of the antimicrobial protein extract required to facilitate cell death, and the effects on DNA integrity using electrophoresis techniques.

Introduction

Antibiotics have allowed scientists to provide treatment for various infections caused by microorganisms. However, microorganisms over the years have been able to evolve and advance in such a way that they can be resistant to antimicrobial drugs. Antimicrobial resistance is one of the most predominant issues in the environment and hospitals. Due to the over-prescription of antibiotics in the health field, microbial organisms have increasingly begun to become multi-drug resistant (Steckbeck, Deslouches, & Montelaro, 2014). Various mechanisms such as degradation of antibiotics, efflux pumps, and mutations have been increasingly observed due to the horizontal transfer of genes through plasmids and transposons which has also increased resistance (Gupta & Datta, 2019). The large spread and development of resistance has begun to

raise concern. Scientists have had to further develop antimicrobial agents and explore alternative sources so that they are still effective against the microbe despite evolutionary changes.

Through recent studies, alternative resources have been used to combat microbial organisms. Researchers have begun to incorporate CRISPR-Cas 9, bacteriophage, and antimicrobial peptides which have proven to be promising treatments against multi-drug resistant bacteria. Scientists have been able to alter DNA sequencing using CRISPR-Cas 9 to specifically target the genes responsible for drug resistance and pathogenicity (Fuente-Núñez & Lu, 2017). Bacteriophage have begun to be utilized as a source for antimicrobial treatment. Recent studies show that phage therapy has the ability to combat multi-drug resistant bacteria without causing a negative effect on the natural microflora (Harada et al., 2018). In recent studies, alternative antimicrobial agents from soil-inhabiting invertebrates have proven to be capable in providing protection against multi-drug resistant microorganisms.

Researchers have begun to explore soil-inhabitant organisms that have proven to possess natural antimicrobial properties as a therapeutic source. The antimicrobial peptides present in these organisms have aided in defense against microbial agents. Antimicrobial peptides have proven to be able to diminish inflammatory response while boosting the host's defenses against the bacterium (Steckbeck, Deslouches, & Montelaro, 2014). The fungi *Fusarium solani*, known for its cytotoxic properties, was studied to understand its broad antimicrobial and anti-inflammatory abilities (Ngwoke et al., 2019). In addition, antimicrobial peptides have been studied and analyzed in various earthworm species.

Annelids are able to colonize large and diverse areas of the environment and continue to thrive in the presence of microorganisms (Bruno, et al., 2019). Earthworms make up a large percentage of soil organisms and like all invertebrates, earthworms rely solely on non-specific

innate immunity to evade and live amongst microorganisms. The identification of features specific to the microbe is essential in activating innate immunity. The features recognized are known as microbe-associated molecular patterns (MAMPs) that bind to pattern-recognition receptors which cause the initiation of the immune response (Cook et al., 2015). Earthworms, such as *Eisenia hortensis* used in this study, have the ability to differentiate between self and non-self which makes this organism a suitable source for antimicrobial peptides. The study and understanding of earthworms have been conducted for years to understand their antimicrobial properties (Bilej, De Baetselier, & Beschin, 2000). The cytolytic activity in the coelomic fluid of *Eisenia fedida*, an earthworm closely related to *E. hortensis*, was studied and determined to cause red blood cell agglutination and inhibition of bacteria (Roch, 1979). The antimicrobial properties in the coelomic fluid is attributed to lysozyme and fetidin proteins (Cho et al., 1998). Natural antimicrobial agents have become an attractive therapy to fight against microorganisms and their ability to become multi-drug resistant.

Previous research in the Fuller-Espie lab on *E. hortensis* using a disk diffusion technique showed the inhibitory properties the protein extract exerts against *M. luteus* (Rothman, 2018). Further research using a modified tube dilution method, showed that the protein extract has inhibitory and cidal properties (Bauer, Rothman, Scarpone & Fuller-Espie, 2019). The study described in this paper used flow cytometry to explore changes in cellular morphology in the bacterium *Micrococcus luteus* after exposure to earthworm protein extracts using forward scatter (FSC) measurements in a dose and time dependent manner. FSC is a measurement used in flow cytometry to determine cell size. Cell death was also quantified using propidium iodide (PI), a fluorescent viability dye, detected by the FL2-photodetector.

Methods

A fresh subculture of *M. luteus* was aseptically prepared using the streak plate method. After streaking the bacteria onto quadrants of the Petri dish containing tryptic soy agar by serial dilution, the plate was inverted and incubated at room temperature for 2-3 days to obtain isolated colonies needed for each experiment. Using sterile technique, approximately 5 colonies of *M. luteus* were transferred to 15ml of tryptic soy broth (TSB) in a 50ml conical test tube using an inoculating loop. The broth was then placed in an aerating orbital shaker at 25°C for 16 hours. Fresh TSB was then transferred to the conical tube to produce a 1:2 dilution. The experiment was carried out in flow cytometry tubes and the time increments used to carry out this experiment were 0, 30, 60, and 90 minutes. All time increments were completed in duplicate with 0 mg/ml, 0.05 mg/ml, and 0.5 mg/ml protein extract added to the designated tubes. After transferring 250 µl of bacterial cells to each tube, phosphate buffer saline (PBS - controls) or treatments were added to obtain the desired concentrations of 0.05 mg/ml or 0.5 mg/ml of protein extract in 25 µl aliquots. After addition of PBS or treatment, the tubes were vigorously mixed on a bench-top rotating platform for their designated time periods. The tubes were then treated with 30 µl of PI (10 µg/ml) and analyzed immediately using the flow cytometer. Untreated and unstained *M. luteus* was used to adjust the forward scatter photodiode (FSC – for detection of size), the side scatter photomultiplier tube (SSC – for detection of granularity), and the FL-2 photomultiplier tube (for detection of PI) instrument settings on the flow cytometer. *M. luteus* heated to 72°C for 30 minutes and stained with PI served as the positive control for PI uptake (**Figure 1**).

Results

Two assays were conducted using exposure times of either 0 or 30 minutes (assay 1), or 0, 60, or 90 minutes (assay 2). A PI-stained heat shock sample and an unstained, untreated sample were used as controls. A forward scatter (FSC) vs side scatter (SSC) dual parameter dot plot graph was obtained and region 1 (R1) was generated to capture intact cells and to eliminate cell debris or large cellular aggregates for subsequent analysis. Using the viability dye PI, that differentiates live (PI negative) from dead (PI positive) cells, the intensity of fluorescence in R1-gated cells was measured using the FL2 photodetector (optimized for the emission spectrum of PI) where region 2 (R2) represented the cells that were PI positive (**Figure 2**).

In the first assay at time increments of 0 or 30 minutes with treatments of 0 mg/ml, 0.05 mg/ml or 0.5 mg/ml, the FSC vs SSC was captured for untreated samples and the data was very similar to treated samples for these two parameters. Similarly, no change in cell viability captured in R2 was observed at these time points and doses (**Figure 3A**). The percentage of R1-gated cells localized in R2 was analyzed using a student t-test, paired two sample for means. The treated samples at 0.05 mg/ml or 0.5 mg/ml were compared to untreated samples and no significant differences were observed (**Figure 3B**).

In the second assay, which extended the exposure times to 60 or 90 minutes but retained the doses used in the first assay, changes in FSC were observed. A noticeable shift was detected in the lower left portion of R1 after 90 minutes at 0.5 mg/ml, reflecting a decrease in cell size, a characteristic which correlates with cell death (**Figure 4**). **Figure 5** shows FSC vs SSC at 60 or 90 minutes in untreated samples with R1 generated to capture intact cells for subsequent analysis. R1-gated cells were then analyzed for relative fluorescence intensity in FL2. Decreased cell viability was confirmed by uptake of PI. After 60 or 90 minutes of treatment, significant PI uptake was measured by the FL2 detector, but only at 0.5 mg/ml (**Figure 5A**). The percentage of

R1-gated cells located in R2 was analyzed using a student t-test. Statistically significant changes were observed at 0.5 mg/ml of protein extract ($p < 0.05$) at 60 and 90 minutes (**Figure 5B**).

Notable morphological changes were observed in FSC vs SSC in the second assay at 0.5 mg/ml. The treated cells were compared to untreated cells after 90 minutes and significant changes were observed based on cell size and arrangement. In **Figure 6**, R1 represents the total population of intact cells, which was then divided into two subpopulations, R2 and R3. R2 represents cells that have decreased in size (lower FSC value) and region 3 (R3) represents cells that appear to form aggregates (higher FSC value). The values reported for R2 are based on the percent of total intact cells in R2. The values reported for R3 are based on the geometric mean of intact cells in R3. **Figure 6A** shows data after 90 minutes comparing untreated with 0.5 mg/ml. **Figure 6B** depicts a comprehensive analysis of 60 or 90 minutes at 0 or 0.5 mg/ml. At time increments of 60 and 90 minutes the percentage of cells that decreased in size in R2 was significant, correlating with the decrease in cell viability determined by PI uptake. Unexpectedly, a significant increase in the geometric mean in cells residing in R3 was observed, presumably indicative of the formation of cellular aggregates in the heterogeneous cell population.

Conclusions

At time increments of 0 or 30 minutes, no significant changes in cell viability or morphology were observed after treatment with 0.05 or 0.5 mg/ml of crude protein extract isolated from *E. hortensis*. At the 0.5 mg/ml concentration, cell viability decreased significantly after 60 or 90 minutes. A shift in FSC was observed indicating a decrease in cell size after 0.5 mg/ml treatment. There was also a shift in the geometric mean of the R3 subpopulation, most noticeably after 90 minutes. Experiments are underway to include deoxyribonuclease (DNase) to

determine if the increase in the geometric mean of FSC was due to cellular aggregates caused by dying cells, and if aggregation can be diminished with the use of DNase. The use of DNase will be used to determine if clumping occurs due to the release of DNA from dying cells and if aggregation diminishes after treatment. This addition, if proven successful, will be incorporated into the protocol for future tests. The use of microscopy will also be implemented to compare and contrast aggregation with and without DNase.

The experiments reported in this paper show that *E. hortensis* possesses antimicrobial compounds that cause cell death in *M. luteus*. The next appropriate steps would be to expand these flow cytometry methods to investigate inhibitory properties against other microorganisms that have previously displayed sensitivity by the disk diffusion and/or tube dilution methods in the Fuller-Espie lab, namely *Bacillus megaterium* and *Micrococcus roseus*. Further tests will also be carried out to identify the minimal inhibitory concentration of the protein extract needed over a longer exposure period. The crude protein extracts could also be further purified to isolate and identify more specifically the characteristics of the protein or peptide responsible for cell death. Methods including ion exchange chromatography, hydrophobic interaction chromatography and gel filtration would be appropriate for this purpose.

Acknowledgements

I would like to thank Alyssa Rothman, Anna Bauer, and Sophia Scarpone for providing the foundation needed to continue to build upon this research. I would like to thank Dr. Fuller-Espie for providing the opportunity and guidance to explore and expand my scientific career. I would like to thank Cabrini University Science Department for providing the laboratory supplies and facility needed to carry out this research.

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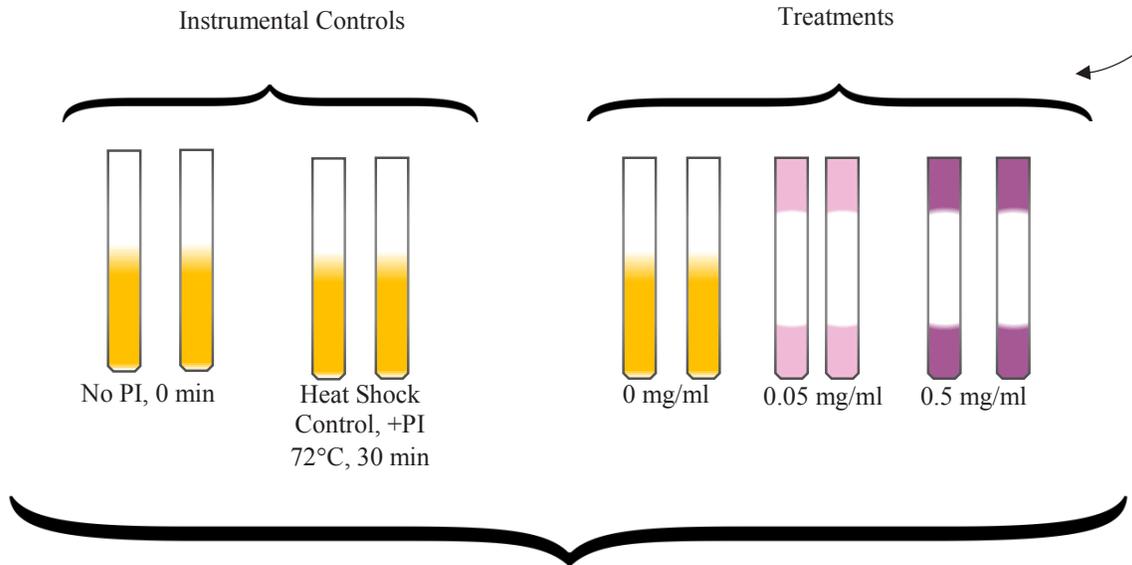
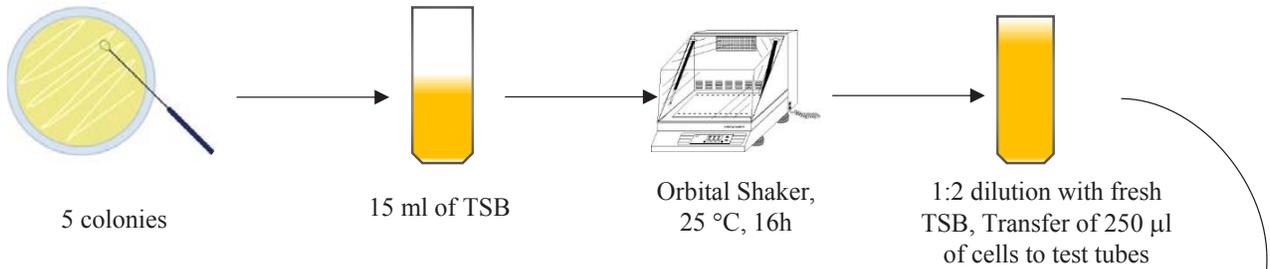
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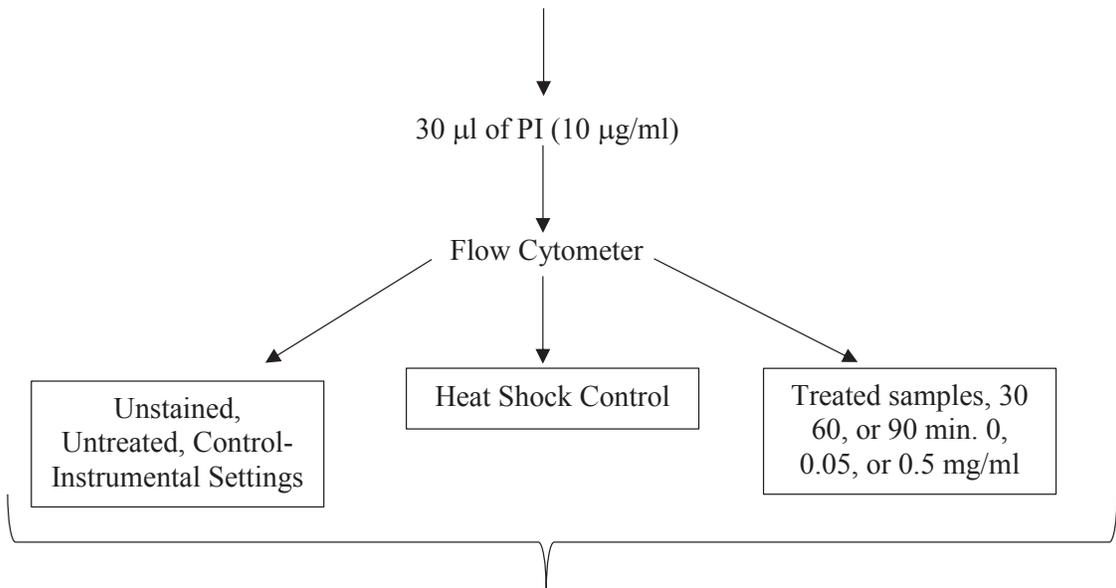
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Figures



Vigorous Mixing for 0, 30, 60 or 90 mins.



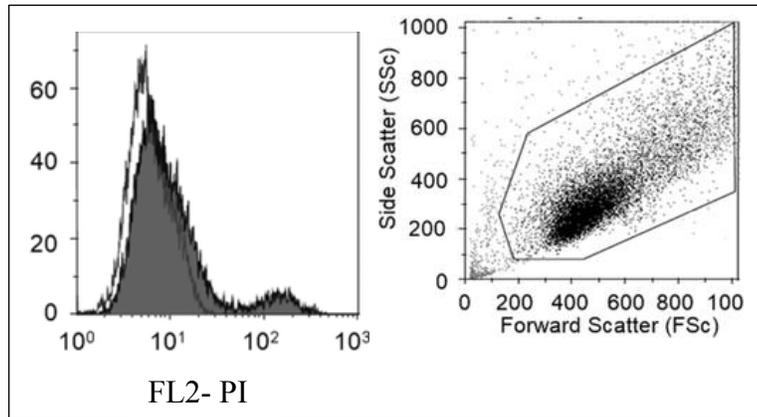


Figure 1- Experiment procedures. Five colonies of *M. luteus* were transferred to 15 ml of tryptic soy broth (TSB) in a 50 ml conical tube. The conical tube was put on an orbital shaker at 25°C for 16h. A 1:2 dilution was made using 15 ml of TSB with vigorous mixing. Each test tube was filled with 250 μ l of cells. The time increments used to carry out this experiment were 0, 30, 60, and 90 minutes. The instrument control, heat shock control, and no treatment control with and without PI were filled with 25 μ l of phosphate buffered saline. The treated tubes were filled with 25 μ l of protein extract at 0.05 mg/ml (low) or 0.5 mg/ml (high). All tubes were placed on a mixing platform for designated times. Tubes were treated with 30 μ l of propidium iodide (PI, 10 μ g/ml) and were analyzed using a flow cytometer. An analysis of the forward scatter vs side scatter was completed to determine size change and granularity respectively. An FL2 detector was used to analyze uptake of the viability dye (PI) after treatment.

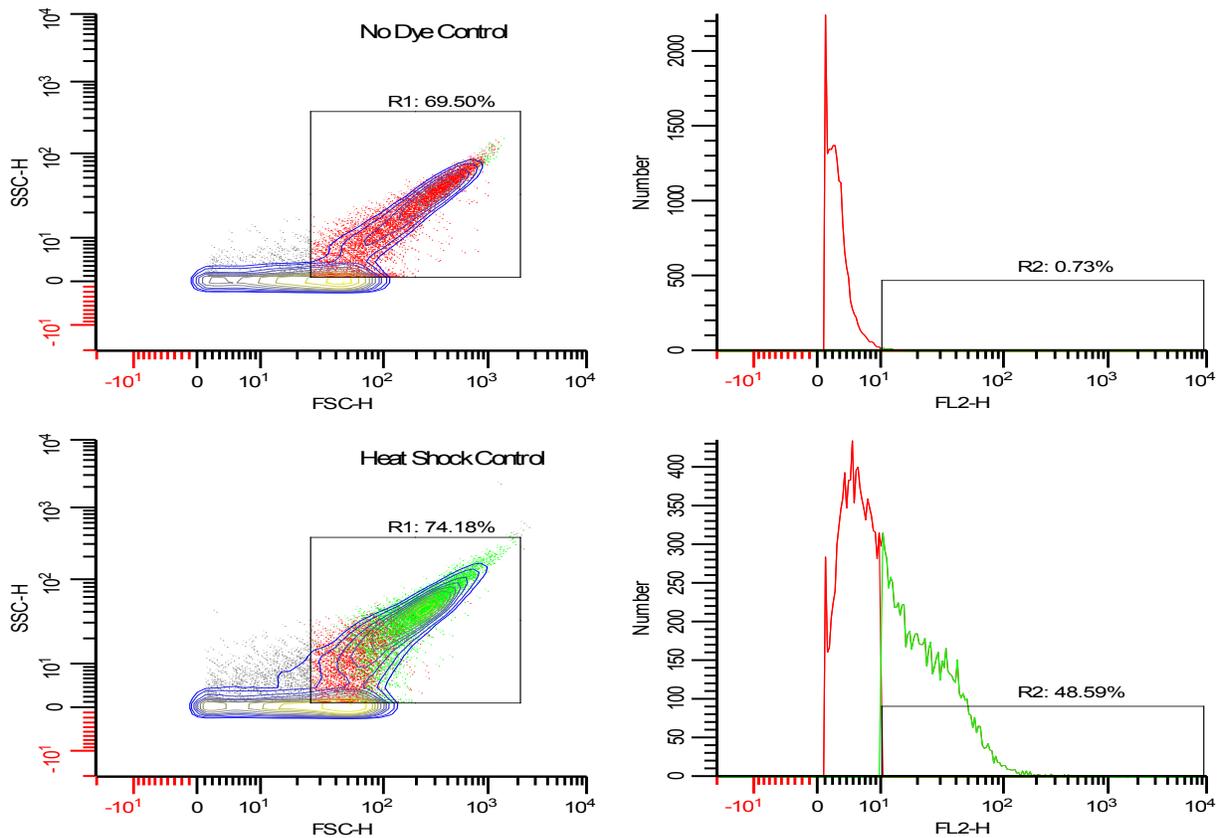
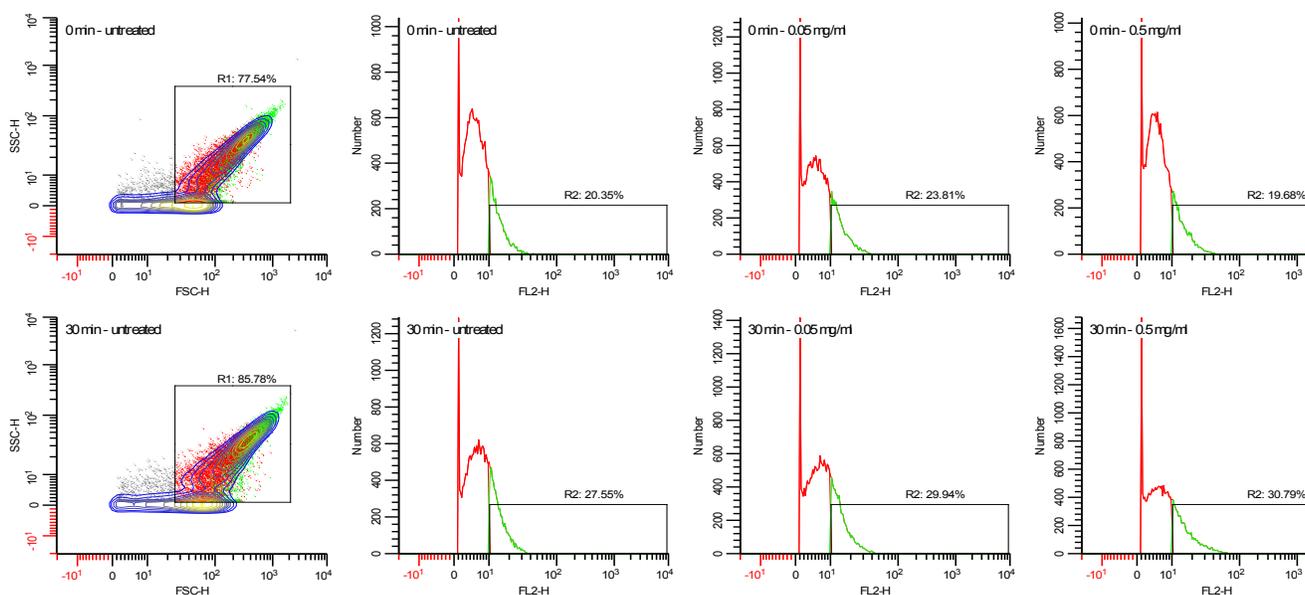


Figure 2 - Representative controls for Assays 1 and 2. Row 1 shows data from untreated samples at time 0 in the absence of PI (autofluorescent control). Row 2 represents heat shock control (72° C) after 30 minutes in the presence of PI. Column 1 shows forward (FSC) vs. side scatter (SSC) dual parameter dot plots with region 1 (R1) capturing intact cells. Column 2 represents relative fluorescence intensity (PI) of cells gated on R1 measured by the FL2 detector. Region 2 (R2) indicates the percentage of PI positive cells.

A



B

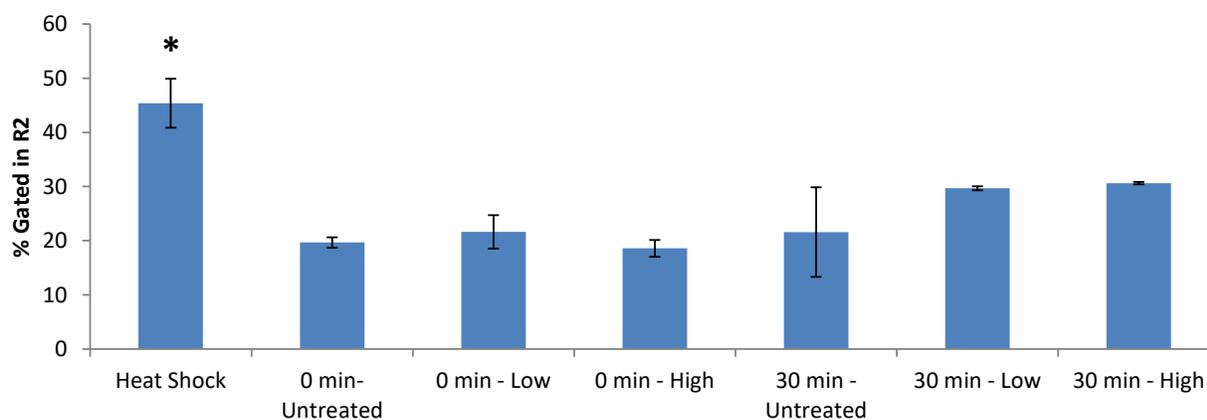


Figure 3- Assay 1: Cell viability measurements and the percentage of PI-positive cells at time increments of 0 and 30 minutes. Panel A: Row 1 shows data at time 0 for samples treated with 0, 0.05, and 0.5 mg/ml protein extract. Row 2 shows the same parameters after 30 minutes. Column 1 represents FSC vs. SSC dual parameter dot plots. FSC vs. SSC plot for treated samples were similar to untreated samples (data not shown). Columns 2-4 represent treatment with 0 (untreated), 0.05, and 0.5 mg/ml protein extract, respectively. Cell viability was unaffected at these time points. Panel B: R1-gated cells treated with 0.05 or 0.5 mg/ml protein extract treatment and residing in R2 were compared to 0 mg/ml (untreated). A heat shock positive control was included (72°C, 30 min). Averages of duplicates were analyzed using the Student's t-test (paired two sample for means). Significant results (* = $p < 0.05$) were observed in the heat shock control. No other significant changes were observed.

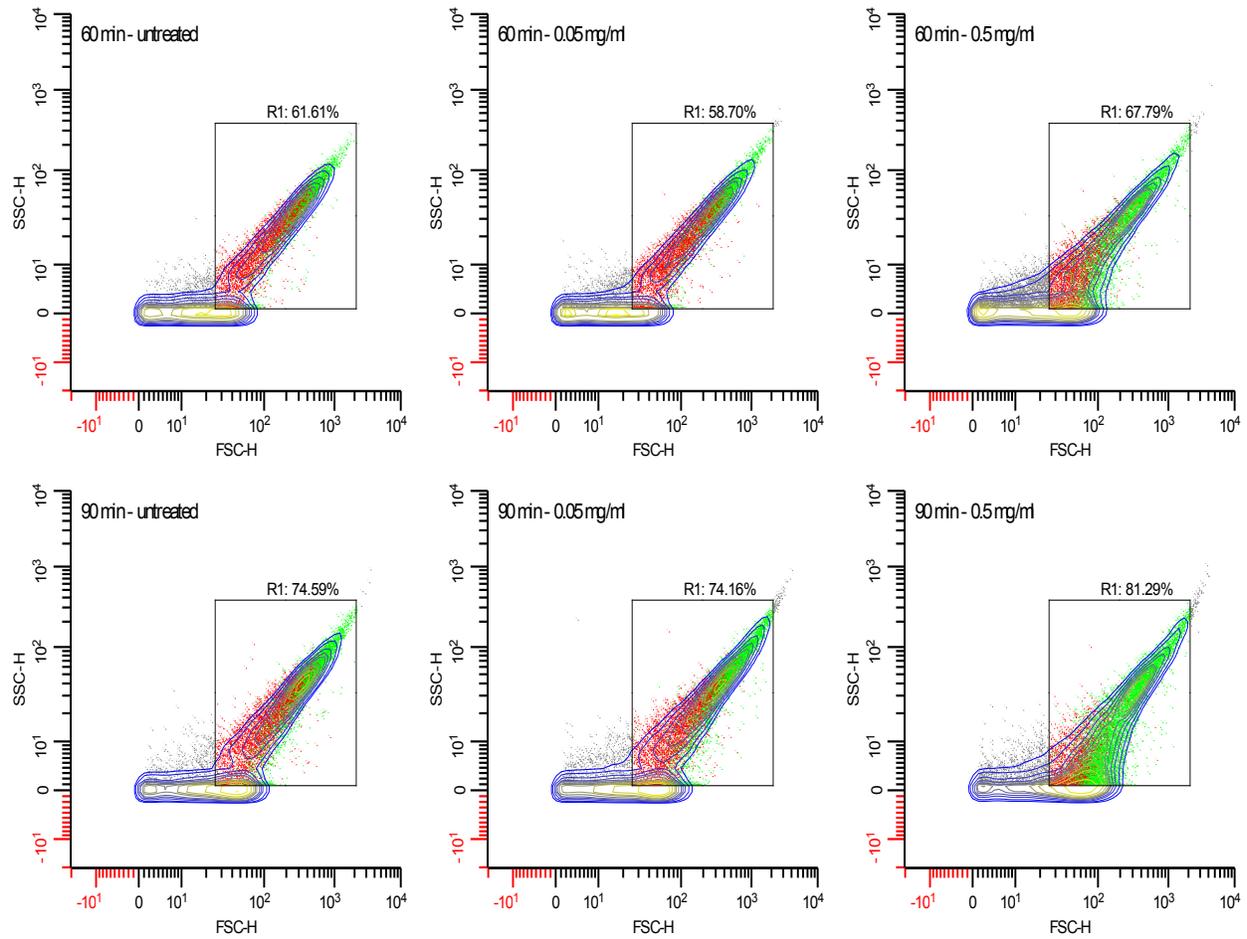
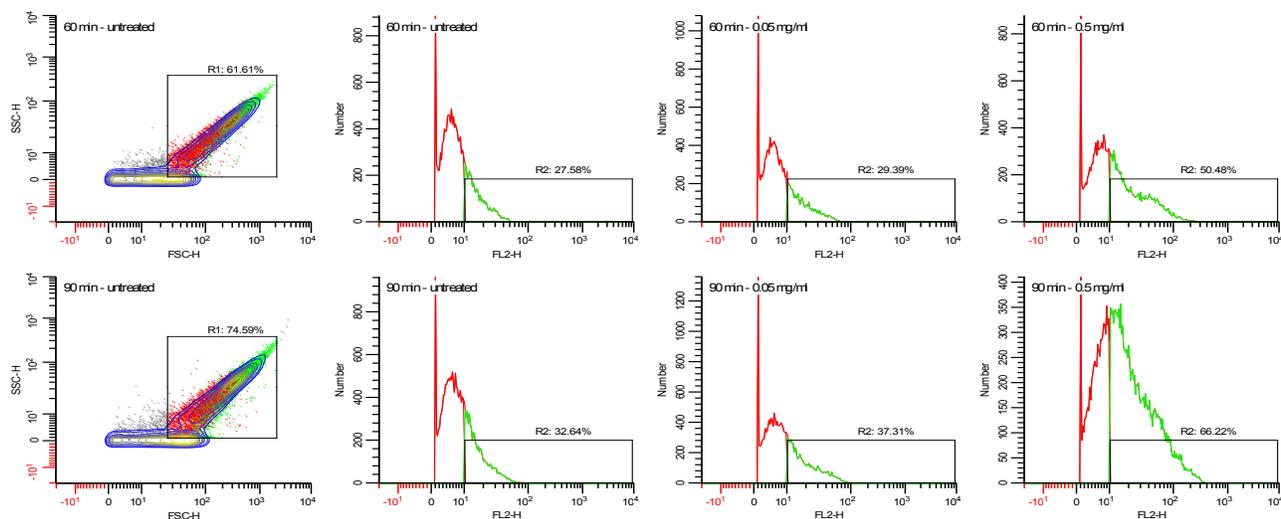


Figure 4 – Assay 2: Increased cell death correlates with changes in forward scatter properties. Samples were treated for 60 (row 1) or 90 minutes (row 2) with 0 (untreated, column 1), 0.05 (column 2), or 0.5 mg/ml (column 3) of protein extract. Data was analyzed using FSC vs. SSC. Changes in FSC were observed only at 0.5 mg/ml for both time periods and most noticeably at 90 minutes (note accumulation of cells in lower left corner of region 1 (R1) depicted with green colored events).

A



B

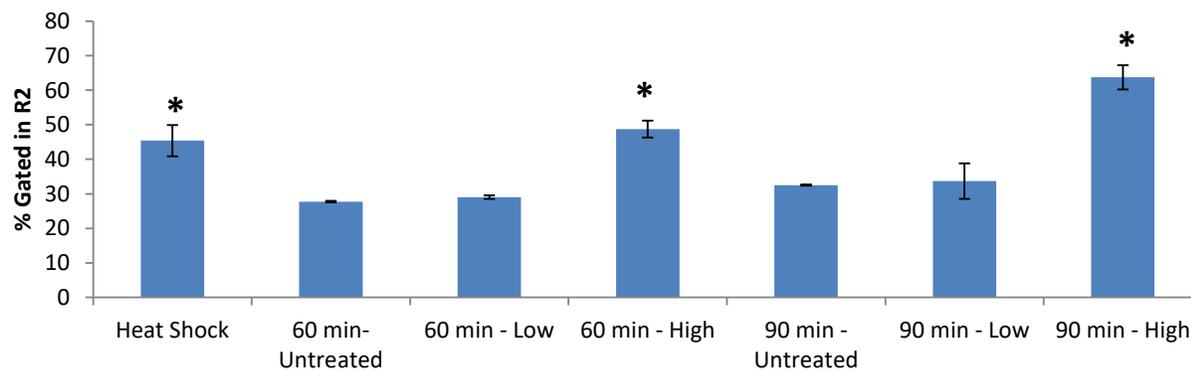
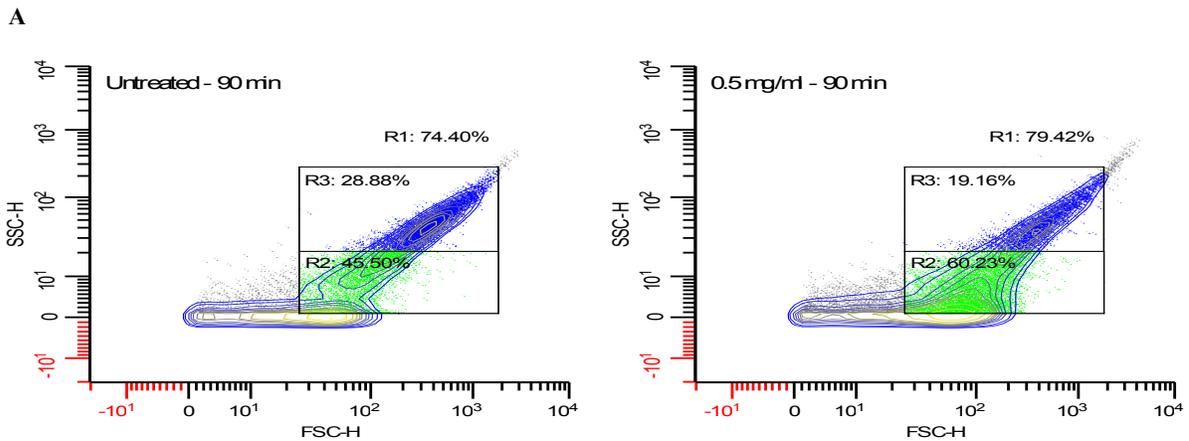


Figure 5 – Assay 2: Cell viability in *Micrococcus luteus* is affected and the percentage of PI-positive cells after 60 or 90 minutes of treatment. Panel A: Samples were treated for 60 (row 1) or 90 minutes (row 2) with 0 (untreated, columns 1 and 2), 0.05 (column 3), or 0.5 mg/ml (column 4) of protein extract. Column 1 represents FSC vs. SSC profiles while columns 2-4 show relative fluorescent intensity of PI. Cell viability decreased significantly after 60 minutes at 0.5 mg/ml and after 90 minutes at both 0.05 and 0.5 mg/ml. Panel B: R1-gated cells treated with 0.05 or 0.5 mg/ml protein extract treatment and residing in R2 were compared to 0 mg/ml (untreated). A heat shock positive control was included (72°C, 30 min). Averages of duplicates were analyzed using the Student's t- test (paired two sample for means). Significant changes (* = $p < 0.05$) were observed at 60 and 90 minutes when using 0.5 mg/ml, indicating that a decrease in cell viability was observed after these time points at only the higher protein extract concentration.



B

| Time Increments | Percentage of Small Cells in R2 | | Geometric Mean of FSC in R3 | |
|-------------------|---------------------------------|-----------------------|-----------------------------|------------------------|
| | Untreated | 0.5 mg/ml | Untreated | 0.5 mg/ml |
| 60 Minutes | 37.69 (0.86) | 48.18 (0.08) * | 320.72 (6.34) | 355.98 (5.78) ** |
| 90 minutes | 45.77 (0.24) | 60.44 (0.20) ** | 364.95 (5.49) | 429.78 (6.54) ** |

Figure 6 – Assay 2: Changes in FSC and SSC reveal morphological changes and aggregation after treatment with protein extract. Panel A: Data are representative of FSC vs. SSC of cells after 90 minutes of no treatment (left) or treatment with 0.5 mg/ml protein extract (right) (data for 60 minutes not shown). Region 1 (R1) captures the entire population of intact cells. Region 2 (R2) represents the subpopulation of cells exhibiting smaller size (shift to lower left). Region 3 (R3) represents the subpopulation of cells that have a higher geometric mean in FSC, presumably due to cellular aggregation. Panel B: The percentage of small cells and the geometric mean in FSC was observed after 60 and 90 minutes of treatment with 0 (untreated) or 0.5 mg/ml of protein extract. Averages of duplicates were analyzed using the Student's t- test (paired two sample for means). Significant changes (* = $p < 0.05$, ** = $p < 0.005$) are indicated. Significant changes were not observed when using 0.05 mg/ml (data not shown). The increase in the geometric mean of FSC in the R3 subpopulation is presumed to be indicative of cellular aggregation.

Temporal control of FOXO expression alleviates acute high-dose-induced cardiac dysfunction in *D. melanogaster*

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Abstract

It has been observed that after 60 years of age more than 70% people suffer from cardiovascular disease (CVD), one of the leading causes of death worldwide. Up until recently, researchers have focused heavily on autophagy as a major contributor to negative phenotypes associated with cardiac aging, but relatively little has been discerned about the role of the transcription factor FOXO in this process. It is associated with longevity and health-span and is responsible for the regulation of genes in many cellular processes. Mild dFOXO overexpression in cardiac tissue was shown to increase ubiquitin-proteasome system (UPS) expression at advanced age in conjunction with improved cardiac function. FOXO functions at specific levels in order to maintain proper cell function. FOXO activity is hypothesized to decrease over time, contributing to cellular senescence, but constitutively increasing the dFOXO dosage is lethal. Increasing FOXO by a mild amount in 2-day old flies decreased heart function in flies at a young age. Thus, we hypothesized that increasing FOXO expression later in life would improve heart function at older ages without compromising the heart function of young flies. This was tested using Gene Switch heart specific GAL4 driver on *D. melanogaster*, a rapidly reproducing model organism. At 3 weeks, flies were induced to overexpress dFOXO, and hearts were analyzed after 30 days and 7 weeks. Flies aged to 4 weeks resulted in normal heart function. Between 4 and 7 weeks, age-associated heart function decline was halted. For future reference, using a fluorescent marker to track the expression of FOXO, using larger sample size and RNA expression to see expression of FOXO.

Introduction

As individuals age, their outer body shows these changes and in relation the inner organ systems also age and undergo transformation. Some body systems decrease function more than others, which can lead to systemic dysfunction. People aged 65 and older are more likely to suffer age-related heart failure. When advanced cardiac aging occurs, hypertrophy and/or fibrosis causes an increase in ventricular stiffness, diastolic dysfunction, arrhythmia and decreased heart rate (Strait & Lakatta, 2012). This may be due to various factors, such as stem cell exhaustion, as when an individual age the stem cells stop replicating (Hariharan & Sussman, 2015). Another example is mitochondria dysfunction, in which mitochondria do not produce sufficient energy for the body's systems to maintain normal function. This is why a high percentage of older adults see a decrease in heart activity compared to the vibrant heart muscle activity observed at young age. Additionally, a buildup of proteins can contribute to lost heart function, which may occur due to dysfunctional

proteasomes (Strait & Lakatta, 2012). Other factors can negatively affect the physiology of the cardiovascular system, such as sarcomeric gene mutations that can cause hypertrophic cardiomyopathy (Akhtar & Elliott, 2018), dilated cardiomyopathy (McNally, Golbus & Puckelwartz, 2013), and Long QT syndrome (Chopra & Knollmann, 2011). These mutations can alter myofiber organization performance of heart contractions, and other molecular functions. These factors that negatively impact the physiology of the cardiovascular system can be observed in *D. melanogaster* (Weismann et al., 2019).

D. melanogaster is widely used as a model of cardiac aging because of its short lifespan and production of many isogenous progeny (Blice-Baum et al., 2017). Similar changes occur in the *D. melanogaster* heart tube including diastolic dysfunction, increased stiffness and chance of arrhythmia and decrease in heart rate. (Kaushik, Fuhrmann, Cammarato, & Engler, 2011; Ocorr, Takeshi, & Bodmer, 2007). By using micro- and mesoscopic imaging, these observations can be seen in real time (Weismann et al., 2019). The typical lifespan of adult *D. melanogaster* is between 60 - 80 days. Stages of life can be divided into 4 stages: embryo, larvae (2 days), pupa, and adult fly (3) (Fernández-Moreno, Kaguni & Garesse, 2007). In the experiment the different ages are selected to determine how the expression of dFOXO would affect the heart at different stages of life. Seven weeks old in a fly is equivalent to an elder human in many physiological respects (Blice-Baum, 2018).

The FOXO family includes transcription factors known to have a helix DNA binding domain called forkhead box. FOXOs are involved in many mechanisms that include pathological and physiological processes, cancer, aging, and neurological diseases (Blice-Baum et al., 2018). They serve as transcriptional activators, and their activity can be inhibited by growth factor signaling or insulin (Blice-Baum et al., 2017). In the absence of either of these factors, they can be

translocated to nucleus and activate programs of gene expression. FOXO can also be modified in the process called post-translational modifications (Wang & Huang, 2016). They are recognized by binding patterns to regulate selected programs of gene expression. They play a role in expression of genes involved in cellular quality control and protein homeostasis, or proteostasis network, and autophagy in all cell types included both vertebrates and invertebrates (Blice-Baum et al., 2017; Brehme, Voisine, Rolland T, et al, 2014). Autophagy is the process to degrade protein aggregates. Otherwise, it leads to cytotoxicity. Three main types of autophagy exist: microautophagy, chaperone-mediated autophagy and macroautophagy. Not only do FOXOs regulate general autophagy, they also promote autophagy in specialized cells through a mechanism called mitophagy. In this form of autophagy mitochondria recognize and degrade proteins with the help of autophagy lysosomal pathway (Webb & Brunet, 2014).

The ubiquitin proteasome system (UPS) is a pathway used by many eukaryotic organisms to mark for destruction proteins that are unfolded beyond repair, chemically altered, otherwise non-functional, or simply no longer needed by the cell (Nijman, Vargas, Velds, 2005).. These ubiquitin molecules that are attached to worn proteins are responsible for triggering the proteasome to lyse the marked protein into many fragments. The proteasome is a large cylindrical complex that proteins enter one end and depart the other end fragmented. The UPS causes degradation of signaling and structural proteins that are misfolded and not functioning properly. Targeted regulation of this system means targeted regulation of different functions of the heart. It has been seen that in case of diseases with increased proteasome activity, proteasome inhibition has prevented its progression (Blice-Baum et al., 2017). Although it is one of three major system that maintains cellular proteostasis, it has some negative effects. Proteasome inhibitors, which target the whole proteasome complex, can cause cardiotoxicity in humans if regulation is not controlled,

so selective inhibition is required (Drews & Taegtmeier, 2014). In *D. melanogaster* when modestly overexpressed in *D. melanogaster* hearts, dFOXO provided cardioprotection accompanied by an increased expression in genes associated with the UPS as age progressed (Blice-Baum et al., 2017; Wessells et al., 2015).

There are multiple molecular genetic tools that are present in *D. melanogaster* that serve as transcription activators (Rhee et al., 2015). The transcription activator used in this study was GAL4. In yeast the GAL4 protein generally functions as a transcriptional activator. It lacks any endogenous targets in *D. melanogaster*. This feature, combined with its potent ability to activate transcription, has made it a widely used tool in selective activation of gene expression in *D. melanogaster* studies. The upstream activation sequence (UAS) is a specific augmenter for the GAL4 protein (Brand & Perrimon, 1993). The *UAS-GAL4* system is an efficient bipartite approach for the activation of gene expression. *UAS*, together with a specific gene of interest, is kept in one fly line, and *GAL4* with a tissue-specific promoter is kept in another. When flies of these two lines undergo crossing, the GAL4 protein will bind to the *UAS* and activate the gene at the tissue that the promoter is specific for (Figure 1). One of the advantages of this system is that toxic genes will only be expressed when bound to the GAL4 protein (Duffy, 2002). This allows flies carrying the inactivated form of a toxic gene to survive normally. In the yeast-based UAS-GAL4 bipartite system of gene expression, and preceded by a tissue-specific promoter, flies of F1 generation possess one allele of the GAL4 transactivating sequence, and one allele of a gene of interest that is preceded by the upstream activating sequence (UAS), that are turned on by GAL4 binding (Brand & Perrimon, 1993). On the other hand, the production of GAL4 in the GeneSwitch GAL4 system is turned off, and downstream UAS-linked genes expression will not occur until the ligand RU486 binds and activates transcription of GAL4 gene (Nicholson et al., 2008).

Overexpressing dFOXO in low doses throughout life has been shown to improve cardiac function in older flies. However, inducing dFOXO overexpression at a moderate level post development caused some acute dysfunction (Figure 2, Blice-Baum et al., 2017). When too much dFOXO was added at a young age (2 days), it was seen that the cardiac function impaired at just one week of age. Interestingly, in the mouse model, a similar phenomenon was observed in which increasing constitutively active FOXO3 in the heart causes heart failure and atrophy (Schips et al., 2011). In this study, overexpression of FOXO3 (the closest ortholog to dFOXO) was linked to the increased expression of BNIP3, a marker of heart failure. It was hypothesized that at a young age, the heart expresses enough FOXO, and by adding too much FOXO can cause proteotoxicity. It was also hypothesized as we age, FOXO levels decline, so if we overexpress FOXO later in life using a gene switch driver we can bypass the negative effects of high FOXO doses. A significant decline in FOXO activity has been observed in other *D. melanogaster* tissues (Birnbaum et al., 2019).) To bypass this negative effect, a system called geneswitch-GAL4 was used. Geneswitch-GAL4 is normally turned off as depicted in figure 1; however, by adding RU486 (Mifepristone), it binds to the enhancer which leads to the activation of GAL4 and this led to the expression (Blice-Baum et al., 2018).

Methods

Preparation of crosses

Virgin female Hand4.2-GAL4 GeneSwitch driver (Hand-GAL4 GS) flies were crossed with UAS-dFOXO wt-m3-1 males. Progeny from the resulting F1 generation were collected, separated by sex, and left to age for three weeks on standard cornmeal and molasses media. After three weeks, collected flies were separated again into two groups. One group was placed on a media that was supplemented with 100 ug/ml RU486, using 100 ug/ ml RUD486 , while the other group of flies

was placed on media that was supplemented with vehicle (100% ethanol). After placed into supplemented media, flies were transferred every 2-3 days to fresh media to ensure constant contact with the drug or vehicle.

D. melanogaster media

A large Erlenmeyer flask was filled with water and placed on top of a hot plate and a stir bar was added. Then agar, yeast, cornmeal, and molasses were added to the water in the quantity needed (Roberts, 1998). Afterwards, the mixture was heated until reaching a thick consistency. After 20 minutes of cooling, Tegosept, propionic acid and phosphoric acid were added to the mixture for antifungal and antimicrobial purposes. Food was poured into flasks or vials and left to cool overnight. Unused food was kept at 4°C for up to 4 weeks.

D. melanogaster semi-intact heart-tube exposure surgery

Heart surgery was performed on one, four, and seven-week flies for comparison purposes. Flies were collected, subjected to semi-intact heart-tube exposure surgery. The flies were anesthetized with Fly Nap and placed in an artificial hemolymph (AH) solution containing 108 mM Na⁺, 5mMK⁺, 2mM Ca²⁺, 8mM MgCl₂, 1mM NaH₂PO₄, 4mM NaHCO₃, 10mM sucrose, 5mM trehalose, and 5 mM HEPES (pH 7.1). Then sucrose and trehalose were added to the AH from refrigerated stock solutions prior to use to prevent bacterial contamination. Fine capillaries (e.g. Glass Capillaries, 100 ul VWR) were used for removal of fat (Vogler & Ocorr, 2009).

Analysis

The hearts were filmed using high-speed video microscopy and analyzed by semi-automated optical heartbeat analysis (SOHA, Cammarato, Ocorr, & Ocorr, 2015). Briefly, a user marks diastole and systole in high-speed video images of beating *D. melanogaster* hearts, and the

program automatically uses the movement to determine several indices of cardiac function. Indices of cardiac function that were measured included heart rate, heart period (inverse of heart rate), diastolic interval (how much time the heart stays in diastole, or relaxation, on average), and fractional shortening (how efficiently the heart contracts each beat). All data were compared to that from one-week control flies. All statistical analyses were performed using GraphPad Prism. Diastolic interval was determined.

Statistics

All analyses were performed on 7 – 25 hearts, depending on cross success (indicated in each figure). All columns were checked for normality before statistical tests were performed. Error bars represent \pm SEM. P-values were calculated using 1-way ANOVA with a Bonferroni post-test comparing all genotypes to each other; * $p < 0.05$, *** $p < 0.001$.

Results

At four weeks of age, after being exposed to either drug or vehicle for one week, flies exposed to RU486 showed no difference in the heart rate (Figure 3A) as well as fractional shortening (Figure 3B) compared with controls. There is no change in heart function when overexpression is induced later in life, suggesting that a delayed induction bypasses negative effects seen in early induction (Figure 2).

Female *Hand^{4.2}GS-GALA > UAS-FOXO* hearts showed significantly decreased heart rate (Figure 4A) and increased diastolic diameter (Figure 4B) between 4 and 7 weeks when exposed to vehicle (control), expected signs of age-associated cardiac dysfunction. Females of the same genotype exposed to RU486 showed significantly tempered cardiac dysfunction (Figure 4). Male

dFOXO-overexpressing hearts displayed significantly rescued heart rate (Figure 5A) but not diastolic diameter (Figure 5B). Fractional shortening for both sexes remained unchanged upon aging and RU486 induction of dFOXO overexpression (Figure 6).

Discussion

There is a steep increase in cardiovascular dysfunction worldwide due to several factors, including the type of diet we eat, age, exercise, etc. With the worldwide life expectancy increasing every year, age is becoming an ever more important factor leading to CVD. In young age the rate of gene expression is higher whereas in old age the rate is lower. This is because dFOXO is the transcription factor which stops the signaling from insulin receptors which helps regulate the deposition of peripheral fat in the body. Hand^{4.2}-GAL4 are expressed during early cardiogenesis, to simultaneously eliminate confounding developmental variables. When too much FOXO was added at a young age (2 days). By overexpressing FOXO later in life via a gene switch, negative effects of high FOXO doses can be avoided.

Here, flies exposed to RU486 showed no difference in the heart rate as well as fractional shortening between control and experimental (Figure 3) at 3-weeks or middle-age. It is known that low doses of FOXO given to flies at young age cause heart function to decline acutely. Although we waited for three weeks to give them the drug, we did not see any significant changes. This could be a good sign, as inducing expression later in life in fact bypassed the negative effects seen at even lower doses at a young age (Figure 2). The female flies were treated at 3 weeks and were aged until 7 weeks. Treating them at 3 weeks was more effective at maintaining cardiac function compared to treating them at 2 days, at which time endogenous *dFOXO* expression is likely sufficient (Blice-Baum, et al, 2007; Birnbaum, et al, 2019).. This may be because dFOXO production decreases as flies age, so increasing its expression later on

improves the function. Heart rate and diastolic function are indicators of cardiac health.

Normally when flies age their heart rate slows and their diastolic volume increase because the heart muscles are weakening. When induced female flies are analyzed at 7 weeks, we do not see that decline in function and heart as well diastolic volume remain more similar to flies that are young and healthy than controls at 7 weeks.

Male flies have the same symptoms when they age normally as female flies do. In this case treatment with dFOXO and analysis at 7 weeks did not help for diastolic diameter but did significantly for heart rate. It is possible that differences due to sex may be because males and females react to FOXO differently. Notably, female abdomens are larger, and heart tube exposure is less prone to error than in males. While when fractional shortening reduces, then there is diastolic dysfunction. But last result showing fractional shortening did not change. Fractional shortening proved inconclusive though the hypothesis of this study was supported by heart rate as a reliable indicator of cardiac function. Interestingly there may be sex effects from using RU486, ethanol, combination of both, and overexpression of FOXO, which may be an interesting investigation in the future.

For additional future studies, we can use a GFP-tagged dFOXO to track its expression over time to see how long expression lasts. We can also look at RNA expression to see if FOXO expression is increased in treated flies, determine if lifespan of the flies is affected when treated. We should increase sample size to ensure data is significant.

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Figures

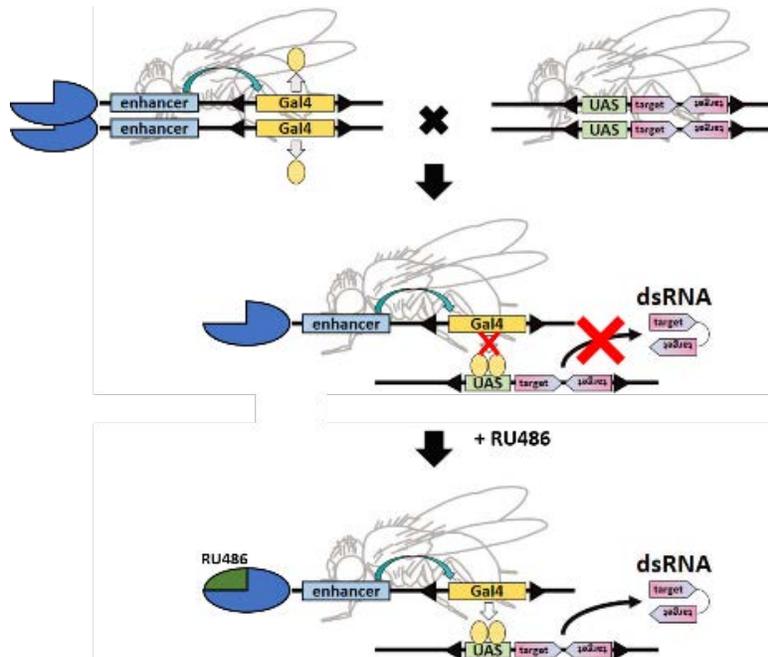


Figure 1. GeneSwitch inducible driver. In the GeneSwitch GAL4 system, production of GAL4 is turned off, and no expression of downstream UAS-linked genes occur until the ligand RU486 binds and activates transcription of the GAL4 gene (Nicholson et al., 2008).

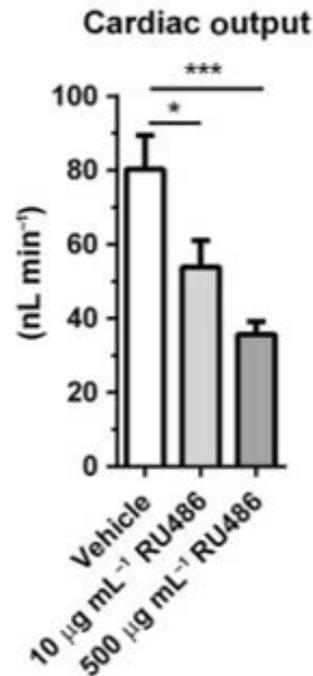


Figure 2. Post-developmental cardiac-restricted overexpression of dFOXO causes acute dysfunction even at low doses using the inducible driver and RU486 supplementation at 2 days (Blice-Baum et al., 2017).

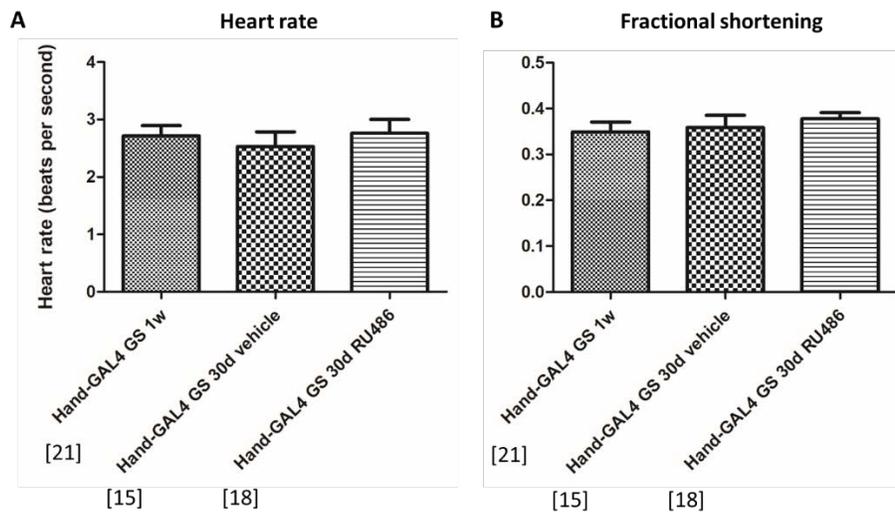


Figure 3. Moderate dFOXO overexpression induced at mid-life has no effect on cardiac function at 4 weeks. When RU486 induced dFOXO overexpression in the heart mid-life, no changes in cardiac function were detected as seen through heart rate (A) and fractional shortening (B) within one week. Number of flies in each category is indicated in brackets.

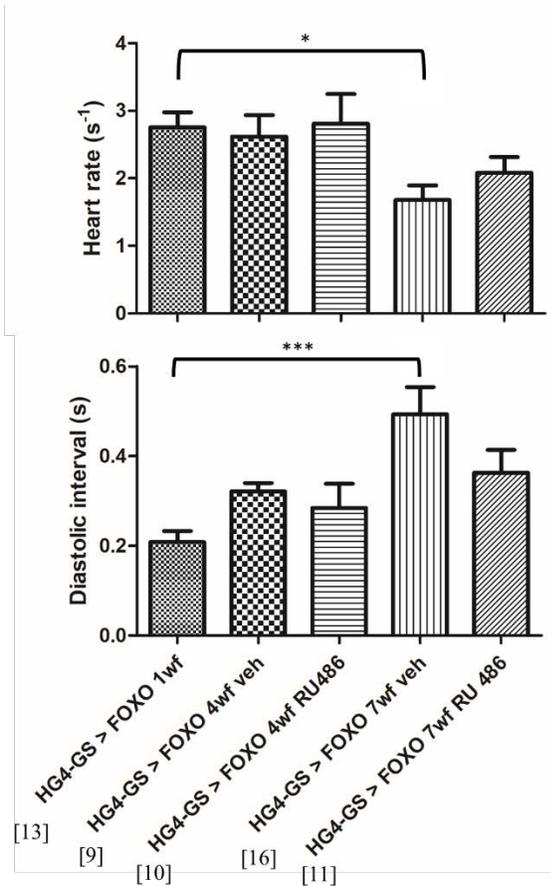


Figure 4. Moderate dFOXO overexpression induced mid-life shows some benefit in female fly hearts. Female *Hand^{4.2}GS-GAL4 > UAS-FOXO* flies were aged to 4 weeks and 7 weeks and treated with RU486 to induce UAS-expression or vehicle to mimic wildtype conditions. Seven week female hearts through significantly decreased heart rate (A) and increased diastolic interval (B), suggesting that lower heart rate is due mainly to longer time spent in diastole. However, the female flies treated with RU486 and aged to 7 weeks experienced no significant change in heart performance compared to “wildtype” flies, suggesting that starting *dFOXO* overexpression in mid-life has beneficial impacts on cardiac performance. Number of flies in each category is indicated in brackets.

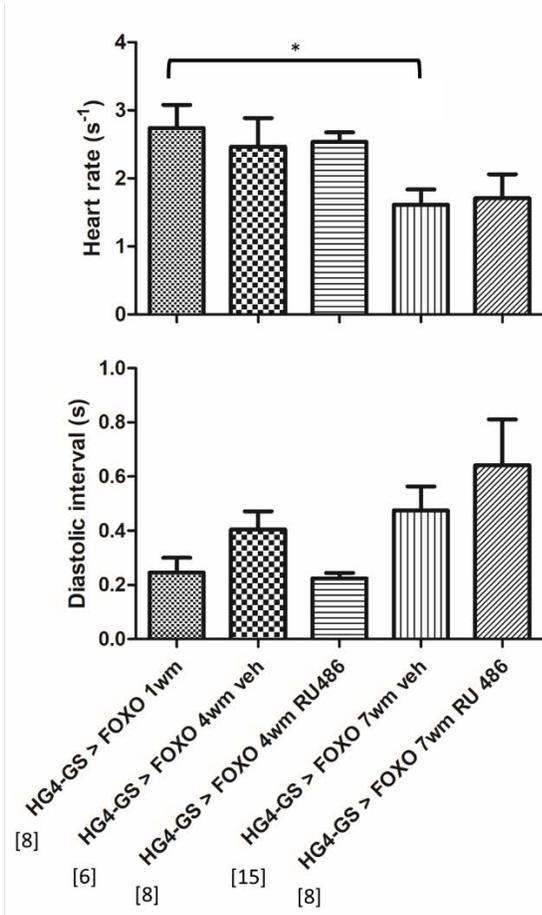


Figure 5. Moderate dFOXO overexpression induced mid-life shows some benefit in male fly hearts. Male *Hand^{4.2}GS-GAL4 > UAS-FOXO* flies were aged to various time points (4 weeks or 7 weeks) and treated with RU486 to induce UAS-expression or vehicle to mimic wildtype conditions. Over time, significant age-associated cardiac dysfunction can be observed in 7 week hearts through significantly decreased heart rate (A). However, unlike female fly hearts, the male dFOXO-overexpressing heart rate did not seem to be rescued significantly at 7 weeks (A). Additionally, diastolic interval did not seem to respond to induction compared to the vehicle-treated flies (B). This may indicate sexual dimorphism in response to FOXO overexpression. Number of flies in each category is indicated in brackets.

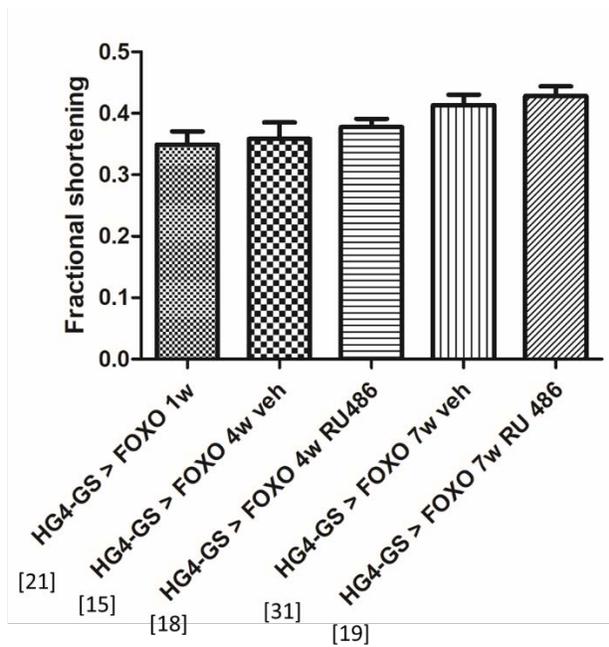


Figure 6. Fractional shortening was not a reliable index of cardiac function in this study. Fractional shortening increases over time in these flies, both those treated with vehicle and RU486. Typically, we observe significantly decreased fractional shortening if we suspect any diastolic dysfunction, as hearts cannot relax completely (Blice-Baum, et al., 2018). Number of flies in each category is indicated in brackets.

Studying horizontal gene transfer between bacteria and *Microviridae* phages to identify the evolutionary history of bacteriophage-host relationships

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Abstract

Bacteriophages from the *Microviridae* family are small, single stranded viruses with 4.5-6kb size circular genomes. These viruses are found in abundance in a broad spectrum of environments from marine ecosystems to the human gut. We used bioinformatic platforms like BLAST and MEGA to explore the possibility of horizontal gene transfer (HGT) between *Microviridae* and several distinct clades of bacteria. We focused on the major capsid protein VP1 for distinct *Microviridae* phages which has shown evidence of HGT with bacterial hosts. We identified positive instances of HGT between *Parabacteroides* bacteria and phages that infects them. Phylogenetic analysis of bacteria and phage sequences provides further evidence that these two sequences cluster together in their own clade. Comparative genomic analyses using synteny of the *Parabacteroides* capsid gene indicate unique sequences and genome arrangement that are not shared with other *Microviridae* phages. This indicates a fitness advantage conferred by this genetic transfer. We want to expand this research into other similar *Microviridae* phages to further investigate the mechanisms of bacteriophage-host relationships.

Introduction

Bacteria are one of the most diverse living organisms on earth. Unique variations in structures, functions, and cell lives have developed throughout bacterial evolutionary history (Lenski and Travisano, 1994). There is evidence to suggest that horizontal gene transfer (HGT) is a key factor in this incredibly fast diversification (Wiedenbeck & Cohan, 2011).

Horizontal gene transfer, also called lateral gene transfer, is the transfer of genes between organisms that do not share a parent-offspring relationship (Gogarten & Townsend 2005). Knowledge of this kind of genetic transfer process has been around for many decades, and recently, the implications HGT has on bacterial diversity have begun to be studied in more detail.

A major contributor to the rapid genetic diversification in bacteria are viruses. Viruses utilize processes such as transformation, transduction, and conjugation to pass their genetic information on to their bacterial hosts. The *Microviridae* family of viruses consist of bacteriophages that have single-stranded DNA as their genetic material and are small and icosahedral in shape (Roux et al., 2012). This family of viruses have a circular genome (Creasy et al., 2018). Recent studies have shown that members of the *Microviridae* family reside in water, animal, and human guts. This

gives rise to the speculation that they have various roles and survival strategies in different environments (Wang et al., 2019).

The exchange of genomic material through horizontal gene transfer may have resulted in bacterial circumvention of the long amount of time it takes for most other organisms to diversify. Organisms that are not subject to HGT must rely solely on mutations and crossing over to create unique genomic variations. Moreover, over long periods of time, HGT between viruses and bacteria must have heavily impacted the evolution of bacteria, including allowing for the creation of entirely new strains (Baptiste & Boucher, 2009).

Evidence suggests that HGT is indeed quite prevalent, but only among certain taxonomic groups (Wijayawardena et al., 2013). Extensive sequence similarity and homologs exist between capsid proteins in viruses and nuclear genomes of other organisms (Liu, 2010). This property makes them excellent candidates to study HGT. Capsids are the structures that contain the genetic material of a bacteriophage and provides protection from the environment. It is made up of small repeating subunits known as capsomeres (Grabow, 2000). These capsomeres are arranged in a particular way, resulting in an icosahedral shape with bilateral symmetry. Interestingly, there are similarities between encapsulin proteins that form bacterial structures resembling shells, and the major capsid protein of the HK-97 bacteriophage (Sutter et al., 2008). This similarity could indicate a shared evolutionary history for genes that encode for these proteins (Abrescia et al., 2012).

With the advent of new sequencing technology, a huge increase has been seen in the number of organisms' genomes that are freely available for analysis. Large databases of sequenced genomes have become readily accessible as means of investigating the relationships between various organisms. In this study, the evolutionary relationship between bacteria and phages were

investigated to identify instances of HGT. We were interested in identifying the prevalence of HGT between bacteria and *Microviridae* bacteriophages and to understand the evolutionary history of these shared homologs.

Methods

Finding evidence of HGT

The sequences used in this research project were obtained from the NCBI GenBank database (Agarwala et al., 2018). The Basic Local Alignment Search Tool (BLAST) (Altschul et al., 1997) from the NCBI website was used to compare sequences against each the protein database to identify sequence similarity based on homology. The community science project pipeline described in Mathur et al., (2019) was utilized to find evidence for HGT. Major capsid protein sequences in *Microviridae* phages were compared against the bacterial database using blastp search tool which was referred to Forward BLAST. Homologous sequences which formed the top ten hits were recorded based on the cut-off parameters: e-value $<1e-50$ and query coverage $\geq 70\%$. The top bacterial hit from the Forward BLAST was then searched against the virus database referred to as the Reverse BLAST. Again, the top ten hits were recorded based on the set cut off parameters. If the top hit in the Reverse BLAST was the same accession number as the original virus search query, it was recorded as a potential case of HGT.

Evolutionary Relationships

The Multiple Sequence Comparison by Log-Expectation tool (MUSCLE) (Edgar, 2004) was used to align the sequences of homologs obtained from blast searches. The data from MUSCLE was used to construct phylogenetic trees with the Molecular Evolution Genetic Analysis, version 7.0.26 (MEGA 7) (Kumar et al., 2016). The maximum-likelihood tree building model was used along with a bootstrap of 100 iterations to generate the phylogenies. We initially generated a tree

showing the evolutionary relatedness of the top 100 *Microviridae* major capsid protein sequences that show similarity to our positive HGT sequences (**Figure 1**). Based on the results from **Figure 1**, a phylogenetic tree of all the positive cases of HGT along with related bacteriophage sequences was generated (**Figure 2**).

Synteny

Synteny is the property of genes in different organisms appearing in the same order in the genome (Sevillya et al., 2020). Many genes in bacteriophage genomes display this phenomenon, especially in their virions (Hatfull, 2008). Synteny for the bacteriophage sequences was determined using the software MAUVE. Major capsid gene sequences were downloaded from the NCBI database. Along with the sequence for the gene of interest, upstream and downstream, sequences were also downloaded. The ProgressiveMauve algorithm generated a synteny visualization of different *Microviridae* phage sequences that were highly similar to our HGT phage sequences (**Figure 3**). The two *Microviridae* phage sequences that show evidence of HGT were also compared with the major capsid gene of two *Siphoviridae* viruses, to visualize sequence similarity and genome arrangement (**Figure 4**).

Results

Based on the community science project pipeline, out of the 30 accession numbers that were analyzed, we identified five positive cases of HGT between *Microviridae* bacteriophages and bacteria (**Table 1**). For the purpose of this study, we focused on the two Parabacteroides phages: Accession # YP_009218533.1 and YP_009218802.1, as it is hypothesized by Quaiser et al., (2015) that these two bacteriophages represent a distinct family of *Microviridae* phages. The top hits from the Forward and Reverse BLAST for YP_009218533.1 are shown in **Table 2** and **Table 3** indicating the case for potential HGT.

Using the homologs from NCBI, a phylogenetic tree was generated of the top 100 similar sequences to the *Parabacteroides* phage major capsid protein sequences (**Figure 1**). The clade with the *Parabacteroides* phages of interest is shown in a yellow box. The major capsid protein sequences of bacteriophages that were on the same clade as the *Parabacteroides* phages were downloaded for further analysis.

The phylogenetic tree of the bacteria and bacteriophages sequences shows a clear pattern of HGT as the *Parabacteroides* phages and bacteria are located on the same clade (**Figure 2**). The high bootstrap values validate this robust relationship. The presence of the HGT pairs on the same clade indicates a shared evolutionary relationship for the gene coding for the capsid protein between – a) *Parabacteroides* phage YZ 2015-a and *Parabacteroides diastonis*, b) *Parabacteroides* phage YZ 2015-b and *Parabacteroides merdae*. Interestingly, the *Parabacteroides* phage (accession # QIW89999.1) also shows a shared evolutionary history with one of the HGT pairs. To better understand this, we analyzed the arrangement of the genes at the major capsid gene locus.

The software Mauve was used to create a multiple sequence alignment and predict synteny of the *Parabacteroides* bacteriophages using the progressive Mauve algorithm (**Figure 3**). The red peaks indicate the areas of relatedness of the five sequences, with the height of the peaks directly proportional to the level of similarity. It is clear that the *Parabacteroides* phage YZ 2015-a, *Parabacteroides* phage YZ 2015-b and the other *Parabacteroides* phage (accession # QIW89999.1) are highly similar to each other. The other two phages in this analysis show certain genomic regions of the major capsid gene that match up but large chunks of sequence upstream of the gene of interest are different. Based on the evidence from the phylogenetic tree and the synteny map, the hypothetical protein in *Parabacteroides* phage (Accession #

QIW89999.1) should be re-classified as a major capsid protein VP1.

Further synteny analysis of the two *Parabacteroides* phages with certain phages from the *Siphoviridae* virus family shows the unique genome arrangement at the major capsid gene locus (**Figure 4**). Thus, the major capsid protein in the *Microviridae* phages in our study show a unique sequence and genome arrangement that is not shared with other bacteriophages. Also, along with the *Parabacteroides* phage (accession # QIW89999.1), these three sequences represent unique major capsid protein sequences that also show evidence of horizontal gene transfer with their bacterial hosts.

Discussion

Numerous studies have confirmed the general relationships between phages and bacteria: that the phage will use a bacterium as a host in which it may inject its biological material and reproduce (Webster, 2001). Here we show evidence of the major capsid protein having a shared evolutionary relationship between *Parabacteroides* bacteria and phages that infect them. This transfer of genetic material leads to increased genetic diversity, thus potentially speeding up adaptations and overall evolution. Additionally, studying the evolutionary dynamic of these genes transferred by HGT is important to understand the spread of antibiotic resistance and emergence of new pathogenic strains of bacteria.

Bacterial genes acquired through horizontal gene transfer are usually quickly deleted from the genome unless they serve a particular function within the organism (Rosenwald et al., 2014). Major fraction of genes that get inserted into bacterial genomes by HGT have shown to have an effect on fitness (Knoppel et al. 2014). The key question here is to predict what role these viral capsid proteins acquired through HGT play within the bacterial genome. There are several hypotheses relating to the origin and evolution of capsid proteins in viruses. Either the

genes encoding capsid proteins originated de-novo within the genomes of non-viral particles (Wagner and Karlin, 2012) or these genes could have different cellular functions initially and then got recruited for virion formation (Jalasvuori et al., 2015). There are instances of virus-like particles acting as gene-transfer agent in pre-historic replicating particles (Jalasvuori et al., 2015). Another hypothesis is that the virus-like particles evolved initially as micro- and nano-compartments similar to prokaryotic carboxysomes and bacterial encapsulins (Giessen, 2016). Comparisons of capsid protein structure show similarities between these proteins in several viruses that infect diverse hosts. Viral particle structural data suggests that several unrelated viruses with diverse genomes adopt a common underlying mechanism for capsid assembly (Requiao et al., 2020)

Certain bacteria possess encapsulin nanocompartments that increase metabolic efficiency and protect them from oxidative stress (Diekmann and Pereira-Leal, 2013). The folds in the shell protein encapsulin were first shown to be similar to the capsid protein in the HK97 bacteriophage (Sutter et al., 2008). Since that discovery several bacteriophages have been found to have the same protein folding mechanism, that would indicate a shared evolutionary origin (Heinemann et al., 2011). Although the encapsulins and viral capsid protein show similarity of structure they perform different functions: metabolism and protection of viral genomes, respectively.

Another important result from the study is the functional classification of the hypothetical protein in *Parabacteroides* phage as a major capsid protein VP1. With the increase in genomic sequence data, the investigation of such sequence-function relationships has become a fundamental necessity. Annotations of these previously functionally unknown proteins provides a more profound understanding of the molecular machinery of organisms at a systems level. (Loewenstein et al., 2009)

Using a bioinformatics-based approach we were able to show evidence of HGT and the evolutionary relationships between bacteria and bacteriophage pairs. Our current knowledge of viral diversity is limited by the sequencing information available in genomic databases. Increased sequencing of viral genomes will help expand our understanding of the extent of HGT that is prevalent between bacteria and bacteriophages. Future research on other *Microviridae* bacteriophages will provide insights into their diversity and the role they play in the shared evolutionary history with the bacteria they interact with.

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| Virus Accession Number | Bacterium Accession Number |
|------------------------|----------------------------|
| YP_009218533.1 | WP_005867318.1 |
| YP_009218802.1 | CDD13573.1 |
| YP_009160333.1 | RAS55772.1 |
| AJK28310.1 | WP_079964593.1 |
| ARQ16014.1 | CRH84962.1 |

Table 1. Positive cases of HGT between bacteriophages and bacteria inferred using the community science project pipeline.

| Description | Query Coverage | E-value | Accession Number |
|--|----------------|---------|------------------|
| hypothetical protein [Parabacteroides distasonis] | 100.00% | 0.0 | WP_005867318.1 |
| hypothetical protein [Parabacteroides sp. AF39-10AC] | 99.63% | 0.0 | WP_122383046.1 |
| hypothetical protein [Parabacteroides sp. AM27-42] | 99.26% | 0.0 | WP_135185613.1 |
| TPA: hypothetical protein [Parabacteroides distasonis] | 98.14% | 0.0 | HCF11199.1 |
| hypothetical protein [Parabacteroides distasonis] | 76.88% | 0.0 | WP_036631168.1 |
| hypothetical protein [Parabacteroides merdae] | 70.18% | 0.0 | WP_122298401.1 |
| hypothetical protein [Parabacteroides merdae] | 70.18% | 0.0 | WP_082430213.1 |
| hypothetical protein [Parabacteroides merdae] | 70.00% | 0.0 | WP_122342714.1 |
| capsid protein VP1 [Parabacteroides merdae CAG:48] | 70.00% | 0.0 | CDD13573.1 |
| hypothetical protein [Parabacteroides merdae] | 70.05% | 0.0 | WP_157313244.1 |

Table 2. Top 10 bacterial hits from the Forward BLAST of the phage sequence with Accession Number YP_009218533.1.

| Description | Query Coverage | E-value | Accession Number |
|---|----------------|---------|------------------|
| major capsid protein VP1 [Parabacteroides phage YZ-2015a] | 100% | 0.0 | YP_009218533.1 |
| hypothetical protein [Parabacteroides phage SC_7_H3_2017] | 100% | 0.0 | QIW89999.1 |
| major capsid protein VP1 [Parabacteroides phage YZ-2015b] | 100% | 0.0 | YP_009218802.1 |
| major capsid protein [Tortoise microvirus 33] | 99% | 0.0 | QCS36953.1 |
| major capsid protein [Microviridae sp.] | 100% | 0.0 | AXH77714.1 |
| major capsid protein [Microviridae sp.] | 99% | 0.0 | AXH77573.1 |
| major capsid protein [Microviridae sp.] | 100% | 0.0 | AXH77293.1 |
| major capsid protein [Microviridae sp.] | 100% | 0.0 | AXH77816.1 |
| major capsid protein [Microviridae sp.] | 99% | 0.0 | AXL14917.1 |
| major capsid protein [Microviridae sp.] | 100% | 0.0 | AXH77410.1 |

Table 3. Top 10 virus hits from the Reverse BLAST of the bacteria sequence with Accession Number WP_005867318.1. Notice that the top hit in the Reverse BLAST is the same accession number that was used for the Forward BLAST. This relationship indicates a potential case of HGT.

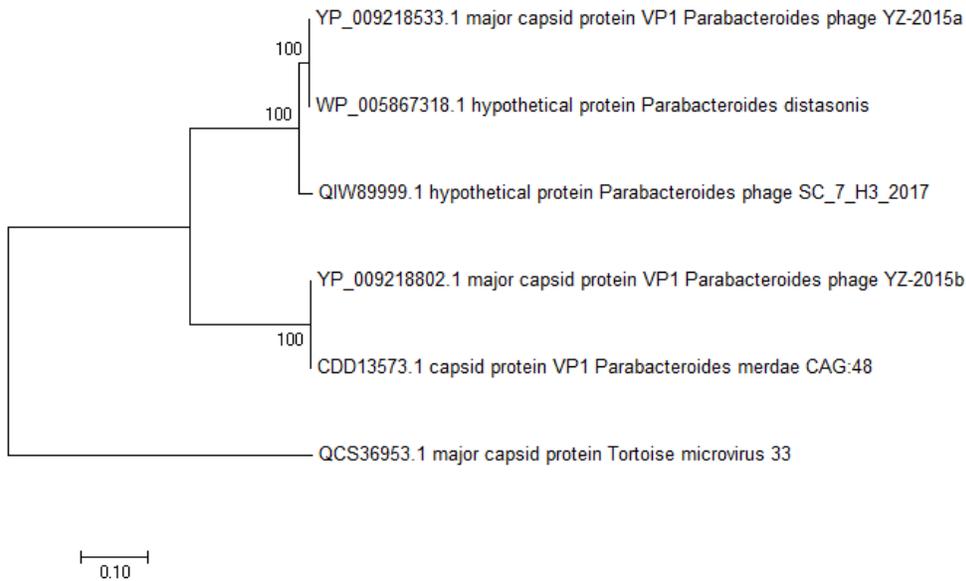


Figure 2. Phylogenetic tree showing the evolutionary relationships between bacteria and bacteriophages of interest. The evolutionary history was inferred by using the Maximum Likelihood method. The tree with the highest log likelihood (-3007.2062) is shown. The tree is drawn to scale, with branch lengths measured in the number of substitutions per site. The analysis involved 6 amino acid sequences.

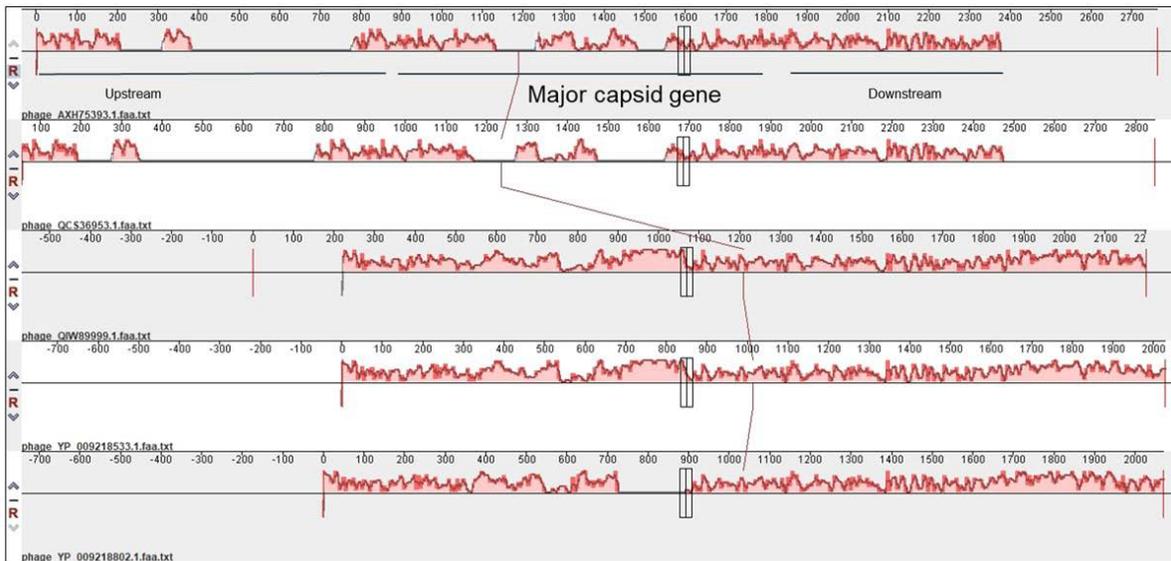


Figure 3. The synteny of five related bacteriophages phages generated via Mauve. The solid red line connecting each sequence shows the location of the matching section of the genome. The major capsid protein lies in the range of approximately 900-1800 base pairs in this alignment. Similarity of genomic regions are based on the peak height and coloration patterns.

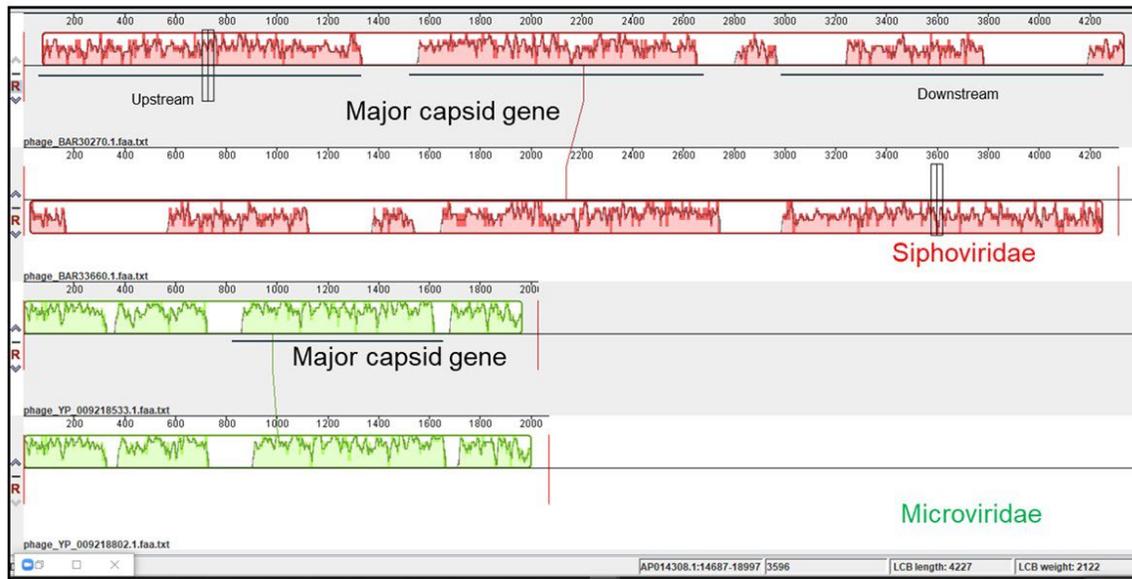
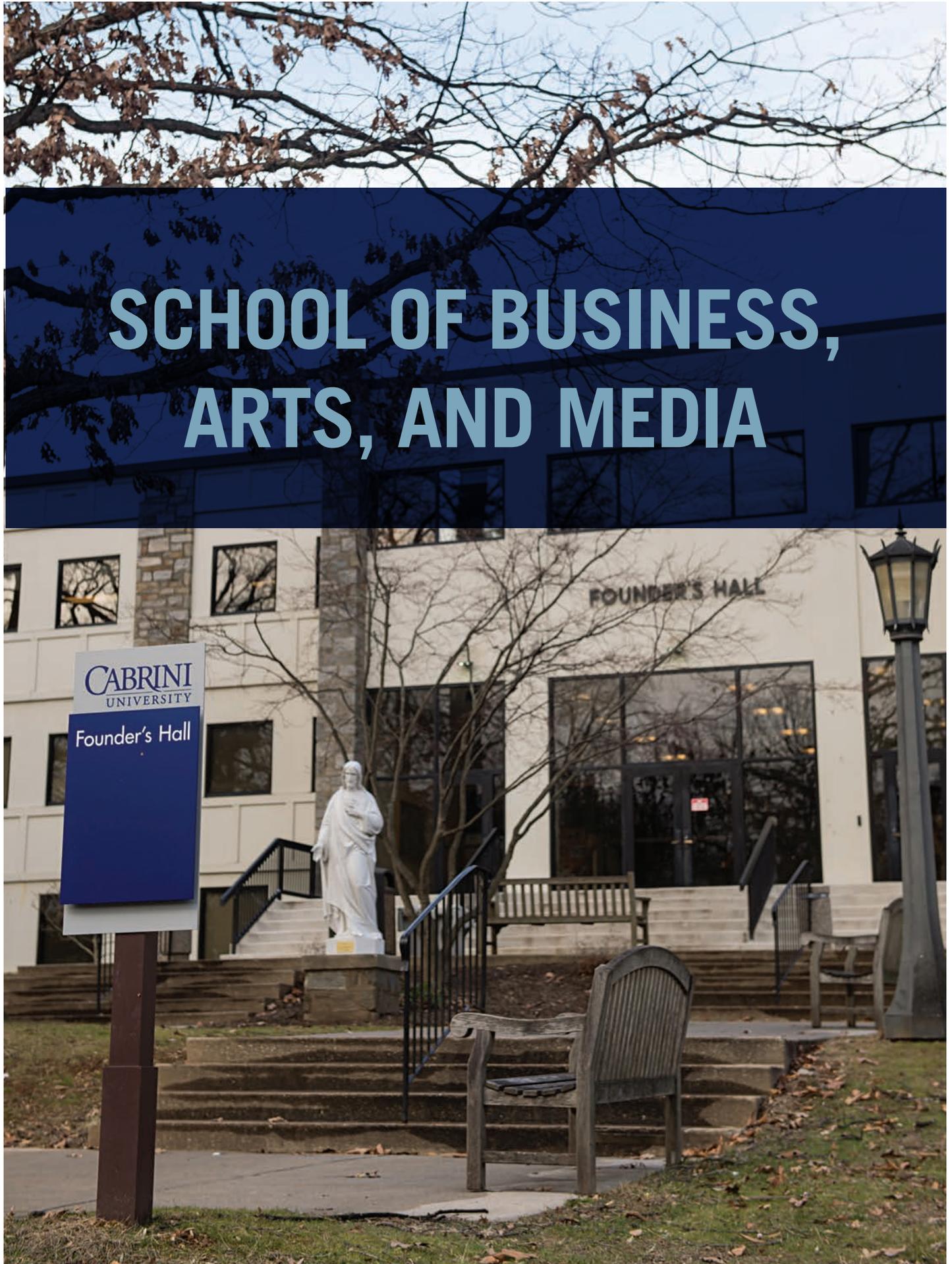


Figure 4. The synteny of two *Siphoviridae* and *Microviridae* bacteriophages phages generated via Mauve. The solid red line connecting each sequence shows the location of the matching section of the genome. Similarity of genomic regions are based on the peak height and coloration patterns – the two types of Viruses have distinct major capsid gene sequence and genome arrangement indicated by the distinct color pattern.

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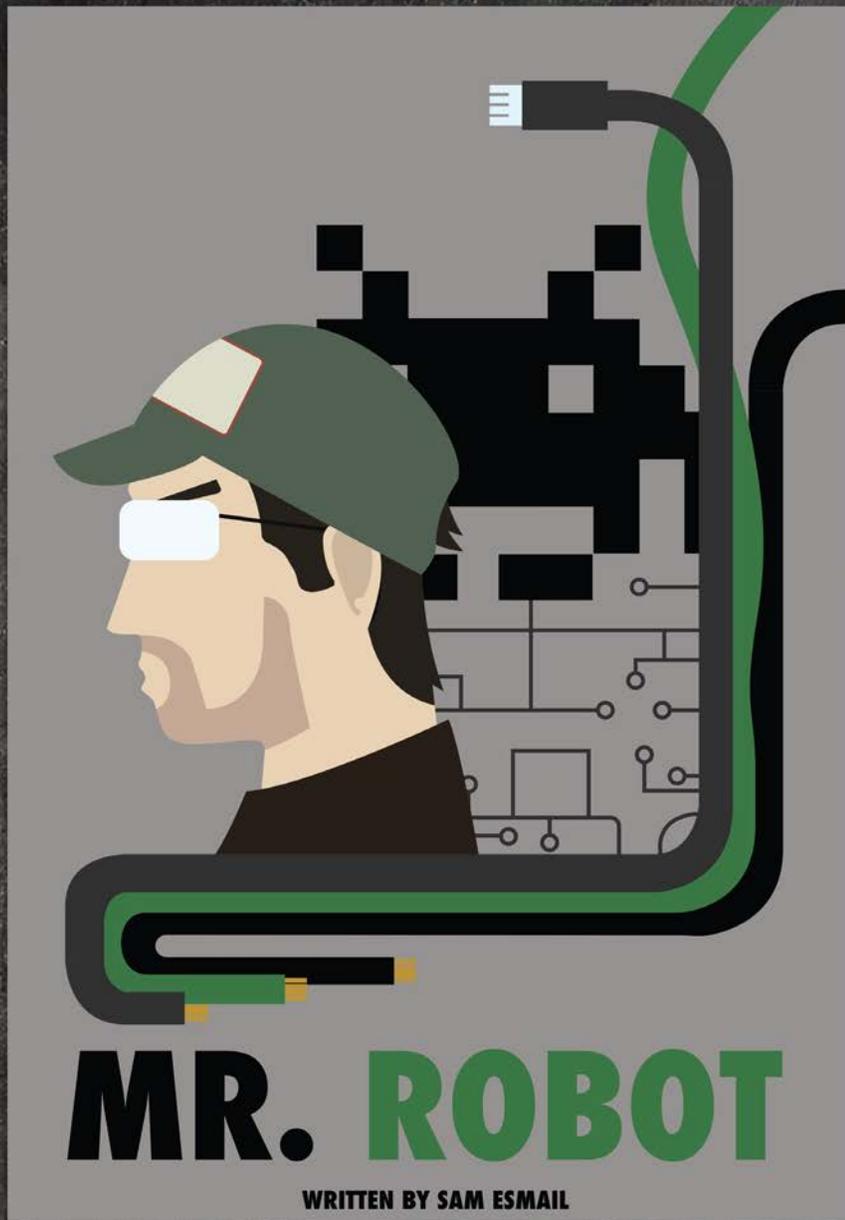
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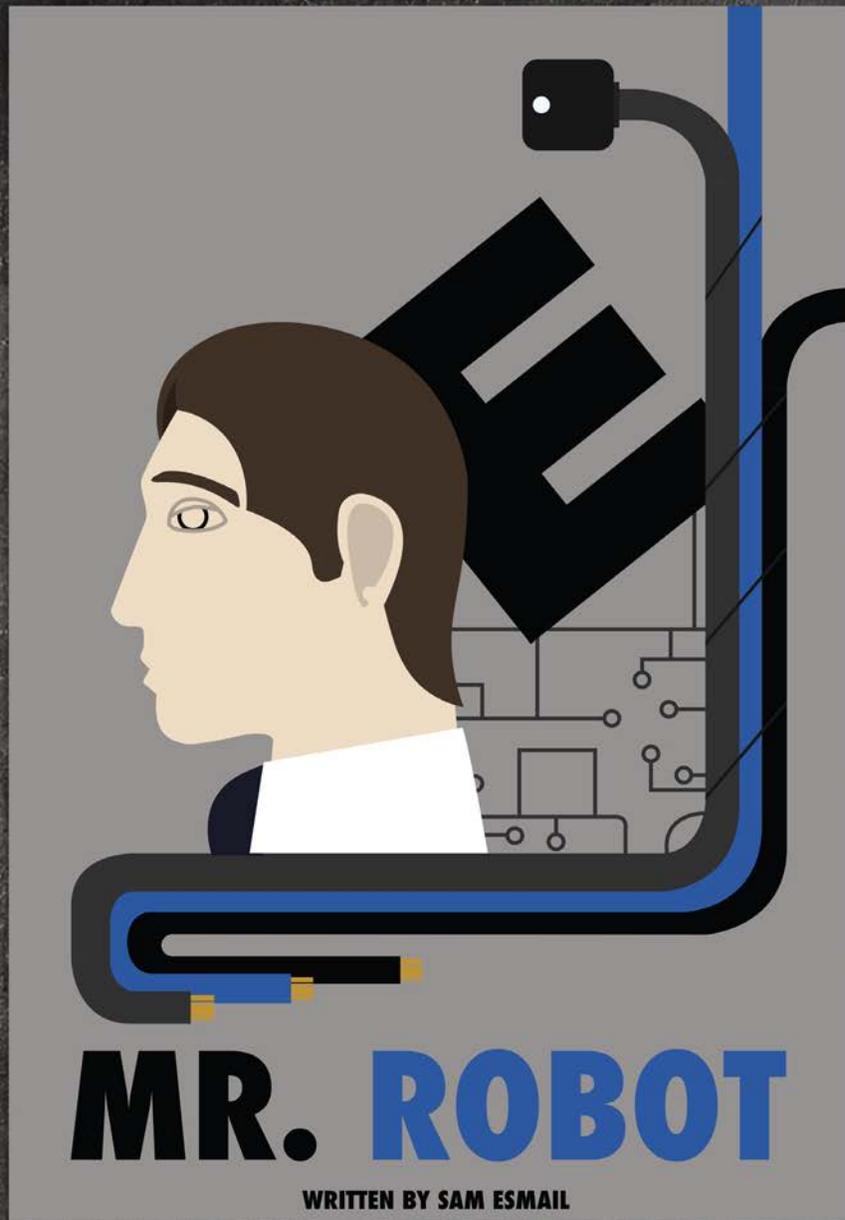
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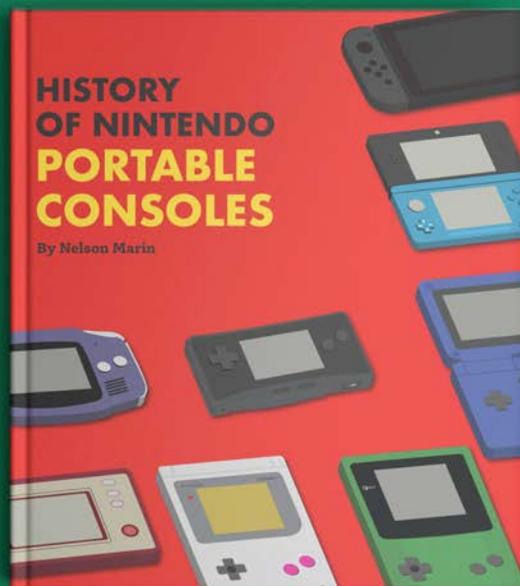
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BOWL 10
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ef broth









Chapter 2

GAMEBOY 1989

The Game Boy is an 8-bit handheld video game console developed and manufactured by Nintendo. It was released in Japan on April 21, 1989, in North America in August 1989, and in Europe in 1990. In Southern Asia, it is known

as the "Tata Game Boy." It is the first handheld console in the Game Boy line. It was created by Gunpei Yokoi and Nintendo's Research and Development — the same staff who had designed the Game & Watch series as well as several popular games for



ORIGINAL GAMEBOY
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Impact of Contemporary Background Music on Performance Efficiency and Performance

Accuracy

Madelyn G. Biddle & Jessica M. Arocho

Research Mentor: Dr. Ruta Clair

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Abstract:

Background: Music effects the human brain and its cognitive functioning/performance (Cournoyer Lemaire, 2019; Lilley et al., 2014; Salame & Baddely, 1989). There are many contributing variables to consider when attempting to understand the various ways in which music differently effects the human brain. Of these contributing variables exists the familiarity one has to the specific music being heard. However, there is limited research in areas which consider such specific variables. This study examines how more frequently known, current, and popular, genres of music differently impact the human brain and its functioning/ performance.

Methods: The participants used in this experiment were all college students currently enrolled in the Research Methods course of the 2020 academic semester. As a means of measuring the participants' cognitive performance efficiency and accuracy this study used three separate Minute Math Worksheets from a website titled Web Minute Math. Participants were exposed to 3 conditions, no music, a country song, and an R&B/rap song.

Results: Ultimately, the findings of this study revealed that listening to different types of familiar music while completing a given cognitive task does not have a statistically significant impact one's cognitive performance efficiency and accuracy while completing the task at hand. Descriptive statistics revealed that while participants (N=19) completed the math worksheet with no background music, they had an average efficiency rate of $M=12.11$ and a standard deviation of $SD=4.545$. The participants (N=19) accuracy during this time was $M=10.2$, $SD=3.910$. When the same group of participants (N=19) completed the given math worksheets with background music, they had an average efficiency rate of $M=15.17$, $SD=5.455$ and an average accuracy rate of $M=15.17$, $SD=5.455$.

Conclusion: This study concluded that neither the presence of familiar R&B/rap or country background music impacted participants' performance efficiency and accuracy while completing a cognitive task.

Introduction:

Music is an experience shared universally among all humans. Psychological studies have found that listening to music can have effects on cognitive performance in humans (Dolegui, 2013, Hanna-Pladdy & MacKay, 2011). It has also been proven that different types of music (ex. stimulating music vs relaxing music) can differently impact these effects in the cognitive performance of humans (Lilley et al., 2014).

Over time researchers have delved deeper into this research topic by finding variables other than that of music type which also have an effect on human cognitive performance (Cournoyer Lemaire, 2019; Lilley et al., 2014; Salame & Baddely, 1989). Of these other contributing variables, one that exists is that of song familiarity (Wilkins, 2015). Further, the effects music can have on the human brain and its cognitive functioning largely depend upon to the familiarity of the specific song being heard (Wilkins, 2015). However, the majority of current research fails to consider such variables. For example, many studies in current literature choose to research the topic by conducting an experimental study in which the participants' dependent variable of cognitive performance is manipulated through the independent variable of either classical or nonclassical music (Guo et al., 2015; Salame & Baddely, 1989). Therefore, continuing to replicate these studies and only using the independent variable of classical and nonclassical music effectively excludes other contributing variables while also limiting the overall findings.

Review of Literature:

Music and its Effect on Humans

Music can be simply defined as an artistic expression of human emotion. Many studies have researched the different ways in which music impacts human behavior (Cassidy & Macdonald, 2007; Landy & Harms, 2019; Metcalfe, 2016). As described by Landay and Harms (2019), music influences humans through the mediator of both mood and emotion. Further, "...music has been shown to impact task performance, organizational citizenship behaviors, and learning" (Landy & Harms, 2019). Cassidy and Macdonald (2007) contributed to this finding by studying the effect of background music on the task performance of both introverts and extroverts. Results revealed that the task performance of introverts was more detrimentally affected by the presence of high arousal music when compared to the extroverts. From the findings of this study it is interesting to note the presence of background music influences different people in different ways. To further support the general evidence that music influences human behavior, Metcalfe (2016) studied the effects of background music on human motor skills. Findings revealed that walking speed was significantly influenced by the tempo of the different background music being heard.

In summary, the referenced studies allude to the general consensus that different types of people are differently affected by music and/ or the specific type of music being heard. Over time, conclusions such as these influenced researchers to further question how different genres of background music might differently affect diverse humans and the inclined behaviors they display.

Music Genre and its Effect on Humans

An important factor when analyzing the ways in which music impacts humans involves considering the type of music being heard, more specifically the genre of music (Young &

Nolan, 2015). Although background noise itself, such as unattended speech, or the sound of a running fan, is not considered to be a music genre, some studies use such noise conditions as “music genres” and compare them to that of instrumental background music conditions (Salamé & Baddeley, 1989). In their study, Salamé, and Baddeley (1989) found that conditions involving background noise, proved to be less cognitively disruptive than conditions involving the background of instrumental music. Building upon “genre” studies like these, researchers then compared the genre effects more directly by comparing either stimulating or relaxing background music. Cournoyer Lemaire (2019) conducted a study which looked at the effects of stimulating and relaxing background music on episodic memory. The results showed that music genres involving stimulating background music, compared to genres involving relaxing music, facilitated higher levels of memorization, therefore suggesting that stimulating genres of music positively benefit the activation of episodic memory in humans. Similarly, Lilley, Oberle, and Thompson (2014) supported this research by contributing their results in which students who listened to energizing (stimulating) background music genres had lower test scores than their counterparts who listened to calm (relaxing) background music genres. This finding could be associated with the fact that research also suggests listening to relaxing genres of music alleviates mental fatigue which comes with performing enduring cognitive-motor tasks (Guo et al., 2015). Although many studies, show that higher intensity (stimulating) music genres are more cognitively disruptive than calming (relaxing) music genres, some studies report finding the opposite results revealing that relaxing genres involving classical music without lyrics had a much stronger and negative impact on participants’ cognitive task abilities than did stimulating genres involving popular music with lyrics (Cournoyer Lemaire, 2019)

These contradicting findings called for more research analyzing the various ways in which different background music genres impact different types of people. Wilkins (2015) highlighted the fact that most research regarding the effects of background music has focused on how different genres and their specific characteristics affect humans. In response to this he conducted a study which focused more on network science and effects of music on the human brain (Wilkins, 2015). This study revealed that listening to a favorite or preferred song altered the connectivity between auditory brain areas and the hippocampus, a brain region responsible for memory and social emotion. Further, these findings only reinforce the idea that effects of background music are seemingly subjective to both the music genre and the individual person.

Music and its Impact on Students

Due to the relevancy of questions regarding background music on humans and their cognitive abilities, researches have heavily researched music and its impact specifically on students and their academic performance. It is evident that music plays a major role in the academic performance of most college students (Neil-Palmer, 2009). Studies revealed that 64% of students who lack concentration while studying in silence tend to have an increased efficiency in studying while in the presence of background music (Antony et al., 2018). Findings such as this led researchers to look into variables within the individual rather than the music they are exposed to. For example, Palmer (2009) found that students who were involved in instrumental lessons had significantly higher math test scores than those who were not involved in such music lessons. Further supporting and contributing to this finding Guhn, Emerson, and Gouzouasis (2019), in a population- level analysis reported that highly engaged instrumental music students were, on average, academically over one year ahead of their peers.

Building on research involving background music and how it impacts students, one case study found that participants who listened to music while completing their reading and writing assignments, tended to have lower math and English grades (Adriano, 2010). Anderson, and Fuller (2010) also contributed to this finding when their study revealed that students performed lower on a reading comprehension test while listening to lyrical music in the background as opposed to the students placed in an environment with no musical background.

Some related research focuses on other variables found in background music including such contributors as lyrics, and sound intensity. Koolidge and Holmes (2018) looked at the effect of background music on children's puzzle assembly. Their results found that children who heard background music without lyrics completed more puzzle pieces than those in either the music with lyrics or no music condition. Dolegui (2013) considered the variable of intensity in his study which examined the impact of listening to music on cognitive performance. Interestingly, findings revealed that when it comes to cognitive performance it is the intensity, rather than the type of music that matters most.

Overall it seems that most research supports and is in favor of St. Clair's (2014) finding that music as a content area is valuable on its own but can also make learning more powerful when utilized in some content areas.

Music and its Impact on Students with Learning Differences

Research has also been conducted on background music and its impact on students with learning differences. Schwartz, Ayres, and Douglas (2017) conducted a study which focused on how background music affected task performance, engagement, and behavior. Results revealed that the presence of background music when completing various tasks could be an effective strategy for increasing engagement and performance levels while decreasing stimulatory

behavior in individuals with developmental disabilities. Sobol (2014) contributed to this research area by examining the relationship between music and developmental/academic gains for students with significant cognitive/language delays. Results from this study pointed towards student improvement with classroom music instruction taught through modified learning experiences. Further, significant growth towards functional independence was seen in basic math counting skills. Some studies take this research even further by considering the contributing factors of noise sensitivity and distraction (Batho, 2014). Results from this research revealed that the performance in children with Attention- Deficit/Hyperactivity Disorder (ADHD) demonstrated a positive effect of white noise and an adverse effect of silence/speech. These results suggest that moderate noise arousal in individuals with ADHD can lead to improved task performance over noises that are either under- or over stimulating. This conclusion then allows researchers to question whether or not music with moderate arousal might also potentially lead to increased task performance in such individuals.

Music and its Neurological Impact

When understanding the ways in which humans are impacted by music, it is beneficial to look at the neurological impact of music on the human brain, and subsequent impacts on human behavior. It has been shown that music can increase cerebral synaptic plasticity (Pecci, et al., 2016). Further, there seems to be a connection between the exposure to music and BDNF which is the growth factor that promotes such neurogenesis and structural plasticity to occur in the hippocampus (Pecci et al., 2016). This finding further suggests that some exposure to music may increase the concentration of this growth factor as it appears in the brain. It is interesting to note that such changes in neural systems when listening to music are not confined to brain sectors

related to auditory and motor processing; they also occur in regions related to the regulation of life processes including those related to emotions and feelings (Habibi & Damasio, 2014).

Additionally, findings such as these encourage researchers to further examine brain circuits during continuous music listening. One study suggested that during continuous music listening musicians' deep perceptual and motoric knowledge of music increased the coupling between areas of the brain that process musical emotions with areas that process motor commands and pleasure (Alluri et al., 2015). In addition to this research, (Lesiuk, 2005) looked at the effects of listening to music on the brain during work performance. This study revealed that positive affect and quality -of- work increased when listening to music. Further, this neural change then led to the workers' enhanced perception of their own performance. Schellenberg (2005) supported this finding by contributing that music listening leads to enhanced performance on a variety of different cognitive tests. Such effects stem from the impact of music on arousal and mood, which, in turn, modify cognitive performance. Moreover, data shows that music can be used in neurorehabilitation to support return to functionality (Tervaniemi, 2017). To solidify this finding, (Pladdy & MacKay (2011) identified modifiable lifestyle factors that may potentially enhance successful aging. The results of this study revealed that participants with at least 10 years of musical experience had better performance in nonverbal memory, naming, and executive processes in advanced age relative to non-musicians. This finding can potentially be applied to neurorehabilitation as music can, overtime, enhance such memory, naming, and executive processes.

Need for Replication

Although extensive research has been conducted on the topic of how music differently impacts humans, researchers are still left with unanswered questions. Many studies on this topic

conclude with very ambiguous findings. Newman, Hunt, and Rhodes, (1966) researched the effects of music on employee attitude and productivity. Although employees reported having experienced a more positive attitude towards working and thought they completed more work while music was being played, the music actually had no effect on the quality and quantity of worker output. Further, it seems that there are many variables to consider in such studies. Studies have shown music and its effects on cognitive task performance greatly depend on the preference of individuals music, the task being completed, and the performer (Gonzalez & Aiello, 2019). There may not be a distinct answer for this research topic. As Anderson (1999) describes, experiences with music are influenced by the listeners' individual uniqueness and their distant circumstances. Further, the type of music which is most useful for task performance depends on the individual's unique nature, knowledge of music, experiences with music, and liking of the music.

That being said many psychological studies in this area choose to explore the effects that classical versus nonclassical music has on humans. Abstract research findings such as the ones mentioned above, allow researchers to replicate such studies and manipulate and focus on particular variables. For example, rather than focusing on the effects from classical versus nonclassical music, research should explore other frequently listened to music genres such as country and pop. This research should explore how these more current and popular genres impact human behavior while also considering extraneous variables that may be partial to the individual and their music experience.

Purpose of the Study

The purpose of this study excludes the common use of classical music. Instead, this study focuses its attention on other, more frequently listened to music genres, such as contemporary

country and R&B/ rap music. Further this study is interested in finding out how these more frequently known, current and popular genres of music differently impact the human brain and functioning through both the variables of performance efficiency and performance accuracy. Moreover, this study seeks to answer the research question asking how different, (deliberately excluding classical) more current genres of background music influence both performance efficiency and performance accuracy. Further, this study hypothesizes that the country song being played will increase both performance efficiency and performance accuracy while the R&B/ rap song will decrease both performance efficiency and performance accuracy due to the fact that it will be perceived as more stimulating and therefore distracting than the country song.

Methods:

Participants

The participants in this experiment were college students from Cabrini University, a small liberal arts school located in Radnor, Pennsylvania. All students currently enrolled in the Research Methods course which took place during the spring 2020 academic semester, were used in this study. The majority of participants in this study are between ages eighteen to twenty-two years. Some unique features possibly setting these participants apart from the general population include the fact that they all attend Cabrini University and the fact that they are all currently enrolled in the same Research Methods psychology course. Further, the participants in this study were required to be a part of Cabrini's research pool unless they chose an alternate assignment, and they will be receiving academic credit for their participation.

Materials and Measures

In this experiment there were three different conditions to which the same participating group were exposed. These participants were required to complete three *Minute Math Worksheets* from a website titled Web Minute Math (See Appendix- C). These worksheets contained a variety of 50 multiplication questions. All three math worksheets presented the same level of difficulty. These math worksheets were then used by the researchers as a means of measuring the participants' results. Performance was measured based on the number of multiplication problems completed, and accuracy was measured based on the number of multiplication problems completed correctly.

During the study, three different conditions took place. In one condition the participants listened to a country song titled "Chicken Fried" by Zac Brown Band (See Appendix- A) while simultaneously completing one of the given math worksheets. In another condition, the same participants listened to a rap/ hip hop song titled "Truth Hurts" by Lizzo (non-explicit) (See Appendix- B) while completing a second math worksheet. Both songs were played by the researchers from YouTube through their computer speakers. In the third condition, participants experienced no music at all while they answered the third math worksheet. Each condition lasted for a duration of two minutes. At the end of all three conditions, the participants were required to fill out a questionnaire regarding their demographics (See Appendix- D).

Design

This within-group study utilized an experimental design in which the independent variable was music, and the dependent variable was the efficiency and accuracy of math worksheets. Extraneous variables that may have affected the accuracy of this particular study include that of the participants' base level knowledge regarding math, the possibility of any math anxiety present in the participant, the participants' ability to clearly hear the music being played,

and/or any present learning deficits which participants may have. This within group design included a total of three different conditions. One condition presented the participants with a country song titled “Chicken Fried” by Zac Brown band. Another condition presented the same group of participants with an R&B/ rap song titled “Truth Hurts” by Lizzo. An additional condition then contained no music at all. Each of these three conditions lasted a total of two minutes during which time the participants completed a math worksheet containing 50 multiplication questions ranging in the same level of difficulty. The use of calculators in this study were not be permitted. However, the participants were permitted to skip certain math problems if they found that they were unable to provide an answer. At the end of all three conditions the participants were then asked to fill out a questionnaire regarding their demographics.

Procedure

When the participants in this study first entered the classroom, they were each given three math worksheets. These math worksheets were handed to the participants as they took their seats. The math worksheets were handed to the participants face-down so that participants were unable to see the multiplication equations contained on the opposite side. These sheets remained turned on their blank side until the very start of each condition being tested. The participants in this study then experienced the three separate music conditions. At the start of each of these conditions the participants flipped their math sheet over revealing the presented questions. In the first condition, the researchers set a timer for two minutes as they played the country song, “Chicken Fried” by Zac Brown Band. During this time interval the participants completed as many math problems as they possibly could until the time ran out. This same process was then followed for the next condition. However, the song playing during this condition was the R&B/

rap song “Truth Hurts” by Lizzo. Again, the same process was followed a third and final time. However, during this condition there was no music being played. This condition acted as the researchers’ control condition. Once the three conditions were completed, the researchers collected all three math worksheets while simultaneously distributing a demographics questionnaire. At this time the participants filled out the demographic questionnaire. Once the participants completed the demographic questionnaire, they turned it into the researchers and were free to leave the study.

Results:

Statistical Analysis

Once this study was completed and the data was recorded, the researchers ran a variety of different statistical analyses. The researchers ran three separate descriptive statistic tests which looked at the participants’ efficiency and accuracy when completing the math worksheet in the three different conditions present. An Independent T-test comparing participants who usually listen to music while studying with those who do not and the effects on the present correct answers. Additionally, researchers ran three separate correlational tests which examined the relationships between participants’ performance accuracy and performance efficiency as they pertain to the three different conditions being tested. Lastly, researchers ran three separate ANOVAs which examined the variable of performance accuracy as it appeared in the three different conditions which occurred during this research study.

Descriptive Analysis of the three experimental conditions

Descriptive statistics were run on the efficiency (number of items completed) and the accuracy (number of items correct) of all participants (N=19) when completing a math worksheet

with no background music. When looking at the variable of efficiency, results revealed that participants had an average efficiency rate of $M=12.11$ and standard deviation of $SD=4.545$. The participants' accuracy while completing a math worksheet with no background music, results revealed a mean and standard deviation of $M=10.2$, $SD=3.910$.

Table 1| *Efficiency and Accuracy when Completing Math Worksheet with No Background Music*

| No music | N | Minimum | Maximum | Mean | Std. Deviation |
|----------|----|---------|---------|-------|----------------|
| Answered | 19 | 6 | 23 | 12.11 | 4.545 |
| Correct | 19 | 5 | 17 | 10.21 | 3.910 |

Data on the efficiency and accuracy of participants ($N=19$) when completing a math worksheet while listening to R&B/rap background music was collected (Table 2). An examination of the participants' performance showed the strongest average efficiency rate across the conditions ($M=15.17$, $SD=5.455$). The mean and standard deviation of participants' accuracy was $M=14.16$, $SD=5.919$.

Table 2| *Efficiency and Accuracy when Completing Math Worksheet with R&B/RAP Background Music*

| R&B/ Rap | N | Minimum | Maximum | Mean | Std. Deviation |
|----------|----|---------|---------|-------|----------------|
| Correct | 19 | 6 | 28 | 14.16 | 5.919 |
| Answered | 19 | 9 | 28 | 15.74 | 5.455 |

Table 3 shows the efficiency and accuracy of participants (N=19) when completing a math worksheet with country background music. The average efficiency was M=13.32 with a standard deviation of SD=4.978. When looking at the participants' accuracy it is seen that they had a mean M=12.26 and a standard deviation of SD=5.141.

Table 3. *Efficiency and Accuracy when completing Math Worksheet with Country Background Music*

| Country | N | Minimum | Maximum | Mean | Std. Deviation |
|----------|----|---------|---------|-------|----------------|
| Correct | 19 | 7 | 24 | 12.26 | 5.141 |
| Answered | 19 | 7 | 24 | 13.32 | 4.978 |

Comparison of individuals who listen to music while studying with those that do not

An independent samples t-test was run to analyze how listening or not listening to music while doing homework might affect the rate of participants' correct answers in each condition of music (Table 4). In the control condition, where no music was present, there was no significant between those that listen to music)(M=9.5, SD=3.95) and those who do not listen to music while studying (M=11, SD=3.94), $t(17) = -.828, p=.419$). Similarly, during the R&B/Rap music condition there was no significant effect shown by usually listening to music while doing homework (M=14.80, SD=5.750) or not (M=13.44, SD=6.37 $t(17) = .488, p=.632$). Finally, in the country music condition, there was also no significant effect between those that usually

listening to music while doing homework ($M=13.50$, $SD=5.74$) or not ($M=10.89$, $SD=4.29$) $t(17)=1.113$, $p=.281$).

Table 4. *T Tests Comparison of Number of Items Correct Across Experiment Conditions*

| Condition | <i>t</i> test | df | <i>P</i> |
|-----------|---------------|----|----------|
| No Music | -.828 | 17 | .419 |
| R&B/Rap | .488 | 17 | .632 |
| Country | 1.113 | 17 | .281 |

Correlations

A correlation analysis demonstrated a significant relationships between participants' accuracy and efficiency when completing a math worksheet with no background music ($r=.902$, $p<.001$).

A correlation analysis examined the relationship between participants' accuracy and efficiency when completing a math worksheet with R&B/Rap background music ($r=.949$, $p<.001$). Results showed that there was a significant relationship between participants' accuracy and efficiency when completing a math worksheet with R&B/Rap background music.

A correlation analysis revealed that there was a significant relationship found between participants' accuracy and efficiency when completing a math worksheet with country background music ($r = .952$, $p<.001$). Further, this finding suggests that, although a significant relationship did appear between the accuracy and efficiency of participants completed math problems, this difference does not appear to be anything inconsistent with their accuracy and efficiency levels when completing a math worksheet with no background music.

Analysis of Variance

Table 5, a one-way between groups ANOVA was run to determine the accuracy of the multiplication questions the participants completed. Results revealed that there was no significant effect of having no background music on while completing math problems. $F(10) = .537, p = .823$.

Table 5 |

Accuracy with No Background Music While Working

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|------|------|
| Between Groups | 1.904 | 10 | .190 | .537 | .823 |
| Within Groups | 2.833 | 8 | .354 | | |
| Total | 4.737 | 18 | | | |

In table 6, a one-way between groups ANOVA was run to determine the accuracy of the multiplication questions which all participants completed. Results revealed that, regarding the participants' accuracy, there was no significant effect on of R&B background music while completing the math worksheet. $F(14) = 1.744, p = .313$.

Table 6 |

Accuracy with R&B/Rap Background Music While Working

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 4.070 | 14 | .291 | 1.744 | .313 |
| Within Groups | .667 | 4 | .167 | | |
| Total | 4.737 | 18 | | | |

To determine the accuracy of the multiplication questions answered by participants while listening to country background music, a one-way between groups ANOVA was run. Results indicated (Table 7) that the presence of background country music had no real effect on the accuracy of participants' answers to multiplication questions. $F(11) = .249, p = .598$.

Table 7|

Accuracy with Country Background Music While Working

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|------|------|
| Between Groups | 2.737 | 11 | .249 | .871 | .598 |
| Within Groups | 2.000 | 7 | .286 | | |
| Total | 4.737 | 18 | | | |

Discussion:

Findings

Ultimately this study found that listening to music while completing a cognitive task does not seem to impact the performance efficiency and accuracy of that task completion. More specifically, this study found that neither the presence of R&B/rap or country background music impacted the performance efficiency and accuracy of completing a multiplication worksheet. However, the trend of highest accuracy in the R&B/Rap condition was consistent with research showing improved performance when listening to stimulating music (Cournoyer Lemaire, 2019; Lilley et al., 2014).

The original hypothesis of this study predicted that the country song being played would increase both performance efficiency and performance accuracy, while the R&B/rap song would, due to the fact that it is usually perceived as more stimulating and therefore distracting, decrease both performance efficiency and performance accuracy. Results did not support this hypothesis. It is however interesting to note that although it was not a significant difference, the R&B/rap condition did have the highest total score of accuracy when completing the math worksheet. This finding was unexpected. It also appeared as though participants were more familiar with the R&B/rap song than they were with the country song. To the researchers, this suggests that perhaps performance efficiency and performance accuracy might depend more heavily upon the song familiarity within the contemporary/familiar song genre as opposed to just the genre being contemporary/familiar.

Limitations

Limitations identified in this research study include the fact that, originally, the participants were supposed to be all Cabrini University students that were currently enrolled in a psychology course offered during the spring 2020 semester. However, due to unpredicted circumstances brought on by a recent outbreak of the Coronavirus, this study was limited to a total sample size of only 19 Cabrini University students that were currently taking a Psychology Research Methods course during the spring 2020 academic semester. In addition, this study was conducted right after the participants found out that, due to the Coronavirus, all face-to-face classes for the remainder of the semester were canceled. This caused participants to be in a state of heightened emotions. Acting as a confounding variable, it is likely that these heightened emotions inhibited the participant's ability to fully focus on the task at hand, and therefore skewed the data. Moreover, all of the participants in this study were pulled from the

same university. They were all enrolled in and taking the same, single psychology course, and they were all around the same age. That said, this study lacks diversity in its already small sample size.

Directions for Future Research

Rather than having multiple sessions in which the same study was run on different participants and in a different order, this study only had the opportunity to run its experiment a single time, in the same order, and on a single group of participants. That said, it is recommended that future researchers run multiple sessions of their experimental study in different conditional orders on multiple groups of different participants. Additionally, these participants should also be larger in sample size and diversity. Future research should also look deeper into song familiarity within contemporary/familiar song genres and see how this might differently affect efficiency and accuracy of performance. This study only selected one song from each music genre it included. Future research should take this into account as it may be beneficial to select a variety of different songs within whatever music genres are being included to see whether results remain consistent.

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Appendix:

- A. <https://www.youtube.com/watch?v=dKbGZwfNtDI>
- B. <https://www.youtube.com/watch?v=SgfdorlWK34>
- C. Math sheet (<https://webmathminute.com/>)

WEB
MATH MINUTE

MULTIPLICATION from 4 to 16
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D. Demographic Survey

Please indicate your gender.

- Male
- Female
- Other
- Prefer to not say

Age: _____

Year: 1st year Freshman 2nd year Sophomore 3rd year Junior 4th year Senior

Do you listen to music while you do homework or study? Yes or No

If Yes, What kind of music? _____

If No, Why not? _____

Do you need background noise when you are doing homework/studying? Yes or No

Have you ever heard the country song played? Yes or No

If yes, what is the name of the song/artist _____

Have you ever heard the R&B/Rap Song played? Yes or No

If yes, what is the name of the song/artist _____

Mozart versus meditation: A comparative study on the effects of meditation and music on
working memory

Matthew Kroon*, Joshua Sanchez, James Dougherty, Cheryl Ford, Yalimet Abreu & Fernando
Cornejo

Research Mentor: Dr. Ruta Clair

*Primary author of this work

Psychology Department, Cabrini University

Abstract

Research has shown that meditation allows more focus and can rid distraction. Research has also shown that people perform better on memory tests when listening to background music (Balch & Lewis, 1996; Bell, McIntyre, & Hadley, 2016; Yuille & Sereda, 1980). The purpose of this experiment was to compare the efficacy of music and meditation as aids to working memory. It was hypothesized that participants would have a greater improvement to working memory when they listened to classical music while studying than when they completed a meditation exercise. Participants completed a baseline test involving being shown a selection of ten playing cards and were asked to record as many details about the cards as they were able after the cards were removed. They then either participated in a meditation exercise or listened to classical music while completing the test a second time. These measures were then analyzed on three factors: accuracy of face value, suit, and color, each on a scale from 0-10 and a composite score. Because of the small sample size ($n = 16$), non-parametric tests were used and showed a significant decrease in accuracy of recall of face value of cards in the meditation group and combined sample, but the music group showed no significant decrease when analyzed separately. Overall, the meditation group still scored significantly higher than the music group. They also showed that there is a significant difference in composite scores after the conditions were implemented. The tests did not show any other significant decreases in performance, but the trends in the data

may suggest that a decrease may exist, and the small sample size may skew the results of the tests.

There are many benefits that come from either mindful meditation or listening to music, as evidenced by the many studies that have shown that both improve working memory in humans. It stands to reason, that due to the age of studies regarding meditation and music, that it has long been part of folk knowledge that music and meditation each separately aid in memory and cognitive function (Balch & Lewis, 1996; Yuille & Sereda, 1980), but which has stronger benefits? Comparative studies between memory and meditation are scarce. Studies as early as 1980 have studied the effects of meditation in humans (Yuille & Sereda, 1980), and the effect music has on memories has been studied as early as 1996 (Balch & Lewis, 1996). Bell, McIntyre, and Hadley (2016), found that a music-based intervention program increases spatial reasoning and mindfulness. After completing a baseline measure, participants were split between four experimental conditions, and each condition varied how long the participants were to have daily exposure to classical music. The four conditions were exposure for 30 minutes, 3 weeks, 6 weeks, and 12 weeks. There was a significant correlation between mindfulness and spatial reasoning, but the effect was only evident in the 6- and 12-week intervention programs. Pairwise comparisons also found that there were significant differences in post-condition test scores between the 12-week intervention and the shortest intervention groups (30 minutes and 3 weeks).

Working Memory

Baddeley (1983) outlined a component system of working memory that has been the foundation of research and clinical work since that time. The model of working memory is that of a central processor that coordinates visual and auditory perception, attention, and memory systems (Baddeley, 1983). Viewing working memory as a cognitive mechanism accounts for the versatility that working memory demonstrates in different measures of function (Baddeley, 1983; Borella et al, 2017). Working memory can be viewed as the process of keeping information

available before it is encoded into long-term memory storage or used elsewhere in the brain (Baddeley, 1983; Borella et al, 2017; Jha, Stanley, Kiyonga, Wong, & Gelfrand, 2010).

There is evidence of changes, and specifically decline, in working memory function that occurs with aging (Borella et al., 2017). However, working memory is a cognitive function that can be improved or maintained with training (Borella et al., 2017; Jha et al., 2010). Borella et al. (2017) found that working memory can be trained in older adults to reduce the rate of cognitive decline. Similarly, Jha, et al., (2010) found that sufficient mindfulness training has protective benefits on working memory capacity as people grow older. Jha et al. (2010) also stated that working memory “is used in managing cognitive demands and regulating emotions.”

As working memory is a central element of executive processing, learning, and daily function (Baddeley, 1983; Borella et al., 2017; Jha et al., 2010) the field has sought to identify training methods to improve working memory function. For example, Mrazek, Franklin, Phillips, Baird, and Schooler (2013) found that mindfulness training improved working memory capacity and reduced distracting thoughts during a task. However, Degé and Kerkovius (2018) found that musical training did not influence central executive function but did have a beneficial effect on encoded verbal and visual memory. There is not yet a definitive program for working memory improvement.

Music and Cognition

Many students listen to music while they are studying, but the results of studies examining the effects of doing so have been ambiguous (Lemaire, 2019). Lemaire (2019) also found that when comparing stimulating music, relaxing music, and noise, stimulating music only facilitated memorization by a small margin. However, Balch and Lewis (1996) found that timbre

and presence of the music did not affect the reduction of memory, but tempo was the essential component. They argued that the different tempos triggered different mood arousal states and that recall of words was better when the tempo matched the learning condition.

On the topic of verbal memorization and the memorization of speech, Silverman and Schwartzberg (2019) found that having a visual and auditory component to a task lowered accuracy during recall, and the effect was especially apparent when the participants were asked to recall speech compared to when they were asked to recall a chant or a melody. This shows that tonality and rhythm have an effect on memorization. Further, Kubit and Janata (2018) found that how we orient ourselves to the music we listen to affects the experiences we have of that song. They also “provide initial evidence suggesting that music-evoked remembering integrates a sensorimotor representation of the music with episodic representations for the related autobiographical content,” (Kubit & Janata, 2018).

Contradictory studies.

While there is evidence of the impact of music on memory, the field continues to demonstrate contradictory findings concerning the effects of music on working memory and executive function. For example, Jaschke, Honing, and Scherder (2018) found that musically-enriched environments had no significant impact on executive functions, such as planning, inhibition, and working memory. Similarly, Nguyen and Grahn (2017) found that while different aspects of music affected memory when compared to music that did not share the same aspects, they concluded that music, when compared to silence, had no significant effect on working memory performance. Yesil and Unal (2017) found that music training did not significantly affect attention shifting in adults, and music only had significant effects in select tasks with a working memory component. These results all imply that music-based interventions will have no

significant long-term effect on working memory, which indicates that people who use them as their sole method of retaining working memory capacity will likely not receive the benefits that they are expecting.

Music and the Brain.

Neural activation studies have shown that music impacts the development of the brain and neural pathways. For example, Groussard et al. (2010) found that during a music familiarity test examining semantic memory for music, several areas in the brains of musicians activated where non-musicians did not activate, suggesting an interaction between episodic and semantic memories. They also found that the hippocampus in musicians had higher gray matter density than in non-musicians (Groussard et al., 2010). This may begin to explain the findings of Silverman and Schwartzberg (2019), where the increased gray matter density and activation of both memory pathways lead to an increase in accuracy when memorizing speech that has a tonal quality and rhythm.

Meditation

Mediation is a complex process that involves multiple cognitive systems (Sedlmeier et al., 2012). Further, Sedelmeier et al., 2012 point out that there are numerous techniques grounded within Buddhist practice, psychotherapy, and other frameworks. A simplification of meditation is a set of techniques that involve breathing, awareness, and concentration to enter a meditative psychological state (Gard, Hölzel, & Lazar, 2014; Sedelmeier et al., 2012). Regardless of technique, meditation has been found to positively affect attention, memory, executive function, processing speed, and general cognition (Gard, Hölzel, & Lazar, 2014).

Just as with music, there is an emotional component to meditation. A meta-analysis by Sedlmeier et al (2012) found that meditation had the strongest impact on emotionality and relationship issues, while the weakest effects of meditation were the benefits for other cognitive measures. Sedlmeier et al. (2012) also nicely summed up the three major classes of meditation, although they are not mutually exclusive and many approaches to meditation fall within multiple classes. They state that concentrative techniques use an object of focus or attention. Mindfulness meditation is focused on the present in a nonjudgmental atmosphere and awareness of the meditator's surroundings (Sedlmeier et al., 2012). Guided meditation focuses on the content of the meditation rather than approaching it with the intent to judge or analyze the content, guided meditation intends to fully experience the content of the meditation (Sedlmeier et al., 2012).

Bloch et al. (2017) found that a course on meditation worked to increase mindfulness in all the participants as well as an increased feeling of meaning in their life. Williams (2010) found that mindfulness changed practitioners' responses to pain, brain structure, and how the practitioners processed emotion, showing a distinct ability to separate the sensory and narrative self. They also found that it increases working memory capacity and enhance the ability for practitioners to talk of crises without becoming overwhelmed.

Mindfulness and Meditation.

Meditation is the practice where an individual uses a technique to focus their mind on a particular thought, object, or activity, which can train attention and awareness. Mindfulness is a state of active and open attention to the present and the individual's thoughts, actions, and body. Rogers and White (2017) equated several steps of experiential reframing and the theory behind the therapy to common mindfulness and meditation techniques. Their work could also be used as a support to show how meditation is able to positively affect so many components of humans

through the basis of Erickson's hypnotherapy techniques. While their work is focused on treating traumagenic experiences and helping alleviate the symptoms of such traumatic experiences, their work can also be used as a guide to reframing any memory or the process through which long-term memories are encoded. Jensen, Vangkilde, Frokjaer, and Hasselbalch (2012) found that meditation-based stress reduction techniques significantly increased selective attention, threshold for conscious perception of stimuli, and visual working memory capacity. They also found that the meditation based techniques worked significantly better than non-meditation-based techniques in reducing stress, both perceived and physiological.

Source Monitoring and Metacognition.

Alberts, Otgaar, and Kalagi (2017) found that mindfulness meditation positively affected source monitoring, but not memory itself. In their study, participants either took part in a brief mindfulness meditation or were part of the control group with no intervention, then they were to watch a short video of a crime. Finally, the participants were given misinformation about the crime scene and given a source monitoring test to measure their memory performance. How the researchers set up their measure may hide what functions were in effect during the study. The process that they call source monitoring could have roots in working memory, as when the participants were to fill out the test, they had to remember what happened in the short video and whether that information was also present in the text they were given. Metacognition is the processes that are used to plan, monitor, and assess one's understanding and performance. Baird, Mrazek, Phillips, and Schooler (2014) studied the impact of mental training on metacognitive ability. They found that the 2-week program their subjects participated in enhanced their introspective accuracy in memory.

Transcendental Meditation.

Transcendental meditation is a form of meditation that is meant to separate the individual from feelings of anxiety and promote self-realization. Throll (1981) found that Transcendental meditation also decreased trait neuroticism, extraversion, and trait and state anxiety. Additionally, Haaga et al. (2011) found that Transcendental meditation also reduces drinking rates among college students. These suggest that transcendental meditation may have an indirect effect on working memory, as both alcohol and anxiety have negative correlations with working memory function (Lukasik et al., 2019; Salling et al., 2018). Lacaille et al. (2018) found that more frequent and longer practices of meditation increased the frequency and intensity of mindful reactions to daily events in participants' lives. In contrast, Yuille and Sereda (1980) found that meditation had no effect on short- and long-term memory, attention, reading skills, and intelligence.

Summary

Working memory is a cognitive process that is essential for both cognitive tasks and daily life. Working memory also reduces in performance as we age, which has led to the field seeking to understand the conditions that maximize working memory processes. However, there is not yet a consensus on the conditions that support the strongest working memory processes. Some studies have shown positive effects for music on working memory (Kubit & Janata, 2018; Yesil & Unal, 2017). However, there are also studies that show little to no effect of music on working memory (Jaschke, Honing, & Scherder, 2018). Similar to music, the research concerning the effects of medication on working memory are unclear. Studies have demonstrated a positive effect on working memory (Baird et al., 2014) as well as no effect (Yuille & Sereda, 1980). The literature has not yet reached a consensus regarding working memory and conditions to strengthen this essential cognitive process.

Purpose

The purpose of the current study was to compare the effectiveness of music-based and meditation-based interventions in respect to increasing working memory performance. With the deterioration of working memory as humans age, it is important to find ways that improve and maintain working memory effectively. A visual task was chosen as the measure for measuring working memory performance because much of the research has used verbal tasks, and we wanted to remove the verbal aspect to allow the experimental conditions to be novel in both groups. For the study itself, it was believed that the lack of decisive evidence for which intervention type would have a larger effect, and the prevalence of students who study while listening to music and attest to the positive benefits, lends credence to the idea that those who listened to classical music would have a higher increase in working memory than those that participated in a short meditation exercise.

Methods

The plan was to use the Cabrini Psychology participation pool, but due to COVID-19 closures, the participants were from Cabrini's Research Methods II class. The class was split in half, and one half was taken to another room. Each room was assigned a different experimental condition. The participants consisted of 16 Cabrini University students, 8 in each experimental condition.

Measures

Participants were asked to complete a form with what they remember from a set of 10 cards arranged in two rows of 5. The results were based on their accuracy in recalling the face/value, suit, and color of the cards presented. The form they were given had two sets of ten

cards each, separated by a line, which they used in the memorization task, as seen in the Appendix. The cards were presented using a normal projector or a document projector onto the screen, and each set was displayed as two lines of 5 cards, similar to the layout of the measure.

Procedures

Participants were all Cabrini University students enrolled Research Methods II during the Spring semester of 2020. They were a mix of Junior and Senior Psychology majors, and they were split into groups by going around the room and counting off either group 1 or group 2. Group 1 was assigned the music-based condition, and group 2 was assigned the meditation exercise, both of which are detailed later. All participants performed a baseline working memory test involving a series of regular playing cards that they were then asked to recall on a paper that had been given to them. They were later judged on recall accuracy of the color, suit, and value/face of the cards. The participants had 45 seconds to view the cards and memorize the face value, suit, and color of each card. They then had 90 seconds to fill in that information on the measure. Then the groups either listened to classical music while completing the task again with a new set of cards or participated in a 5-minute long meditation exercise. After the meditation exercise, they were asked to perform the same task again with a new set of cards. Finally, each group was asked to put a letter in the ID line for ease of analysis and group identification, either A for the group who participated in a meditation exercise or B for the group who listened to classical music.

Results

Due to the small sample size, non-parametric analyses had to be used. A Wilcoxon signed-rank test was used to compare the participant's performance after the condition was

implemented to their performance in the control setting and examine the idea that a musically-enriched environment and meditation exercises improve working memory. The test showed that the accuracy regarding the face value of the cards for the meditation group decreased after the meditation exercise ($M = 6.875$) when compared to the baseline test ($M = 8.875$, $W = 27.0$, $p = 0.033$). There was no significant difference in the accuracy when recalling the suit ($W = 4.0$, $p = 0.850$) or color ($W = 0.0$, $p = 0.098$). A total accuracy score was calculated by adding the scores in the component measures, up to a maximum score of 30. There was no significant difference in this score in the meditation group ($W = 12.0$, $p = 0.799$). Like the meditation group, the group that listened to music did not show any significant differences in recall of color ($W = 1.0$, $p = 1.0$), suit ($W = 10.0$, $p = 0.098$), or in their total score ($W = 29.5$, $p = 0.123$). In addition, the music group did not exhibit a significant reduction in accuracy of recall regarding the face value of the cards ($W = 23.0$, $p = 0.149$). When combined, participants had lower accuracy in recalling the face value of cards after the condition was imposed ($M = 6.75$) when compared with their baseline tests ($M = 8.625$, $W = 93.5$, $p = 0.011$). The combined data did not show any other significant differences.

A Mann-Whitney U test was used to compare the two conditions. and it showed that the only significant difference between the meditation group and the music group was the total measure scores after the experimental condition was implemented, with the Meditation group ($M = 12.0$) performing better than the music group ($M = 8.625$, $W = 52.0$, $p = 0.039$).

While there were few statistically significant findings, there were trends that were suggestive of a difference between the conditions. The meditation group performed better than the music group for identification of the face value of the cards, and were equal or better in recall of the suits of cards. Before the experimental conditions were implemented, the meditation group

scored lower in recalling the color of the cards than the music group ($0.75 < 1.0$), but the overall total scores were comparable (Meditation = 11.75, Music = 11.5). After the experimental conditions were implemented, the meditation group performed better than the music group in every aspect of the measure.

Discussion

This study sought to compare the performance on working memory after meditation or music. Interestingly the meditation group were less accurate in identifying the face value of the stimulus cards after they engaged in a mediation task than before. This is counter to the findings in the literature that suggest improvement in working memory after mediation (Gard, Hölzel, & Lazar, 2014; Sedelmeier et al., 2012). However, trends in the data showed that there were increases in the recall of suits and colors of the cards in the meditation group, which led to higher scores overall after the condition was implemented. The increase in component scores also made it such that the meditation group had significantly higher total accuracy scores than the music group after the conditions were implemented. These results suggest that performing a meditation exercise before an examination may result in a higher score than listening to music while studying.

These results and trends support the work of Jensen, Vangkilde, Frokjaer, and Hasselbalch (2012), where they found that meditation increased visual working memory capacity. The trends in the results here show that it may not be all visual working memory, but specific components of visual working memory that can be improved through meditation. The participants were not able to remember the face value of the cards as well after the meditation exercise, but they were able to more easily remember the color and suit of the cards that were presented to them. This shows that they were able to remember more simple shapes and colors,

while more elaborate images, such as the images on the jack, queen, and king cards were more difficult to remember.

The trends in the data also suggests that while a meditation exercise decreases recall of face values; it also increases recall of suits and colors of cards. Generalizing this, the results may show that meditation aids the recall of more abstract ideas such as colors and shapes, while meditation also inhibits the recall of numerals and letters. The trends also show that music decreases recall of suits and face values of cards, while at the same time improving recall of the colors of the cards. These trends are contrary to the literature as previous studies have not yet shown a decrease in performance in working memory tasks, only either increases in performance, or no significant difference. The implications of these results are that college students should reconsider using meditation as a memory aid when studying for an examination that relies on recall of intricate details.

There were limitations to the study that bring into question the generalizability of these results. The Participants were all college-age students, so the results may not be generalizable to middle-age adults or older adulthood. In addition, the sample was small, so the results may not be generalized to the population of college students. In the future, a study could be done with people of all ages and a larger, more representative sample to normalize the distribution of possible sample means. Another factor that may have impacted the results is the timing of the experiment, as it was conducted at the time that an email was sent out that the college campus would be shutting down due to COVID-19, which may have increased state anxiety in the participants and impacted their results.

The results are not conclusive due to the limitations of the study, but the results do suggest that music has no significant effects on visual working memory performance. The

results, while inconsistent, also suggest that meditation may be effective in increasing working memory capacity when performing a visual memory task. This suggests that meditation may be a good strategy to aid in maintaining working memory capacity as humans age.

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Appendix
Recording sheet

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Contact Theory & Views on Currently/Formerly Incarcerated Individuals

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Abstract

Many studies have examined and reported on the different prejudices groups of individuals face in society (Calaway, Callais, & Lightner, 2016; Hilinski-Rosick, & Blackmer, 2014; Nordberg, Praetorius, McCoy, Mitschke, & Henderson, 2017; Smith, Meade, & Koons-Witt, 2009). However, scant research has focused specifically on the population of people who are currently or formerly incarcerated. In this study, the concentration is on this specific population, the prejudices they experience, and how those prejudices can be decreased by applying the Intergroup Contact Theory. A survey using availability sampling was administered to 136 Cabrini University students to investigate the effects that contact with the criminal justice system may have on one's views of those who are currently or formerly incarcerated. Results showed a significant relationship between knowing someone who has been incarcerated and the belief that currently/formerly incarcerated individuals are not worse or less than people who have not been incarcerated.

Introduction

Biases, prejudices, and stereotypes have been part of society for centuries and continue to be problematic today. Although there have been major advances in teaching tolerance and acceptance, many prejudices, biases, and stereotypes are far from being eradicated. One prejudice that is very active in today's society, but is often ignored, is the prejudice against those involved in the American criminal justice system (Calaway et al., 2016; Hilinski-Rosick, & Blackmer, 2014; Nordberg et al., 2017; Smith et al., 2009). Not only do these individuals experience prejudice and mistreatment in jails and prisons, they experience it once they are released as well (Nordberg et al., 2017).

The United States has the highest incarceration rate in the world (Highest to Lowest - Prison Population Total, n.d.). In 2016, the estimated total U.S. population was 323,071,342 (United States Census Bureau, 2010). Of that national population, there was an estimated 6,613,500 people under supervision of the U.S. adult correctional system, which is approximately 2% of the total population (Kaeble & Cowhig, 2016). This is problematic because often incarcerated people are mistreated (Nordberg et al., 2017). In addition to the mistreatment experienced within correctional facilities, people are often stigmatized once released from prison as well (Nordberg et al., 2017).

The stigmas and stereotypes that formerly incarcerated individuals experience are often dehumanizing (Calaway et al., 2016). For example, they are perceived to have flawed characters that impact their ability to make decisions and frame moral issues, presenting a perceived risk to society (Calaway et al., 2016). These individuals have a difficult time shedding the negative

labels that are associated with them after they have been incarcerated. After people have been arrested or incarcerated, many believe that they deserve little to no sympathy because of their crimes and they are viewed to be less than a human being (Calaway et al., 2016). This is extremely problematic because of the disadvantages these individuals have when re-entering into society, which is why there are many things being done to eliminate these views.

While prejudice still exists in society, there are efforts being made to teach acceptance and reduce discrimination of different populations. The Intergroup Contact Theory, or contact hypothesis, is one theory that introduces a way to reduce prejudice in different populations. This theory states that prejudice can be reduced by contact between majority groups (ingroups) and minority groups (outgroups) while attempting to obtain the same goals (Allport, 1954). Allport (1954) also states that prejudices would have greater reduction when the contact between the groups was overseen or sanctioned by institutional supports. Nordberg et al. (2017) and Calaway et al. (2016) use the contact hypothesis to challenge students' attitudes towards individuals that have been involved in the criminal justice system.

Studies examining contact hypothesis have shown that, for the most part, contact between the ingroup and the outgroup can reduce any prejudices or biases towards one another. To investigate further, this research will explore whether contact with the criminal justice system impacts one's views on those who are currently or formerly incarcerated.

Literature Review

Stereotypes and Discrimination

In discussing the stigmas, stereotypes, and discrimination that this specific population faces, labeling theory plays a significant role. Individuals who are currently/formerly incarcerated often have harsh labels applied to them and they must battle dehumanizing

stereotypes (Calaway et al., 2016; Hilinski-Rosick, & Blackmer, 2014; Nordberg et al., 2017; Smith et al., 2009). Not only do these individuals combat stereotypes and experience discrimination while in jail and prison, but it continues while out in society (Nordberg et al., 2017). When they were arrested, they were automatically labeled as deviant. Once they are convicted and released, the discrimination that formerly incarcerated individuals face because of the labels placed on them is significant and can possibly advance the discrimination that most likely played a part in their initial run in with the law (Nordberg et al., 2017). These labels are extremely hard to shed once they are applied and stigmas begin to take form around that population once they are incarcerated, as well as when they re-enter society. A stigma places a target on one's back to be treated differently or discriminated against if they are part of a group that is being stigmatized because the stigma labels an individual as "different" (Calaway et al., 2016). Individuals who are currently or formerly incarcerated are stigmatized because of their time within the criminal justice system. Being stigmatized means harmful stereotypes are often applied, such as, the perception of being a threat to society, having a flawed character, and being unable to make decisions properly and frame moral issues (Calaway et al., 2016). People in this population are also perceived to be lazy, uneducated, and sometimes crazy (Nordberg et al., 2017). Once these stereotypes and stigmas are placed on these individuals, it dehumanizes them, makes them one-dimensional, and makes it hard for formerly incarcerated people to be considered trustworthy again (Calaway et al., 2016).

In addition to having these stereotypes placed on them, formerly incarcerated people have trouble trying to secure employment, find housing, receive credit and financial services, and lose the ability to fully participate in civil society (Nordberg et al., 2017). For example, many states revoke the voting rights of individuals who have been incarcerated, however, there are states that

allow members of this population to continue to vote (Nordberg et al., 2017). Only two states, Maine and Vermont, have no voting restrictions for individuals who have been incarcerated (Potyondy, 2019). There are 16 states and the District of Columbia where individuals lose their right to vote only while incarcerated and have them restored after they are released (Potyondy, 2019). There are 21 states where incarcerated individuals lose their voting rights during incarceration, and for a period of time after release, but voting rights are automatically restored after that time period has ended (Potyondy, 2019). There are 11 states where individuals lose their voting rights indefinitely or require a governor's pardon in order for voting rights to be restored (Potyondy, 2019). In addition, individuals in those 11 states face an additional waiting period after completing their sentence and any parole or probation time and/or require more steps to be taken before their voting rights can be restored (Potyondy, 2019). Although some states' laws fully restore individuals' voting rights fairly quick and easy, there are still often long waiting periods and many barriers that prevent them from regaining their right to vote (Nordberg et al., 2017).

Another example of hardships currently/formerly incarcerated individuals face is the termination of parental rights. This actually affects women that are incarcerated more than men because women are seen to be the sole caretaker of their children. The Adoption and Safe Families Act (ASFA) makes it mandatory for parental rights to be terminated if a child is in out-of-home care for 15 out of the last 22 months (Allen, Flaherty, & Ely, 2010; Green, Rockhill, & Furrer, 2006). This is an issue for mothers who are incarcerated since a woman's average sentence is 18 months and ASFA does not consider incarceration to be an exception to the mandated time frame (Allen, Flaherty, & Ely, 2010; Women's Prison Association, 2006). This is also an issue because a growing number of women are being incarcerated. Over the past 30

years, the increase in the female prison population has regularly exceeded the male prison population in all 50 states, which makes women the fastest growing division of the U.S. prison population (Women's Prison Association, 2006; Allen, Flaherty, & Ely, 2010). According to the Women's Prison Association (2006) and Allen, Flaherty, & Ely (2010) "more than 65% of these women were mothers of minor children, and 64% of them had lived with their children prior to incarceration." Since more women are being incarcerated, that means that more mothers are being incarcerated and taken away from their children and having their parental rights terminated as well. This is just another hardship that incarcerated individuals have that affect their lives while inside and outside of jail and prison.

These stereotypes and other obstacles these individuals face effect every facet of their lives (Nordberg et al., 2017). However, there are different programs, like the Inside-Out Prison Exchange Program and prison tours, and studies, such as Calaway et al. (2016), Hilinski-Rosick, & Blackmer (2014), Nordberg et al. (2017), and Smith et al. (2009), being introduced into society to try and eradicate these biases and stereotypes. The Inside-Out Prison Exchange program is an international program that began in 1997 through Temple University in Philadelphia, Pennsylvania (Hilinski-Rosick & Blackmer, 2014). The program teaches college level classes in prisons and jails (Allred, 2009). The class consists of the same amount of incarcerated individuals (inside students) and college students (outside students), as well as a facilitator or professor who has been specially trained to teach in the program. (Allred, 2009). The course topics vary, however, no matter the topic, the outside students bring in a more academic or outside viewpoint of the criminal justice system, while inside students bring perspectives of people who have actually experienced that system firsthand (Hilinski-Rosick & Blackmer, 2014). The goal is to help the inside and outside students learn together and learn

from each other. Many studies that have looked at how contact with incarcerated individuals have influenced people's views have used the Inside-Out program and prison tours along with the Intergroup Contact Hypothesis as an example (Calaway et al., 2016; Hilinski-Rosick, & Blackmer, 2014; Smith et al., 2009).

Intergroup Contact Theory

Allport's (1954) Intergroup Contact Hypothesis Theory was introduced in his book, *The Nature of Prejudice*. In this theory, it is hypothesized that prejudice can be reduced by contact between majority groups (ingroups) and minority groups (outgroups) while both groups are working together to obtain the same goals (Allport, 1954). This prejudice reduction usually can only occur, however, when the individuals who hold the prejudice against the outgroup feel secure and are open to thinking positively (Hutchison, & Rosenthal, 2011). Allport's (1954) theory also hypothesizes that prejudices would have greater reduction when the contact between the groups was overseen or sanctioned by institutional supports. This is exemplified in programs like prison/jail tours and the Inside-Out Prison Exchange program.

Application of the Contact Hypothesis

Successfully applying the contact hypothesis in different research studies has helped ground it as a valid theory (Calaway et al., 2016; Hilinski-Rosick, & Blackmer, 2014; Hutchison & Rosenthal, 2011; Nordberg et al., 2017). Research that has used Allport's theory show that increased contact between individuals from the ingroup and members of the outgroup can help increase positive attitudes towards those of the outgroup (Allport, 1954; Calaway et al., 2016; Hilinski-Rosick, & Blackmer, 2014; Hutchison & Rosenthal, 2011; Nordberg et al., 2017). Nordberg et al. (2017), Calaway et al. (2016), and Hilinski-Rosick & Blackmer (2014) use the contact hypothesis to challenge students' attitudes about individuals who are/have been involved

in the criminal justice system. Hutchison & Rosenthal (2011) use the contact hypothesis to challenge individuals' prejudicial attitudes against Muslims.

In the studies conducted by Nordberg, et al. (2017), Calaway, et al. (2016), Smith, et al. (2009), and Hilinski-Rosick & Blackmer (2014), prison/jail tours, first-hand accounts of incarceration, and programs like Inside-Out are used. These programs are important tools in challenging damaging stereotypes of currently and formerly incarcerated people. Nordberg et al. (2017) invited an exonerated individual who had been on death row to come and speak to Social Work students. Students were asked to write reflections of the experience using 1 of 4 questions they were provided (Nordberg et al., 2017). Two examples of questions used are "Please describe your impression of death row, and the people who live and work there, before and after Mr. Melendez's talk" and "How did Mr. Melendez's story of imprisonment, release, and so on, challenge or confirm your personal paradigm" (Nordberg et al., 2017). The researchers then analyzed the reflections and found that the students gained useful insight into aspects of oppression experienced by many groups and other oppressed individuals (Nordberg et al., 2017).

Calaway et al. (2016) examined whether a prison tour would have any effect on criminal justice students' attitudes toward punitiveness, harsh penalties, rehabilitation, empathy, and alternatives to prison. Students toured Southern Ohio Correctional Facility which is a maximum-security facility and is also responsible for the administration of the death penalty for the entire state of Ohio (Calaway et al., 2016). Surveys were administered before and after the tour to assess any change that occurred (Calaway et al., 2016). According to Calaway et al. (2016), the results "indicate that a prison tour with moderate prisoner interaction changed perceptions of criminal justice students in support for rehabilitation and educational programming, opposition to the death penalty, general attitudes toward inmates, understanding of prisons, and greater support

for parole and community corrections.” Smith et al. (2009) also utilized a prison tour to investigate the impact of a prison tour on students’ perceptions of punishment philosophies and “typical” prisons and prisoners. These students were also given a survey before and after the tour to assess any change (Smith et al., 2009). Overall, the change in student’s opinions were more positive than they were before the tour (Smith et al., 2009).

Hilinski-Rosick and Blackmer (2014) used papers from the Inside-Out Prison Exchange program to evaluate change in the students’ perceptions. The outside students’ papers showed that being in the class changed their views on punishment philosophies, challenged preconceived notions of inmates, helped humanize inmates, break down different stereotypes of inmates, etc. (Hilinski-Rosick, & Blackmer, 2014). Hutchison and Rosenthal (2011) used two different surveys at two different times to examine non-Muslim individuals’ attitudes towards Muslims. This study investigated the relationship between the non-Muslim individuals’ experiences of contact with Muslims and their intergroup anxiety, outgroup attitudes, perceptions of outgroup variability and intergroup behaviors (Hutchison & Rosenthal, 2011). The results of this research did show that increased positive contact improved non-Muslims’ attitudes towards Muslims (Hutchison & Rosenthal, 2011).

The hypothesis of this research is that individuals who have had prior contact with the criminal justice system will have more positive views on currently and formerly incarcerated individuals.

Methods

This research was conducted using a non-experimental survey design and availability sampling. The survey was conducted in the Fall semester of 2019 at Cabrini University. After IRB (Institutional Review Board) approval, students attending a variety of classes at Cabrini

were asked to complete a survey of 33 questions. This research study was done as part of the Research Methods II class at Cabrini University. To make data collection easier for all individuals in the class, the survey distributed for this research included questions that also measured other researchers' areas of interest. The independent and dependent variables of this study were measured by 10 of the 33 questions that made up the survey.

Demographics

The sample (N=136) consisted of 84 (62.7%) females, 49 (36.6%) males, and 1 (.7%) individual who identified as other. Participants in the sample ranged in age from 18 to 29 with the majority being aged 18 to 21 years old (83.1%, n=113). The race breakdown of the sample showed that 66.9% (n=89) of participants identified as White/Caucasian, 15.8% (n=21) identified as Black/African American, 1.5% (n=2) identified as Asian, 6.0% (n=8) identified as Multiracial, and 9.8% (n=13) identified as Other. In terms of ethnicity, 107 participants (82.3%) identified as Non-Hispanic or Non-Latinx and 23 (17.7%) identified as being Hispanic or Latinx. The majority of participants in the sample (78.7%, n=107) had majors that were in the schools of Business, Arts, & Media, and Humanities & Social Sciences. The descriptive statistics of the sample participants can be found in Table 1 and Table 2 below.

According to the National Center for Education Statistics (n.d.), Cabrini University's gender breakdown is 61% female and 39% male. The race breakdown for the school is 52% White, 21% African American, 2% Asian, 3% Multiracial, and 9% Unknown race/ethnicity (National Center for Education Statistics, n.d.). The gender and race breakdowns of sample participants are very close to that of the Cabrini University population, which makes the results easier to generalize to the sample population.

Table 1. *Frequencies of Survey Participants (N = 136)*

| <i>Variable</i> | <i>Percent</i> | <i>N</i> |
|--|----------------|----------|
| Gender | - | 134 |
| Male | 36.6% | 49 |
| Female | 62.7% | 84 |
| Other | .7% | 1 |
| Major | - | 136 |
| Business, Arts, & Media | 47.8% | 65 |
| Humanities & Social Sciences | 30.9% | 42 |
| Natural Sciences & Allied Health | 12.5% | 17 |
| Education | 2.2% | 3 |
| Undecided | 1.5% | 2 |
| Multiple Departments | 5.1% | 7 |
| Race | - | 133 |
| White/Caucasian | 66.9% | 89 |
| Black/African American | 15.8% | 21 |
| Asian | 1.5% | 2 |
| Native American/American Indian/Alaska Native | - | - |
| Native Hawaiian/Pacific Islander | - | - |
| Multiracial | 6.0% | 8 |
| Other | 9.8% | 13 |
| Ethnicity | - | 130 |
| Hispanic or Latinx | 17.7% | 23 |
| Non-Hispanic or Non-Latinx | 82.3% | 107 |

Table 2. *Frequencies of Survey Participant Age (N=136)*

| <i>Variable</i> | <i>Percent</i> | <i>N</i> | <i>Mean</i> | <i>SD</i> |
|-----------------|----------------|----------|-------------|-----------|
| Age | - | 136 | 20.2647 | 1.89828 |
| 18 | 12.5% | 17 | - | - |
| 19 | 26.5% | 36 | - | - |
| 20 | 25.7% | 35 | - | - |
| 21 | 18.4% | 25 | - | - |
| 22 | 6.6% | 9 | - | - |
| 23 | 5.1% | 7 | - | - |
| 24 | .7% | 1 | - | - |
| 25 | 1.5% | 2 | - | - |
| 26 | 1.5% | 2 | - | - |
| 27 | .7% | 1 | - | - |
| 29 | .7% | 1 | - | - |

Variables of Interest

The independent variable measured for this study is “contact with the criminal justice system.” Contact with the criminal justice system is defined as knowing an individual who is or has been arrested and incarcerated, personally being arrested and/or incarcerated, knowing or being an individual who is in law enforcement or corrections, living near or having toured a jail or prison, or studying criminology/criminal justice (Allport, 1954; Calaway et al., 2016; Nordberg et al., 2017). Only 2 questions out of the 5 used to measure the independent variable were chosen to be analyzed since they were the questions that had the most consistent number of responses. The first question out of the 2 used was “Do you know anyone, self or other, who works in law enforcement or corrections?” Of the participants that answered this question (n=132) 65.9% (n=87) of respondents answered yes, while 34.1% (n=45) answered no. For the second question, “Do you know anyone, self or other, who has been incarcerated?” out of the 132 respondents, 85 (64.4%) answered yes and 47 (35.6%) said no. All questions used to measure the independent variable are provided in Appendix A.

The dependent variable measured for this study is “views on individuals who are currently/formerly incarcerated.” Views on individuals who are currently/formerly incarcerated is defined as having positive or negative views/opinions about incarceration and those individuals who are or have been incarcerated (Hilinski-Rosick & Blackmer, 2014; Smith et al., 2009). Only 3 questions out of the 5 used to measure the dependent variable were chosen to be analyzed since they were the questions that had the most consistent number of responses. The first question used, “Do you believe that most prisoners can be rehabilitated?” had 132 total responses. Of those respondents, 81.8% (n=108) answered yes and 18.2% (n=24) answered no. The second question, “Do you believe that most prisoners are too lazy to earn an honest living?”

had 16.0% (n=21) answered yes, while 84.0% (n=110) answered no. The third question asked, “Do you believe that individuals who are/have been incarcerated are worse or less than individuals who are not in jail or prison?” Out of the 132 respondents, 24 (18.2%) answered yes and 108 (81.8%) answered no. All questions used to measure the dependent variable are provided in Appendix B. All answer frequencies discussed of the independent and dependent variables can be viewed in Table 3 below.

Table 3. *Frequencies of Survey Answers (N=136)*

| <i>Variable</i> | <i>Percent</i> | <i>N</i> |
|--|----------------|----------|
| 1. Do you know anyone, self or other, who works in law enforcement or corrections? | - | 132 |
| Yes | 65.9% | 87 |
| No | 34.1% | 45 |
| 2. Do you know anyone, self or other, who has been incarcerated? | - | 132 |
| Yes | 64.4% | 85 |
| No | 35.6% | 47 |
| 3. Do you believe that most prisoners can be rehabilitated? | - | 132 |
| Yes | 81.8% | 108 |
| No | 18.2% | 24 |
| 4. Do you believe that most prisoners are too lazy to earn an honest living? | - | 131 |
| Yes | 16.0% | 21 |
| No | 84.0% | 110 |
| 5. Do you believe that individuals who are/have been incarcerated are worse or less than individuals who are not in jail or prison? | - | 132 |
| Yes | 18.2% | 24 |
| No | 81.8% | 108 |

Plans for Analysis

After all survey data was collected, it was compiled into a new dataset and analyzed using a statistical software analysis package called SPSS. In order to analyze the relationship between contact with the criminal justice system and views of currently/formerly incarcerated individuals, a Pearson Correlation was conducted, which is the most appropriate analysis given that the variables were binary.

Results

Table 4 shows the results of the Pearson Correlation that was conducted in order to assess the relationship between contact with the criminal justice system and views on currently/formerly incarcerated individuals. Through the Pearson Correlation, there were 3 significant relationships found, however, only 1 of the significant relationships directly related the independent and dependent variable.

The first relationship was a weak, significant, negative correlation between the variables Incarcerated and Worse_Less, $r(136) = -.205, p < .05$. This means that if an individual knows someone, self or other, who has been incarcerated, they are less likely to think believe that currently/formerly incarcerated individuals are worse or less than people who have not been incarcerated. This significant correlation supports the hypothesis that individuals who have had prior contact with the criminal justice system will have more positive views on currently/formerly incarcerated individuals. This is the only significant relationship that related directly to the independent and dependent variable.

The second relationship was a weak, significant, negative correlation between the variables Rehabilitation and Lazy, $r(136) = -.276, p < .01$. This means that if someone believes that incarcerated individuals can be rehabilitated, then they are more likely to believe that those individuals can work and earn an honest living. The third relationship was a weak, significant,

positive correlation between the variables Lazy and Worse_Less, $r(136) = .223, p < .01$. This means that if someone believes that incarcerated individuals can work and earn an honest living, they are more likely to believe that incarcerated individuals are not worse or less than those who have not been incarcerated. These two significant correlations do not directly support the hypothesis because they do not show a relationship between the independent and dependent variable.

Table 4. *Pearson Correlation Results*

| <i>Variable</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> |
|--------------------------|----------|----------|----------|----------|----------|
| 1. Corrections | 1 | - | - | - | - |
| 2. Incarcerated | .163 | 1 | - | - | - |
| 3. Rehabilitation | .037 | .145 | 1 | - | - |
| 4. Lazy | -.081 | -.110 | -.276** | 1 | - |
| 5. Worse_Less | -.129 | -.205* | -.145 | .233** | 1 |

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

Discussion

The purpose of this study was to examine if contact with the criminal justice system affected one's views of currently/formerly incarcerated individuals. Based on results from previous literature, the hypothesis was formed that individuals who have had prior contact with the criminal justice system will have more positive views on currently/formerly incarcerated individuals. The results from this study support the constructed hypothesis due to the Pearson Correlation results showing a significant relationship between the independent and dependent variables. The significant relationship showed that individuals who know someone who has been incarcerated are less likely to believe that people who are currently/formerly incarcerated are worse or less than people who have not been incarcerated.

The two other significant relationships found were interesting because they did not directly relate to the independent and dependent variables. However, there was a different theme that emerged that showed that people who tend to hold positive views about certain aspects of the population in question are more likely to hold positive views of that population as a whole. When looking into a possible explanation of this finding, there was little research to provide support or explanation. Further research is suggested to investigate the actual cause.

The results from this study also correspond to the results of other studies using the contact hypothesis to investigate people's views of currently/formerly incarcerated individuals. Studies conducted by Nordberg et al. (2017), Calaway et al. (2016), and Hilinski-Rosick & Blackmer (2014) used the contact hypothesis to challenge students' attitudes about individuals currently/previously involved in the criminal justice system. These studies used things like a death row exoneree's personal testimony, a prison tour, and the Inside-Out Prison Exchange Program to assess any changes the students had in their views. The studies conducted by Nordberg et al. (2017), Calaway et al. (2016), and Hilinski-Rosick and Blackmer (2014) produced results that did display students had a change of views in a more positive direction. This indicated that the contact of the individuals from the out-group (i.e., currently/formerly incarcerated people) introduced to the students resulted in more positive opinions of that population of people, which corresponds to the hypothesis of the current research.

This research and its results are important since there are not many studies that investigate this exact topic. Other studies, such as the ones discussed in the literature review, have explored this topic, but it has not been as direct as the current study. Calaway et al. (2016), Hilinski-Rosick, & Blackmer (2014), Nordberg et al. (2017), and Smith et al. (2009) introduced programs like Inside-Out and other stimuli like prison tours and personal testimonies to examine

if the individuals who encounter them have a change in opinion or views of individuals who are incarcerated. This study was interested in the views that people held on their own that they formed from influencing life events or people they know or have encountered. There was no introduction of any type of special program or stimuli to assess a change in people's views, rather, previous life experiences/encounters were used to examine how those experiences have possibly influenced them to hold their current views. Life experiences and individuals that one encounters throughout their life are extremely important and can help mold someone into who they are, which is why previous experiences and encounters were utilized rather than introducing a program or stimulus to attempt to change people's views. The perspective exemplified in this work is unique as there have not been many studies that examine how life experience specifically applies to a topic like this, which makes it an ideal point to build from for future research.

Some limitations of this study include the sample size, population surveyed, overall generalizability, and time constraints. This study used availability sampling and had a sample size of 136 participants. The population surveyed was made up of college students aged 18-29. Since this research looked at how life events or people one knows/has encountered can affect their views on certain populations, college students may not have that much experience involving this topic. While the results are generalizable to the Cabrini University student population, it is believed that the results could be more interesting and generalizable to a greater population if there were more participants and more diversity in the age of participants. The fourth limitation is time constraint. This research had to be conducted in a short window of time which did not allow for many survey questions to be compiled or for more participants to be included. Overall suggestions for future research would be to have a longer period of time to conduct the research,

increase the amount and detail of questions, gain a larger sample size, and have more diversity in age to increase the likelihood of the results being generalizable.

The results of this study support the hypothesis that individuals who have had prior contact with the criminal justice system will have more positive views on currently and formerly incarcerated individuals. This study contributes to research that has found that contact with the criminal justice system will increase the likelihood of possessing positive views of individuals who are currently/formerly incarcerated. While the initial hypothesis is supported, the approach this study took is one that has not previously been taken. This research places emphasis on prior life experiences/encounters and how they influence one's views, which is why additional research is suggested to explore this concept further. Nevertheless, the results of this research show that contact can influence one's views in a more positive manner, which means that the Intergroup Contact Theory could be an effective approach to decreasing prejudice.

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Appendix A

Measurements used to assess the independent variable “contact with the criminal justice system.”

Questions 2, 3, and 5 adapted from Calaway, Callais, and Lightner, (2016).

1. Do you know anyone, self or other, who works in law enforcement or corrections?
2. Do you personally know anyone, self or other, who has been incarcerated?
3. Have you ever been on a prison tour?
4. Do you live near a prison or jail?
5. How many criminal justice/criminology classes have you had (including current classes)?

Appendix B

Measurements used to assess the dependent variable “views on individuals who are currently/formerly incarcerated.” Questions 1 and 5 adapted from Smith, Meade, and Koons-Witt (2009). Questions 2 and 3 adapted from Calaway, Callais, and Lightner (2016). Question 4 was adapted from Hilinski-Rosick and Blackmer (2014).

1. What punishment philosophy do you think is currently enforced in the criminal justice system? (options: deterrence, incapacitation, retribution, rehabilitation, or restoration)
2. Do you believe that most prisoners can be rehabilitated?
3. Do you believe that most prisoners are too lazy to earn an honest living?
4. Do you believe that individuals who are/have been incarcerated are worse or less than individuals who are not in jail or prison?
5. Briefly describe what you think a “typical inmate” looks and acts like.

Trauma & Spoken Word Poetry
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According to the National Council for Behavioral Health, “70% of adults in the U.S. have experienced some type of traumatic event at least once in their lives” (1). This growing statistic, given our social climate, is alarming. The word trauma is broad, functioning as the umbrella in which its specific facets are unique, and dependent on the experience of the individual. Trauma can have social, emotional, and physical effects on all aspects of human functionality. The broad terminology, for the sake of this exploration, will be used to emphasize the importance of writing for any trauma experienced. Trauma does not go away; there is no “cure” for trauma, only treatment or trauma focused care that helps those who have experienced trauma navigate their experience(s). Using spoken word poetry as a processing and coping strategy of experienced trauma can foster a healthier and more beneficial mindset while creating lasting positive neurological impacts for this specific demographic.

Psychologically, there are many impacts of trauma. Current treatment of children and adolescents uses narrative writing as a means of coping with the trauma (Cohen et al. 119). However, spoken word poetry could be an art form used for trauma patients as a supplement to the pre-existing narrative. The qualities of spoken word and the intricacies of this entity, speak to the complexities of trauma. Giving the trauma survivor a voice and the ability and platform to share their story is empowering and inspiring. However, before exploration of the spoken word poem as a means of assisting with trauma processing, it is equally as important to examine what trauma is and how it affects the individual.

Founder and Medical Director of the Trauma Center in Brookline, Massachusetts, Bessel Van Der Kolk, M.D., defines trauma as “unbearable and intolerable. [...] It takes tremendous energy to keep functioning while carrying the memory of terror, and the shame of utter weakness and vulnerability” (1-2). The functionality of those who have experienced a trauma varies based on symptomatology and the severity of the trauma given the intricacies of the individuals’ experience(s). Van Der Kolk’s description speaks to the difficulties of living with memories of trauma. Once the trauma is experienced, it never goes away. However, there are treatments in which the patient can learn to process and cope with their trauma.

Symptoms of trauma vary based on the individual. High functioning trauma survivors may actually experience very minimal symptoms. Trauma can affect every part of a human’s life, if the symptoms are, similarly to mental illness, disrupting one’s ability to progress throughout their day. Trauma can impede a survivor’s functionality not only within society but within themselves. There are ways in which the brain is affected by trauma. Chief Medical Officer of Behavioral Health Services at Acadia Healthcare, Dr. Michael Genovese, explains, “When someone continually has traumatic experiences, it alters the neural pathways in their brain. These altered pathways influence how the person experiences the world and cause them to view ordinary experiences through a lens of trauma and fear” (Hanifen para 2). Experiencing a trauma does not end once the trauma has ceased. The neural pathways created from the trauma affect the way in which people live their lives, even individuals who are considered higher functioning trauma survivors.

Trauma puts a heavy amount of stress on an individual. Once the trauma happens, it does not stop happening. Even with the proper treatment, there are wounds the body cannot heal from entirely. Physical symptoms vary but include shaking, exhaustion, bodily arousal, etc. The body

during a traumatic experience goes into a fight or flight mode, triggered by the amygdala. However, something strange can happen to the body after the trauma is experienced. The functionality of the individual can become compromised. They can sometimes, in severe cases, like those who have been diagnosed with PTSD, actually relive their trauma(s). The body tenses, the senses become affected, and they are taken back to the time in which the event occurred (“Post-Traumatic Stress Disorder” para 7). The effect on the body could also be connected to how the brain and mind are affected.

The brain’s response to trauma has been studied by many. The part of the brain involved in a traumatic experience is the amygdala, the center of emotion (specifically anger and fear). There are areas of the brain that are involved in different processes. Specifically, there are a few areas that not only recognize certain sensations, but also provide individuals with a sense of self. This is referred to as the “Mohawk of Self-awareness” which includes: The Anterior and Posterior Cingulate, Medial and Orbital Prefrontal Cortex, and the Insula (Van Der Kolk 93). The aforementioned are instrumental in consciousness. However, in a study of eighteen chronic PTSD patients, Van Der Kolk found that the activation in these areas of the brain were minimal to none. The reality of this finding was alarming. Van Der Kolk explains,

There could only be one explanation for such results: In response to the trauma itself and in coping with the dread that persisted long afterward, these patients had learned to shut down the brain areas that transmit the visceral feelings and emotions that accompany and define terror. Yet in everyday life, those same brain areas are responsible for registering the entire range of emotions and sensations that form the foundation of our self-awareness, our sense of who we are.

(Van Der Kolk 94)

Without having the ability to have a sense of who one is after a trauma, it will deeply affect every aspect of one's life. This hinders our ability to recognize our voice and the power we have, which ultimately is why spoken word poetry can be instrumental in trauma treatment- giving a voice to those who feel as though theirs has been muted or taken. The brain is a complicated and complex entity and has the ability to make or break an individual. Traumatic memories deeply effect the way in which we think and behave, altering body systems and even re-paving neural pathways in the brain (“How Traumatic Memories Hide in the Brain, and How to Retrieve Them”).

Trauma travels repeatedly through neural pathways and can lead the brain toward reoccurring accounts of the trauma(s). However, research has shown that mindfulness can actually help re-pave neural pathways in order to relocate memories to another place within the brain, decreasing the severity and/or frequency of symptoms. Freelance writer and Psychologist, Shirley Davis, speaks more on brain plasticity, which is the idea that the brain has a plasticity to it; it is malleable and synapses can be changed depending on the experience. The terminology used is neuroplasticity. Davis explains, “[m]odern research shows that the brain is not static after early adulthood, but a vibrant and changing organ which changes as we encounter new experiences” (Davis n.p.). With the brain being able to change based on experiences, who is to say that it cannot be rewritten, synapses and neurons being re-routed and making new connections? Trauma treatment, specifically through writing, has the potential to do that. With new experiences comes newly paved neural pathways. The way in which the world is seen is based on experiences, which is why creating positive ones, or being mindful of the negative ones, is so important to Trauma Focused-Cognitive Behavioral Therapy (TF-CBT) and Trauma Informed Care (TIC).

“Being traumatized means continuing to organize your life as if the trauma were still going on-unchanged and immutable-as every new encounter or event is contaminated by the past” (Van Der Kolk 53). After an individual experiences a trauma or multiple traumas, it is almost as if the body systems re-write themselves; the brain may experience this the most. The repaving of neural pathways changes thinking patterns, altering future decisions that will be made. However, it goes much deeper than that. Trauma can affect how the individual sees themselves and this is why TF-CBT is crucial to the processing of trauma. Without having the professional help to guide the individual through restructuring thinking patterns, the likelihood of the behavior changing on its own is painfully low.

Current TF-CBT, uses narrative writing in order for patients to process the trauma (Cohen et al. 119). Cognitive behavioral therapy is exactly as it sounds; it is therapy focused on changing cognitive patterns (thinking) in order to positively affect, influence, and change behavior. The success of this treatment has been plentiful, but there are more ways an individual can utilize this treatment plan. The narrative writing will not work unless someone is there to bear witness during the composition process (Herman 147). The narrative is raw and will open wounds that have never fully healed, making treatment challenging and exhaustive. Writing is important, as stated before, but incorporating a performance aspect to the treatment may actually help the individual express the trauma and share the story; the most important aspect, other than relocation of memories, is being able to share the story with a community of people who will support them.

Writing has restorative and healing qualities, this is why narrative writing has been instrumental in the current treatment processes for trauma. More specifically, poetry has therapeutic advantages. There are three therapeutic components of poetry, but two in particular are

crucial to the argument for the incorporation of spoken word poetry into therapy sessions for trauma survivors. The two crucial components of poetry are the expressive/creative component and the symbolic/ceremonial component which includes sound devices that emphasize storytelling (Alvarez 263-264). The expressive component helps those share their feelings while the ceremonial reinforces the idea of telling one's story. Writing helps the patient take control over their narrative. In regards to control of the narrative, Andersson and Conley explain that "perceived control promotes physical and psychological health, traumatic/stressful events induce a loss of perceived control, and thereby impair health, in their victims, and expressive writing on various topics restores perceptions of control and, in turn, improves health" (139). Having control over the self allows for one to create meaning. Creating meaning in one's life can be important for trauma survivors because, as mentioned before, one's sense of self can become distorted or even non-existent. Therefore, giving an individual the ability to create meaning and give value to their lives can help in Cognitive Behavioral Therapy.

Poetry would be a positive influence, and genre, to use in trauma informed care. Poetry is a broad term, with different forms an individual can utilize for a plethora of reasons: self-expression, storytelling, coping, etc. Poetry is therapeutic in its ability to act as arguably the most concentrated form of writing. The significance of poetry for trauma processing is to help us reconnect with ourselves and our world. Distinguished Professor of English at CUNY Graduate Center and Hunter College, Meena Alexander, expresses

poetry's task is to reconcile us to the world—not to accept it at face value or to assent to things that are wrong, but to reconcile one in a larger sense, to return us in love, the province of the imagination, to the scope of our mortal lives.

(Alexander 19).

Ultimately, it helps us understand the world on a deeper level, a more emotionally driven language and lens at viewing existence. Alexander continues, “It seems to me that in its rhythms the poem, the artwork, can incorporate scansion of the actual, the broken steps, the pauses, the blunt silences, the brutal explosions” (Alexander 21). Poetry can actually help individuals integrate the physicality of the trauma by using intentional rhythmic adaptations and sound through well-crafted word choice. The benefit of poetry in particular, as stated previously, is the ability to use language in its most concentrated form while ignoring the proper and language constricting guidelines engrained into our minds through grammar, syntax, etc.

In terms of writing as a method of trauma processing, poetry can be useful, specifically spoken word poetry given the uniqueness of both the written and performance components. Writing about the trauma can be beneficial. However, the performance of one’s story can be truly liberating. There are many ways in which oral recitation has been a pinnacle of various cultures for hundreds of years. Speaking as a means of communication and expression has outdated its later compliment: writing. Hundreds of years ago, stories were shared orally, many with little to no record of their existence.

Oral recitation of stories, years ago, was an art form that spoke to the individual storyteller. A lot of the stories were already known but it was up to storytellers to make it unique in their own way and embellish stories, adding their own personalities to the stories they would tell. This is something that can be seen in spoken word poetry. Usually, this art form is meant to be performed in front of communities of people who come to see these slams or performances. A slam, or poetry slam, is a forum in which poets come to perform their pieces in front of an audience. Slams can be a way for youth to survive and overcome challenges while working on

improving the self (Muhammad and Gonzalez 444). Slams are meant for people to come and share their works with other poets and a community of supporters. People listen to the poetry about a variety of topics. Even if audience members know a lot about a specific topic, this forum allows for them to hear it in a new way. The performance is unique to the poet. The audience will continue to listen to these poems, even if they have heard a plethora performed on the same topic. Why? They listen because it is not about the topic; it is the personal journey the poet takes the audience on that makes all the difference.

The performative component of storytelling is most interesting in regards to the voice of the individual. The term ‘voice’ is not meant as a tonality, although that is helpful; it is also in the sense that an individual is able to speak on something in a more concentrated, emotional, and raw form. Van Der Kolk explains, “[t]rauma memory is not condensed” (182). With that being said, spoken word poetry can help individuals condense and concentrate their story into a performative healing process. Being able to share one’s experience of a personal trauma can be beneficial in many ways. It gives the trauma survivor the ability to take control of their narrative and give them a voice. It gives them the ability to share their story in a different way.

Storytelling is extremely important to trauma. Whether it is in the composition of the trauma narrative or composition of the spoken word poem, the story is important. Being able to be expressive about experienced trauma has many health benefits. “One of the goals of creating the trauma narrative is to un-pair thoughts, reminders, or discussions of the traumatic event from overwhelming negative emotions” (Cohen et al. 119). Being able to discuss the narrative will help the patient in removing the negative emotions which can help in the performative aspect of spoken word poetry. Not only will the speaker benefit from this through the recitation of their story, but it will foster a supportive community within the audience.

In regards to trauma recovery, an important stage is storytelling. It is important for a trauma survivor to be able to share their story in a safe environment. This is why narrative writing is used in current TF-CBT. The two most important steps in psychological recovering processes for the trauma survivor are safety and the story, the first being safety for the survivor (Herman 147). In congruence with Maslow's Hierarchy of Needs, the individual must be safe, no longer experiencing the trauma, in order to begin to process. Without ensured safety, the individual will not be able to focus on constructing a narrative, similarly to a student who is unable to learn in an unsafe environment. Second, is immersion; this means winding the clock back (figuratively speaking) to reconstruct the trauma. This is difficult to re-open wounds that did not heal properly in the first place.

Being able to share the story repetitively will help the individual with the processing of the trauma. This will give the survivor an easier time when it comes to owning their lives and taking control and power back (Herman 148). "[T]rauma robs you of the feeling that you are in charge of yourself... The challenge of recovery is to reestablish ownership of your body and your mind-of yourself" (Van Der Kolk 205). In order to re-claim the self and regain the agency and authority over an individual's existence, they have to be able to process the trauma and tell the story. TF-CBT attempts this through narrative writing and the work the therapist does with the patient. Park and Blumberg explained that

facilitating or encouraging people's cognitive processing of a difficult experience will eventually give rise to changes in their situational meaning, their global meaning, or both. Continued cognitive processing of the stressful situation should enable people to change their views of it toward less distressing and more easily assimilated ways of thinking

about it, which should reduce distress and, eventually, reduce the need for cognitive processing

(612-613).

One of the best ways to vocalize what has been trapped inside and diminished is through spoken word poetry. This art form weaves musical, performative, and written elements into one.

Spoken word poetry is a form of poetry that has a specific performative element. However, just like other forms of poetry, it can be produced for publication, giving it a tangible quality. Spoken word is unique in its art form for a few reasons. Other than harnessing an experimentation of sound, music, and theatrical performance, Poetry Foundation describes it to be “[c]haracterized by rhyme, repetition, improvisation, and word play, spoken word poems frequently refer to issues of social justice, politics, race, and community” (“Spoken Word” para 1). Today, we see more adaptation to the content performed. Stories of personal experience, specifically trauma, have emerged; there are a plethora of performers who have shared their experiences. The real identifier and qualities of spoken word poetry can be seen in the structure and flow of the piece.

The qualities of spoken word poetry are similar to other forms of poetry through utilizing literary devices such as personification, metaphor, and sound devices like rhyme, rhythm, and others. However, the qualities that distinguish spoken word poetry from other forms of poetry are the performative elements. Spoken word poetry is meant to be orally recited, so there are intentional movements both vocally and physically that make this art form unique. The performative elements include body language, gestures, repetition, word play, intentional

pausing and line breaks, and clear emphasis with volume and tonal shifts. Spoken word poetry is meant to be shared in a public forum.

For trauma survivors who have shared their content in public platforms, one can see how this process can be healing. To incorporate this into TF-CBT, as an alternative for treatment or a supplement to pre-existing treatment, it can give the survivor more power and control- power and control they may feel they have been lacking. Narrative writing is helpful and beneficial in many ways, but can be limiting for different reasons, specifically the syntactical and grammatical restrictions. Whereas spoken word poetry has an element of improvisation, encouraging the performer and composer to break the confines of languages, manipulating sound, rhythm, sentence structure, and word to construct their desired outcome in the literary, performative, and mental elements.

Looking at examples of spoken word and the restorative and therapeutic benefits it has, National Geographic filmed a short documentary about a teenage girl who had experienced a childhood trauma. Years later, she had found herself in a poetic justice class learning about spoken word poetry and using the time allotted within the class setting to construct a spoken word about her own experience(s). The short film followed her journey in the course and the struggles she faced. Her teacher encouraged her, through the tears, to write her story and share it because it is important. Tyesha was raped by her neighbor at a young age, treated poorly by her family, and struggled with her image. However, in the class, she explained how she had felt free and that she believed it was helping her deal with her life (DeKornfeld). By the end of the short film, she was shown sharing her work with the class, something she was extremely nervous to do. It is obvious by the little they filmed of the piece that she had not fallen directly in line with some of the qualities most commonly attributed to spoken word poetry. However, this does not

matter. Spoken word poetry has a musicality and performative aspect, and she shared her story hoping to get justice for herself. This is what spoken word was originally created for. Even if it was not, it is the fact that this course on spoken word poetry could inspire students to share pieces of themselves and be completely vulnerable with others. Imagine how this would work in a setting where the patient has already established a relationship with their therapist. Performing the piece for a community of individuals does not have to be a deciding factor on using this art form.

Stories like Tysha's make it easy for someone to sit and say that this is a fool-proof idea. It is not. Obviously there are risks if the piece is performed publicly, even in a controlled setting. This would be something that an individual would have to work up to, but also be willing to do. Herman explains that "each patient should be encouraged to develop a personal repertoire of coping strategies" (147). This process takes longer as the therapist has to make sure the patient is safe and also given enough strategies to cope. Many wounds will be opened during the sessions, specifically in the composition of the narrative. The re-telling of the story will become easier overtime. However, the narrative, even in its current form, cannot be started without the therapist and patient working together and developing a relationship.

Given the minimal research on this particular proposal for trauma treatment, there is obviously room for error and improvement. Spoken word does not have to completely replace narrative writing, rather it can be offered as a supplement or alternative. There has been proof of narrative working, music therapy working, and theater therapy working. So, what would happen when all three of these elements come together? Spoken word poetry would emerge and, hopefully, also be successful. Integrating spoken word poetry could be instrumental in TF-CBT. Elements of spoken word poetry make storytelling more exciting and experimental.

Other spoken word poets have experimented with expressing their trauma(s) through this medium. Promoting understanding of spoken word poetry and the qualities attributed to the art form can help in defending the potential success of integrating it into TF-CBT or TIC.

An example of using this as a means of processing and storytelling, not as a part of any trauma informed care or TF-CBT treatment plan, is my spoken word “Re-birth.” This can be used as a model for how this integration would/could work. For the purposes of highlighting the aforementioned qualities, certain areas of text will be bolded for the reader’s understanding. A brief analysis will follow.

They say a picture speaks a thousand words,

So let me paint one for you.

I was only five when my parents **divorced**.

Divided.

Both set on a new **course**.

Separate **journeys**, not understanding the amount of **hurting**

That would grow **from** the **cracks** they **created**

In my **foundation**.

Maybe I was a troubled kid.

At the age of eleven I was drinking

In my friend’s basement

Trying to fill a void within **me**,

Because the cracks from “**mommy** where’s **daddy**” and “**daddy** don’t hit **mommy**”

Were obviously too much for a child just shy of **three**.

Six years old, blood rushing to my head
my ankles in firm, but trembling hands,
or maybe I was just **shaking**.
I screamed so loud
The world around me **breaking**
As they dangled my helpless body over the
Well.
That wasn't covered up so **well**,
But, oh **well**.
So close to bottomlessness
The basement we **resided**
Just the three of us,
Nobody to see or stop **it**.
Nobody ever did or would.
If you walked through the hallways of my childhood house
Portraits, crooked, broken
Colored works of art mixed with pre-pubescent faces.
Coldness in their smiles, a darkness in their eyes
Their faces lined the walls all the way into the kitchen.
They filled the dining room and hung just outside the threshold of my room,
Excuse me: the guest room.
Those words beat me over the head

Just like they used to.

Very few pictures of my sisters and **myself**,

They resided in the living room, just resting on a forgotten **shelf**,

Usually covered by holiday décor

Or littered with birthday cards, well wishes, sorry for your **loss**.

My brother was long dead, but the cards remained... collecting **dust**.

I used to like sitting in **front** of the fire place and watching the **flames flicker**,

The chipped off white paint **scattered** across the **base**.

In the **background**,

Screaming.

The **sound** of a **belt**.

I woke up next to what was left of the fire,

Rich embers still beaming.

Smoke dissipating before bloodshot eyes

And I found myself lifeless,

Practicing stillness.

If I moved, they'd get a second wind,

But I also loved the smell of wood burning.

I never once understood why people could be so terrible.

I never once understood how people could be so terrible.

Twelve years old, and I left that house **behind**.

But the last day there,
I took a picture of myself from my home.
I asked for my father to light the fire one last **time**.
Alone with the flames,
I quickly unfolded the picture of myself,
Throwing it in the blaze.
If a picture truly speaks a thousand words,
than I have a thousand and one.
(Maslin)

My process for writing spoken word poetry is a little off the beaten trail. However, there really is no right or wrong way. I begin with a chain of words, random emotions I feel towards a specific event, memory, or situation in my life. I leave space to write in between each word. Sometimes I have instrumental music playing the background so I can feel the beat as I write. However, most of the time I feel the rhythm internally. I focus on feeling and emotion, specifically through internal and external rhyme as well as alliteration and the musicality of my work. I use intentional voice cracks, line breaks, and other sound devices to help the audience feel and experience what I want them to. It is so concentrated sometimes I have difficulty coming up with lines that will move people or make me and my audience feel something, but that is the beauty of poetry. Poetry is subjective. It is okay if someone does not understand what I am trying to write (ea. Gertrude Stein). It is supposed to be a platform and art form- an escape. The individual should be able to perform how they choose, for their own benefit. It is okay if not everything rhymes or the performer takes time to breathe. As long as they give themselves the time and space they need to create and perform and the confidence to know that it is about the

story, then they are doing it “right.” I remind myself that this is a form of self-expression so if it satisfies my needs, then it is working, without the need for audience approval.

For “Re-birth,” readers can see all of these qualities in the bolded areas. I used external and internal rhyme, alliteration, repetition, and rhythm. The rhythm is more accented when performed because the intentional voice cracks, tone, volume, and tempo are manipulated. As for the repetition, it was important that I emphasize the confusion about how people could be so terrible given my experiences. I was young, and still learning how the world worked, so being exposed to so much trauma at a young age affected the lens in which I view the world. It affects every moment and decision in my life. For years it was effecting my relationships with people I cared about, and I was not able to trust anyone.

Repetition in a spoken word can be powerful, just like in any other setting. The listener recognizes that this is an important point to be aware of. It is similar to a professor lecturing and repeating an important concept and then maybe winking, a hint that it will be on the test. This is what I am trying to do here, except that is not the only way repetition is used. A closer look at my piece, and repetition rears its head without being blatantly obvious. I will say something and then say the same idea using different words. An example would be, “I was only five when my parents **divorced**/Divided/Both set on a new **course**/Separate **journeys** not understanding the amount of **hurting**” (Maslin lines 3-6). Seen here, divorced and divided are similar in concept and sound, “divided” emphasizing more than just a physical split. The poem continues explaining how they have both set on a new course, separate journeys. Separate can relate to the course and journey, but also the divorced and divided point I was emphasizing. These small nuances are important to me, because it also conveys the way I interpret all of this chaos, convincing myself (using different language) that all of this had to happen. It was out of my

control, so I take the control back by choosing my words. Being able to write my own story in this way gives me the power. I get to choose how I manipulate word and sound to fit my own narrative.

Other bolded selections in my piece show both internal and external rhyme, even off-rhymes. External off-rhyming can be seen in the following lines, “sorry for your **loss**/My brother was long dead, but the cards remained... collecting **dust**” (Maslin lines 41-42). I also use alliteration. It is heaviest in the following excerpt, “I used to like sitting in **front** of the fire place and watching the **flames flicker**/The chipped off white paint **scattered** across the **base**/ In the **background**/ **Screaming**/The **sound** of a **belt**” (Maslin lines 43-47). Here the reader will notice the emphasis used in alliteration on the letters F, B, and S. One can also note the internal rhyme of background and sound. Little intentional word choices help to paint a picture for listeners as well as give power to the writer/performer. The sound devices are really important in oral recitation of pieces because they bring the narrative to life. This, as mentioned before, has been seen in storytelling for years. Stories that used alliteration, like *Beowulf*, before being recorded, really developed scene and emotion through sound devices. Overall, “Re-Birth” embodies many literary and sound devices and spoken word qualities, but that is not why this piece works; it works because it has given me a voice, a platform, and a choice to share the intricacies of who I am and why I am. It has allowed me to re-claim my story and help me to create meaningful and positive experiences while re-paving neural pathways.

For my needs, spoken word poetry has been successful in helping me regain confidence, and power in myself and my voice. However, there are potential risks that one should consider if this were to be integrated into TF-CBT. Spoken word poetry was created to be performed. It is the performance element that gives individuals the power to take control over the way they want

to express themselves through word. It allows them to re-create the scene for themselves and listeners while re-claiming their narrative. They are able to connect more deeply with themselves and the community that is there to support them. However, not everyone can just get up in front of strangers and perform. It can put this demographic into a vulnerable position, even though the community there for them is one of support. It is important to recognize this limitation. It is not easy to put the words on to the page. Current treatment uses narrative writing, but they build up to construction of the narrative. This is not something attempted during the first session. There are weeks of learning coping mechanisms to help when wounds that never properly healed are re-opened. The good news is that the same technique can be used for the writing of the spoken word poem. The spoken word allows individuals to break from a strict form of grammatical writing and adopt their own styles, giving them more power and control over their voice. As mentioned before, for a trauma survivor, the voice is lost.

Before integrating this art form and healing mechanism into TF-CBT, it is important to note how this could work. Unfortunately, there is no research, in my findings, that express an attempt at this. However, I believe that it can be something really powerful. We have seen success in music therapy for different demographics. We have seen theater therapy, a fairly new form of therapy, work for different demographics. We have also seen current TF-CBT treatment of narrative writing be beneficial and successful for individuals receiving care. Integration of spoken word poetry is blending these three therapies together. Music therapy would help with the rhythm, volume, tempo, and stress given to certain aspects of the spoken word. Theater therapy helps with the performative elements of the piece, intentional pausing, breathing, and performing in general (this could include performance anxieties and how to deal with those).

Lastly, the narrative writing is already used in TF-CBT, so it would be breaking the confines of the written narrative form and telling one's story in another way.

Park and Blumberg conducted a study on writing about trauma and the effect that it has. The study had a trauma-writing group and a general group. It was found that the trauma-writing group actually saw benefits to their writing. Over the course of four days, the trauma-writing group perceived the event they wrote about as “less uncontrollable and less threatening” (613). This supports that writing works and why it is an important and crucial element in processing and coping efforts. The narrative would be told through the spoken word, functioning as a new way patients could engage with their narrative and a community of support. Maybe the patient could pick their audience, or maybe other survivors can listen to the patient's poetry. This could be encouraging and inspiring and more adolescents can use this art form to cope and re-claim their stories.

As mentioned before, there is plenty of room for research and further consideration. This specific demographic of trauma survivors deserves the best care possible. Integrating creativity into the re-claiming of their story will help individuals find their voice. It can bring together a community of support they might not have had before. It can be offered as an option in TF-CBT, given the fact that limiting the individual to just one option is taking away their choice, which takes away their power and voice. Spoken word poetry is not just an art form or a platform for social justice; it is a window into the worlds of those who have kept their curtains closed for too long. Spoken word poetry will create a more beneficial mindset, helping the individual repave neurological pathways and create meaningful and positive experiences. Current TF-CBT

treatment should consider integrating spoken word poetry into treatment for this important and vulnerable, but exceptionally beautiful, demographic.

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Creative Portion

The Apple Tree

Broken blood vessels,
Another sweatshirt.
Band-Aids covering my legs,
And my wrist’s only gotten worse.
A fake smile.
Teeth clenched through my tears,
Cement seeps through the cracks
Closing the only safe spaces I have left.
It’s another long day,
But they all feel long at this point.
I hop on my bike and take off,
Smashing fallen apples with each tire rotation.
The sun feels good on the cotton covering my skin.

I probably shouldn't ride off without letting an adult know,
But I don't want other people to follow.
Especially them,
Because when they find me it's not going to be pretty.
You'll find me rotting and discarded under the shade of an apple tree.
When I ride, I'm a little unsteady-but I'm used to it.
Maybe it's the thrill of it.
If I fall, then I know I'm still feeling all of it.
Wind burn on my face reminds me of winter chills,
Snow falls and huge snowmen I like to build-
Usually alone.

Snowball fights make good cover ups
For bruises... so does falling off my bike.

I never had a fear of falling.
I had a fear of trying so hard and still being empty inside.
I'm scared of being numb.
I feel less human,
and when you call me by my name and I don't respond to it-
I'm not here.
I wish I was, but no one is home.
There's no such thing as home

that burned down too long ago.

I remember the first time he touched me.

I remember uncertainty and fear.

I remember softness, but then abrasiveness.

I remember biting on my tongue so hard

It started bleeding.

My space invaded,

Pieces of my being, I was told were sacred, were now

Explored, navigated.

But they weren't up for grabs.

They were pieces of my humanity that I didn't want to share with anybody,

Not at 6 years old.

At 6, kids want to ride ponies and play with action figures.

I wanted to ride my bike in the summertime without a sweatshirt.

I wanted to watch television without my face against carpet,

My cheek pressed firmly into the grips of my teeth.

I wanted to be able to open my mouth and speak,

But the words were unspoken...

Until now.

I've been silenced for too long.

I've been broken into pieces of myself.

I've been diminished into the nothing that I am.

I try to make some sound.

I pedal faster.

I'm trying to pedal faster.

Depression

It's pain.

It's pressure, pushing against the skulls of the people who already have enough on their minds.

It's feeling the static inside like the pixels in the television, white, gray, black, all dancing within the confines of the screen.

It's trembling, the hand trying to hold the pencil tight enough so it won't slip through the fingers trying to grasp it.

It's the effortless flow of salty streaks from the bloodshot eyes of broken human beings and those who are on the verge of shattering into a billion pieces.

It's the wind screaming at the window to let it in.

It's staring blankly into a mirror with the reflection being an unknown figure.

It's the heart beating out of the chest and into the throat.

It's the night sky, with stars nowhere in sight.

It's... depression.

Body Image

I asked her what she thought of when I said the words "Body Image."

She looked at me, puzzled, almost as if my tongue melted as each letter spilled out of my mouth, the words burning into her skin, branding her body by society's hand because when she looks in the mirror at her reflection, she can't stand the way her thighs are barely distinguishable.

Her stomach hangs lower than the models she sees in fashion shows, and she knows that their bodies are beautiful yet unrealistic; but it's still painful every time.

Her friends remind her of her beauty; strangers scoff and stare intently; she feels so negatively about the complexities of her body.

I told her she should try to love the skin that she's in. Her body is beautiful, but then I realized... I am her.

When it comes to my body I have never grown to like it, and yes I'm forced to live in it but I don't like having to look at it.

I never really saw myself as beautiful.

Yes of course beauty is in the eyes of the beholder, but beauty in terms of the soul is what resonates within us.

Yet is physical attraction and attractiveness not something notable?

Do we, a society of people who praise a size 4 and disregard an 18 really outweigh the fact that external beauty can only get us so far?

I'm not looking for someone who fits the mold of models in magazines.

I'm looking for someone who feels as deeply as I do about love and honesty.

So yes, honestly, I've never felt beautiful.

Beauty is in the eyes of the beholder.

When my girlfriend holds me to the highest regard and picks up the broken shards of the mirror I had shattered long ago and tells me to look cause I'm more beautiful than I could ever know; It's not just because we listen to the same music or care about current events, It's also because she loves me and the skin that I'm in.

And I know my body is the vessel for my soul and for years I told myself I was not deserving of love. Only the most beautiful things in this world deserve it.

It wasn't until others perceived me positively that I even gave the idea of my own beauty a chance.

So I opened my eyes a little wider and took more than just a glance at my broken reflection. Beauty is in the eyes of the beholder, so if I don't see myself that way then, truly, how can anyone else.

And it really hurts when I have to stand up and share about the despair that I wrestle with everyday inside of me because I have really never been able to love my body entirely.

Sure, I think I have nice eyes because society tells me to hide away my thighs.

I think they are nervous they will suffocate between them because my body is a vice, a device, a vessel for my soul.

My body is a million stories left untold, so discover me.

Discover every inch but be forewarned that first I'll have to let you in.

Even then I have my reservations, my hesitations.

I hesitate because my body has known the degradation, it has seen so much devastation, she's

known many bruises and scars, she's felt tears well in her eyes and at what price?

Her confidence?

Her ability to be shared?

Why is it that every time she opens up, no one seems to care?

All I can seem to do is put up walls,

and hide behind them.

So I'm trying to challenge myself.

I'm challenging my body, stepping out of my comfort zone and showing the world it's alright to be me.

I can love the way I look and feel confident in my skin, even if it takes a whole lifetime to feel good living in it.

I know it's important so I can love more deeply, not only my body, but also those who care about me.

I'm trying to be gentle with myself because if I can't do it for me, how can I do it for anyone else?

The Count Down

21- By law I've been permitted to consume a liquid that alters my way of thinking, being, existing. Depression still finds its way to creep back in, settling into a body I just can't get comfortable in. Everything demands to be a priority except for my own health and sanity. The tension in my relationships are tightening the chains around my wrists. I used to be more positive. I used to be more hopeful. I used to be better.

20- I met the most beautiful girl I think I have ever seen. She really gets me. She really understands me when no one else tries to. I know I'm going to marry her. My mother tells me I'm not gay. I skip dinner that night.

19...

18- Adulthood is nothing crazy. College throws new things at me. I lose friends but they weren't ever really friends to me. I think about what my life should look like. What am going to do with this degree? I stop smoking cigarettes.

17...

16- I started talking to my dad again. I see him more now. I stopped consuming unhealthy substances... well, for the most part. I can't keep from inhaling these toxins into my lungs to kill the demons I tried to drown, but instead they kept rising to the surface, mocking my existence.

15- The pills I take are supposed to help me. My little sister calls them happy pills; she's only six and sees that without these I can't be happy. So my dosages start doubling, without my doctor knowing. My mom says talking to my dad might help. Fuck that! I never thought I'd turn out like this. I wonder how much my little sister sees me hurting...

14- My new friends are “psychotic.” We sit and listen to each other’s problems while trying to make sense of our own thoughts. I start trading pencils for pb&j and apple juice. My inner thoughts and secrets were exposed and now my parents know. They saw the writings, the scars, the pills. I hid behind my pain for so long, I don’t want to stop hiding. I’m addicted to my sadness. Attempts 5 and 6.

13...

12- School is lame. Back and forth between mom and dad is unfair. I can’t do this anymore. I am alone in a house full of people. I stay awake until I am sure they are asleep. I check in my closet and under my bed before I change. Attempts 2 and 3.

11...

10- I don’t go out for recess. I watch everyone else have fun. I sit in my science classroom, reading about frogs. Why does everyone hate me so much?

9- The pain is too much to handle. Mom? Dad? Anybody?

8...

7- I don’t want to go to dad’s tonight.

6- I wonder how fast I can ride this thing.

5...

4- Mommy, where's daddy?

3- Don't hit mommy!

2...

1...

Re-birth

They say a picture speaks a thousand words,

So let me paint one for you.

I was only five when my parents divorced.

Divided.

Both set on a new course.

Separate journeys, not understanding the amount of hurting

That would grow from the cracks they created

In my foundation.

Maybe I was a troubled kid.

At the age of eleven I was drinking
In my friend's basement
Trying to fill a void within me,
Because the cracks from "mommy where's daddy" and "daddy don't hit mommy"
Were obviously too much for a child just shy of three.

Six years old, blood rushing to my head
my ankles in firm, but trembling hands,
or maybe I was just shaking.

I screamed so loud
The world around me breaking
As they dangled my helpless body over the
Well.

That wasn't covered up so well,
But, oh well.

So close to bottomlessness

The basement we resided

Just the three of us,

Nobody to see or stop it.

Nobody ever did or would.

If you walked through the hallways of my childhood house

Portraits, crooked, broken

Colored works of art mixed with pre-pubescent faces.

Coldness in their smiles, a darkness in their eyes
Their faces lined the walls all the way into the kitchen.
They filled the dining room and hung just outside the threshold of my room,
Excuse me: the guest room.
Those words beat me over the head
Just like they used to.

Very few pictures of my sisters and myself,
They resided in the living room, just resting on a forgotten shelf,
Usually covered by holiday décor
Or littered with birthday cards, well wishes, sorry for your loss.
My brother was long dead, but the cards remained... collecting dust.
I used to like sitting in front of the fire place and watching the flames flicker,
The chipped off white paint scattered across the base.
In the background,
Screaming.
The sound of a belt.
I woke up next to what was left of the fire,
Rich embers still beaming.
Smoke dissipating before bloodshot eyes
And I found myself lifeless,
Practicing stillness.
If I moved, they'd get a second wind,

But I also loved the smell of wood burning.

I never once understood why people could be so terrible.

I never once understood how people could be so terrible.

Twelve years old, and I left that house behind.

But the last day there,

I took a picture of myself from my home.

I asked for my father to light the fire one last time.

Alone with the flames,

I quickly unfolded the picture of myself,

Throwing it in the blaze.

If a picture truly speaks a thousand words,

than I have a thousand and one.

Fine

Eyes close in on me-

Suffocation.

I try to formulate a response to my teacher's empty hearted,

"Hi, how are you today?"

I sit down, cold metal touches the side of my leg.

It's familiar to me.

I try to pay attention to the class,

My mind racing, thoughts telling me I should be dead.

I raise my hand, head to the bathroom-

A quiet place to cry.

I used to eat lunch in there sometimes,

When no one wanted to sit with me.

The rest of class is pointless.

I find little to no meaning in looking at these poets.

The bell rings,

I'm the first student leaving.

My headphones

Make love to my ears,

A beautiful and tragic connection.

I unplug the rest of the world.

I get off the bus and dash for my room,

My school bag slightly propped

Against my laundry pile.

I lay down on the floor and cry again.

Why was I always so sad?

The feeling of worthlessness and despair.

Numb.

I need to feel again,

So I reach for my blade and drag it across my skin.

I watch blood drip from the tip of the razor blade.

I begin to feel the soreness and the sting,
Reminding me I'm alive.

The next day at school
When my teacher asks me again,
"Hi, how are you today?"
... I'm fine

The Push

If I could capture the essence of you,
You would exist in
Snapped sinews
And palpitations,
Migraines that last for days,
Meaningless conversation.

Your very being
Corrupted with shallow thoughts,
Absorbed in awe of yourself.

I watched as your eyes
Traced the outlines of my body,
Then looked up at me intently.

I think a part of me knew what was going to happen.

I think a part of me thought that maybe I wanted it,

But my tiny fractions of desire were accompanied by

Innate hesitations.

No does not mean yes.

Your hands,

Hands I watched palm a basketball,

Hold on to my breasts.

My heart, swirled with emotion.

I couldn't fight you.

I wouldn't win.

I froze.

When I first met you, we were just high school kids.

You sobbed to me about not knowing your purpose.

You dunked on me and mocked my height.

You let me drive your car, which you never let a girl do before.

His hands slid down my body.

I held my breath.

He started to unbutton my pants,

One hand on my throat

The other...

You used to show up to my house with that stupid football sweatshirt you always loved.

You would do funny voices and accents while we played games together.

You used to sit at my dinner table and I used to sit at yours.

We would talk for hours with our families.

My frozen state,

Quickly defrosted.

My legs, limber-

Stretched then pushed.

His eyes lit up.

I rolled to the floor.

My shorts, buttoned.

He brushed it off,

Pretended like it was nothing,

Like I was nothing.

Maybe I was upset with myself.

Maybe he didn't do anything wrong.

Why wouldn't I just let him touch me?

Why am I always like this?

It is said that with every action there is a reaction.

A small ripple in the pond creates larger ripples over time.

Large ripples create waves,

Waves – an ocean...

One that I can't keep myself from drowning in

Abuse

I think if you took the word love and fractured its existence...

You would find me.

You would find a collection of rose pedals pumping attar through my blackening veins,

Rooted in disappointment,

My body used, discarded, used, discarded, and used again.

A bed of roses wilted, tainted by you-

A pathology, a plague.

Weeded with your words, entangled in your enchanting smile.

I thought your garden was the most beautiful I had ever seen, while mine...

Mine was merely a shadow.

Necrosis. Cell by cell, eukaryote by eukaryote, Necrosis.

The insides of who I am, who I was, who I was always meant to be.

Apoptosis.

Your actions accelerate my demise.

You watch me from afar.

You will never understand the severity and depth of your existence,

Rooted between my toes, extensions of the things I hate about myself ...

One of them being you.

You've always been a part of me, eating away at my insides,
Like a never ending horror movie.
I can't help but to think If I could have done things differently,
Things wouldn't be so bad for me.

Your hold on me is crushing,
Deoxygenating pieces of my flesh with your grip,
If you were to rip me
To shreds,
That's nothing compared to what's already been done to me.
I'm merely remains of the girl that I used to be.

Honestly, I blame myself.
Ignoring flags,
Not knowing that a day without you could be so freeing.
I should have left you when I had the chance,
Reaching out, but you grabbed my hand and
Held me under.
You took your time,
You drowned me under covers,
But now yours is blown.

You used to see me on my phone,

Snap.

Grab my wrist,

I act like there's no one home.

The morning after, cigarette burns on my skin,

A hickey underneath my chin,

Regret begins to sneak back in.

I WISH I WAS DEAD.

But I crawl out of bed,

Throw on a pair of sweat pants and a sweatshirt,

And wait for it to happen...

Again.

Impact of Athletics on Academic Performance

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Abstract

Participation in athletics is one of the most common ways for students to become involved in their academic environments. The purpose of this study is to explore the influence of athletic participation on academic performance. Participants for the study are from a research pool, where they were asked to complete a reading comprehension test, mathematical questions from a practice SAT exam, demographic survey, and an Athletic Identity Measurement Scale (Brewer and Cornelius 2001). The goal of this study was to determine whether or not students should or should not participate in athletics based on academic performance.

Keywords: Academic performance, athlete, athletics, Grade point average (GPA)

Introduction

Athletics, also known as sports, are physical activities in which individuals take part in for a variety of reasons, whether it is to manage weight or for the sole purpose of enjoyment. A student athlete is an individual who engages in athletics or sports through their educational institution (Brewer and Cornelius, 2001). In many cases, student-athletes are athletes first, and students second (Saffici & Pellegrino, 2012). Many parents question whether or not to encourage and/or enforce participation in athletics because they fear it will negatively impact their child's academic performance (Harris, 2011).

Athletics involve a commitment from the student, in which they are required to create a balance between their athletic identity and academic identity (Brewer and Cornelius, 2001; Harris, 2011; Solrabi & Shajie, 2012). For many students, this balance is difficult to create (Kristiansen, 2017; Washington, 2016). On the other hand, athletics can encourage a student to excel in the classroom, as athletics require students to maintain a specific grade point average (GPA) (Stegall, 2012). This often serves as a motivator for some students to excel academically in order to take part in their sport(s) (Stegall, 2012). The literature has found conflicting support as to whether or not athletics have a positive or negative impact on academic performance, if any at all. Further, it is unclear which factors play the greatest role in academic performance.

Literature Review

Stages of Student-Athlete Success

Keith Harrison (2011), the DeVos Associate Unit Head/Chief Academic Office of the Sport Business Management Program at the University of Central Florida, outlines the stages and the factors that fall within them to explain an athlete's academic success. There are many components that contribute to a student athlete's academic success (See Figure 1).

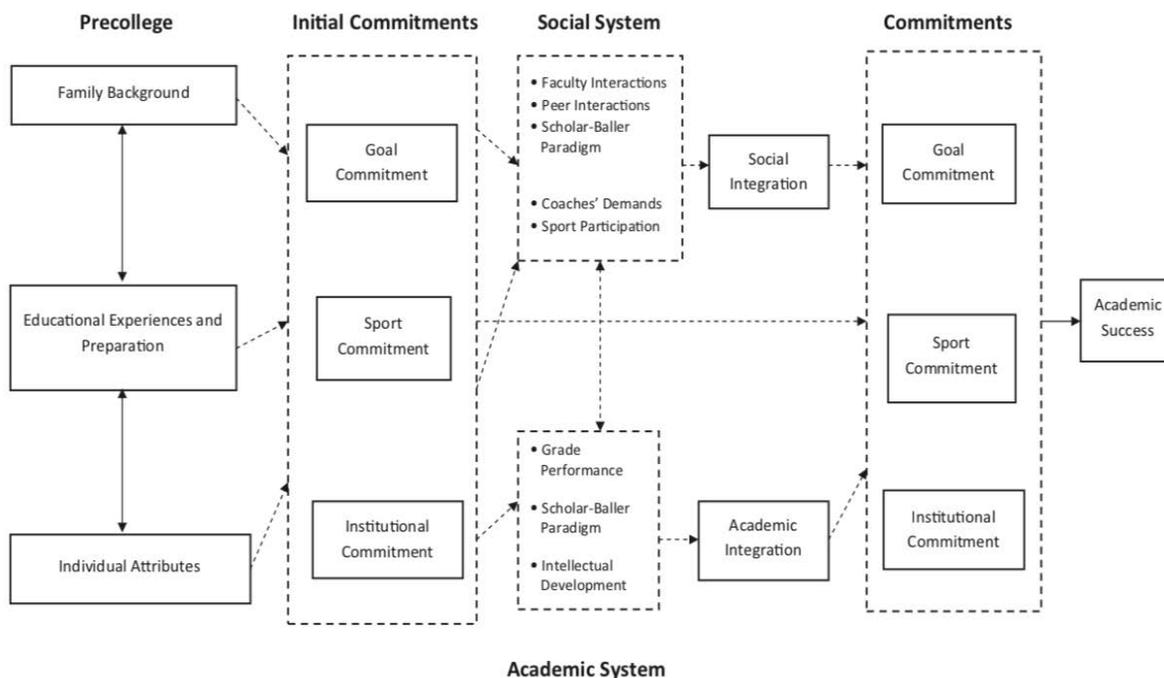


Figure 1. Model for college student-athlete academic success (Harrison, 2011, p. 238)

In the first stage, “Precollege,” individuals who take part in athletics have different experiences, including their family background, educational experiences and preparation, and individual attributes (Harrison, 2011; Sellers & Chavrous, 1997; Beamon and Bell, 2006). These characteristics can help predict an individual’s motivation to continue learning, ability to establish goals, and develop a strong support system (Astin, 1996). Further, conditions into which an individual is born also influence their experiences (Harrison, 2011). For example, if an individual is born into a low-income family, they might have to rely on academics and athletics for scholarship opportunities (Harrison, 2011). Therefore, socioeconomic status may play an important role in students’ academic achievement and success (Harrison, 2011). Finally, individual’s attributes and self-concept may also reflect their decision to participate in athletics and excel in academics (Harrison, 2011; Yarsworth & Gautheir, 1978). As a result, early self-

concept is likely a strong predictor of the relationship between an athlete's athletic performance and academic success (Yarsworth & Gautheir, 1978).

In the second stage, "Initial Commitments," an individual undergoes goal commitment, sport commitment, and institutional commitment (Harrison, 2011; Papaioannou, Ampatzoglou, Kalogiannis, & Sagovits, 2008). Individuals are required to make assurances, to take part in athletics, to attend a specific college, among their own personal commitments. Personal commitments may refer to core values, relationships, and religious beliefs (Harrison, 2011). Harrison's model also indicates that institutional commitments include the student's drive to succeed in their academic department, whereas sport commitment is the student's promise to continue sport participation throughout the season. All of these commitments require motivation from the student-athlete (Simons, Vanrenen, & Covington, 1999). In addition, commitments are also predictors as to how a student-athlete will interact with the college environment (Harrison 2011). For example, commitments are the bridge to the college experience; they are what ultimately binds an athlete to their academic achievement. Further, their personal attributes play an important role in their commitments and their desire to achieve them (Harrison, 2011; Papaioannou et al., 2008; Simons, Vanrenen, & Covington, 1999).

In the third stage, "Social System," individuals experience two different social classifications: athletics and academics (Harrison, 2011; Kristiansen, 2017; Washington, 2016). Within the athlete's social system, individuals experience faculty interactions, peer interactions, his/her coaches' demands, and sport participation (Harrison, 2011). On the other spectrum, the academic system, individuals experience grade performance and intellectual development. Individuals are forced to find a balance between the two systems in order to succeed

academically (Harrison, 2011; Kristiansen, 2017; Washington, 2016).. Harrison (2011) suggests the college environment is complex, and therefore, balance may be difficult to achieve.

In Harrison's final stage, "Commitments," individuals' social and academic systems are integrated and student athletes reflect back on their commitments and goals. Reflecting back on a goal reminds an individual as to why they chose to make commitments to the sport and institution. Again, this helps motivate a student-athlete to integrate their academic and social system equally, and therefore achieve academic success (Harrison, 2011).

This model highlights the attributes necessary for academic success within a student-athlete (Harrison, 2011). Further, an individual's experience, home life, and personal values are the foundation for their academic success in college (Harrison, 2011). As individuals make commitments to life-changing goals, they then begin to integrate those goals with their academic and social systems (Harrison, 2011). Finding a healthy balance between the two systems helps the athlete follow through with their goals and achieve academic success (Harrison, 2011).

Positive Impact of Athletics on Academic Performance

The literature suggests that participation in athletics plays a positive role in an individual's life. Athletics encourage academic achievement, academic performance, character development, confidence, goal creating, and working memory (Assor, Vansteenkiste, & Kaplan, 2009; Bonfiglio, 2011; Duda & Nicholas, 1992; Høigaard, Kovač, Øverby, & Haugen, 2015; Fung, Tsai, Chang, Huang, & Hung, 2018; Washington, 2016). For example, researchers have found significant differences in GPA for athletes and non-athletes.

Ryan Stegall (2012) examined the differences in GPA for athletes and nonathletes at Northwest Missouri State University for the graduating class of 2012. According to Stegall (2012), "the group of athletes was determined to have a higher GPA, averaging $M=3.25(0.53)$."

He adds, “The non-athletes averaged a GPA of $M=3.01(0.65)$, significantly lower than the athletes.” Participating in sports has a positive impact on both the body and the mind (Stegall 2012).

Athletics have a positive impact on a participant's executive function and planning (Hsieh et al., 2018). Outcomes of athletic involvement, include higher overall satisfaction with school and better time management (Grimit, 2014; Maloney & McCormick, 1993; Byrd & Ross, 1991; Pascarella, Truckenmiller & Terenzini, 1999). Specifically, Hsieh et. al., (2018) have found differences in working memory in athletes and non-athletes and the role that plays in their academic performance. Working memory is the cognitive process of remembering information temporarily, which ultimately supports decision-making. Further, working memory is important in academics because it is the foundation for learning new material (Swanson & Alloway, 2012). Hsieh et. al. (2018) conducted a study with $N=47$ participants who ranged from 8 to 11 years of age. The participants were randomly separated into control and experimental groups. The control group was placed in a “comfy chair,” where they were in a quiet environment. The experimental group took part in motor fitness and aerobic exercises. The researchers found significant differences in working memory in those who took part in physical activity daily versus those who did not via demographic variables, objectively measured physical activity, fitness assessments, delayed matching test, and electroencephalographic recordings (Hsieh et. al., 2018). They specifically found a significant difference in the response accuracy between the two groups, $F(1, 30) \square=128.63, p<.05$ (Hesiech et. al., 2018).

Researchers including Gary Burns, Dale Jasinski, Steve Dunn, and Duncan Fletcher (2013) examined the correlation between athletes and the academic support services they have available to them. Because athletes have to maintain a specific GPA to remain on the team, there

are more services available to them to assist with their academic performance. Athletes who found the academic social support systems beneficial experienced an increase in their confidence when it came to decision-making skills (Burns et al, 2013; Gritmit, 2014). Athlete support services conferred an advantage for those students who accessed them.

Finally, there are also positive effects on mental state. According to Kenneth Fox, a writer for the *Public Health Nutrition*, physical activity positively influences mental health (1999). This includes reducing the state of anxiety, improving self-perception, and increasing cognitive functions (Fox). Because participation in athletics involves physical activity, individuals are exposed to these influences on their mental health. A positive mindset ultimately increases the likelihood of higher academic success. Byrd and Ross (1991) found parents themselves have witnessed the positive outcomes of athletic participation. Parents believe participation in athletics lead to “enhances school identity, decreases racial prejudice, increases revenue, and promotes physical fitness and wholesome participation” (Byrd & Ross, 1991).

Negative Impact of Athletics on Academic Performance

Other research has found that athletics can have a negative influence on academic performance. Athletes may fall behind in their education for a variety of reasons (Pascarella, Bohr, Nora, & Terenzini, 1995). For example, athletes may take less than the recommended amount of credits, therefore causing them to fall behind. Or, they may not have enough time to dedicate to academics. Athletic participation takes up a lot of time, and therefore individuals may not have an adequate amount of time to prepare assignments and study for examinations. As a result, the development of critical thinking skills and intellectual curiosity may lag in maturity (Gritmit, 2014).

Class attendance is impacted by athletic schedules (Saffici & Pellegrino, 2012).

According to Robert McCormick and Michael Maloney, professors at Clemson University, athletics have a negative impact on a participant's academics when they are in season (1993). The researchers used a sample of 12,000 undergraduate students from Clemson University (Maloney & McCormick, 1993). The researchers discovered that athletes do not perform as well in the classroom as their peers (Maloney & McCormick, 1993). Maloney and McCormick also found an athlete's high school rank and SAT scores were significantly below those scores for non-athlete peers (1993). They also identified a difference in the graduation rates between athletes and nonathletes, where the graduation rate for "athletes are 10 percentage points below the rest of the student body" (Maloney & McCormick, 1993). They believe this is because athletes have to dedicate an excess amount of time to their participation in athletics, whether it is games, travel time, weight training, etc. (Maloney & McCormick, 1993) The student athletes do not have as much time to dedicate to their academics as non-athletes do.

Conclusion

In conclusion, there is conflicting support as to whether or not athletics have a positive or negative impact, if any at all, on academic performance. There are many other confounding variables, including acquired scholarships, hope, goal belief dimensions, life satisfaction, time management, sport-related injuries, etc. that may influence an athlete's academic performance (Collins, 2017; Curry, Snyder, Cook, Rubby, & Rehm, 1997; Kristiansen, 2017; Ridpath, Kiger, Mak, Eagle, & Letter, 2007). Because of these confounding variables, it is difficult to see if there is a significant difference in academic performance between athletes and non-athletes. Athletics require a large time commitment from athletes, which cuts into their time going to class, preparing assignments, and studying. On the other hand, athletics require physical activity which

stimulates the brain and has a positive effect on mood. It is important to understand the correlation between athletic participation and academic performance to see whether or not parents should encourage their children to be an athlete.

Purpose

The purpose of this study is to examine the impact of athletics on academic performance of student athletes compared to non-athletes. Other variables, including gender, academic year, and the race will also be used to further research the role athletic participation has on academic performance. For this study, those who are a member of a sports team are considered an athlete. This includes both sports leagues on an academic campus and/or a town. The hypothesis is if a student participates in athletics, then their academic performance is stronger than a student who does not currently participate in athletics. Being involved in athletics gives an individual confidence, understanding of commitment to goals, and working memory. Students who possess these traits are more likely to perform successfully in their academics.

Method

Participants

Participants for the study included Cabrini University undergraduate students who were enrolled in a psychology course during spring 2020. The participants include $N=98$ individuals. 82 participants were females, while 15 were males. One participant disclosed as being non-binary. The participants come from a variety of backgrounds, including African American $N=21$, Asian $N=2$, Caucasian $N=56$, Hawaiian $N=1$, Hispanic $N=13$, and Multi-Cultural $n=5$. Participants also represent all four academic years, including freshman $N=25$, sophomore $N=31$, junior $N=29$, and senior $N=13$. Of the participants, $N=33$ were athletes, where $N=65$ were non-

athletes. Participation was lower than expected due to the COVID-19 pandemic (See Limitations).

Measures

Participants completed a reading and mathematical comprehension test made up of questions from Test Prep Review and College Board. First, participants read a passage from Test Prep Review and answered five questions which examined their reading comprehension. Then, participants answered five non-calculator multiple choice math questions from a practice SAT exam. All of the questions asked are intended for the high school age group. Participants were given a score out of ten. This measure was used as a surrogate measure for academic performance.

After the comprehension measure, participants were then asked to report their demographics, including gender, age, race, year in school (freshman, sophomore, junior, and senior), and grades usually received, such as A's, B's, C's, and D's. The survey also asked participants if they believe their involvement in athletics has influenced their grade point average.

The final part of the survey included the Athletic Identity Measurement Scale (Brewer & Cornelius 2001). This scale has been proven to show both reliability and validity by several researchers (Sohrabi & Shajie, 2012). The Athletic Identity Measurement Scale measures how much participants identify and value athletics. Participants were asked to identify with a series of statements ranging from, "I consider myself an athlete," to "I would be depressed if I were injured and could not compete in sports." The Athletic Identity Measurement Scale takes

approximately 5 minutes to complete alone. The survey in whole took approximately twenty minutes to complete.

Procedure

Participants were sought from the psychology research participation pool. The participants were sent a survey, created by Google Forms, via email. The students read the consent form, and provided their consent by clicking the “Next” button. Afterwards, students engaged in a measure of reading comprehension skills, followed by mathematical questions. After they completed the academic measures, they were asked to report their demographics and completed The Athletic Identity Measurement Scale. This scale, created by Britton Brewer and Allen Cornelius (2001), focuses on an individual’s identification with their role in the sport they play. There are 10 questions in which the participants responded on a 7-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). At the end of the survey, participants typed in the code word “Senior” for verification purposes and submitted it.

Results

Statistical analyses completed include: descriptive statistics, independent sample t-tests comparing grade point average (GPA) in athletes and non-athletes at both the college and high school levels, a correlation between self-identifying as an athlete and their total score on the mathematical and reading comprehension measure, and lastly an ANOVA examining the difference in GPAS across races represented in the sample. These statistical analyses helped determine if there is a positive or a negative relationship between academic performance and athletics, if any at all.

Demographics

Table 1 shows the characteristics for individuals who participated in the study. The results show the majority of the participants were female (83.67%). Participants self-reported their race. More than half of the respondents identified as Caucasian (57.14%). Grade and/or current status was fairly equal between freshmen (25.51), sophomores (31.63%), and juniors (29.59%). Seniors were underrepresented in this sample (13.27%). Athletes and non-athletes were also not equally distributed as both the high school and college level. High school athletic participation was made up of 60 participants (61.22%). In college, athletic participation decreased to only 33 participants (33.67%). The results are inconclusive as to why participation in athletics decreased from the high school to college.

Table 1.

Descriptive Statistics for Gender, Race, Year, and Participation in Athletics in High School (HS) and College (C).

| | | Frequency | Percent |
|--------------|------------------|-----------|---------|
| Gender | Male | 15 | 15.31 |
| | Female | 82 | 83.67 |
| | Non-Binary | 1 | 1.02 |
| Race | African American | 21 | 21.43 |
| | Asian | 2 | 2.04 |
| | Caucasian | 56 | 57.14 |
| | Hawaiian | 1 | 1.02 |
| | Hispanic | 13 | 13.27 |
| | Multi-Cultural | 5 | 5.10 |
| | Year | Freshman | 25 |
| | Sophomore | 31 | 31.63 |
| | Junior | 29 | 29.59 |
| | Senior | 13 | 13.27 |
| Athlete (HS) | Yes | 60 | 61.22 |
| | No | 38 | 38.78 |
| Athlete (C) | Yes | 33 | 33.67 |
| | No | 65 | 66.33 |

The participants were asked to self-report their grade point average (GPA) at the time of the study (Table 2). Reported GPA ranged from a 2.00 to a 4.00 ($M=3.40$, $SD=0.48$).

Table 2.

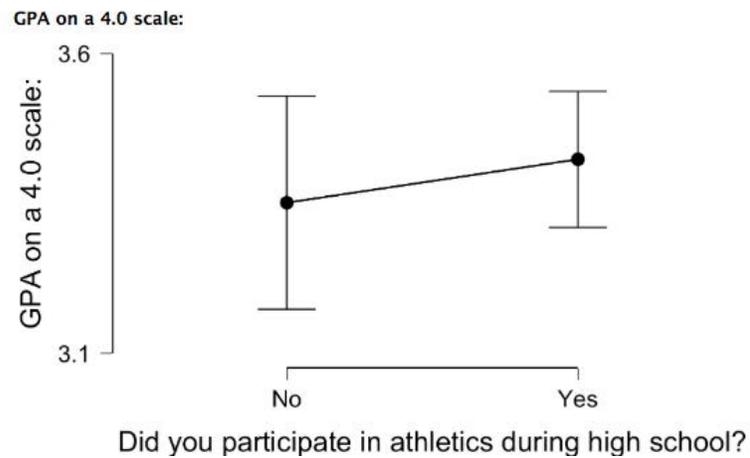
Summary Statistics for GPA of All Participants

| | N | Min | Max | M | SD |
|-----|----|------|------|------|------|
| GPA | 98 | 2.00 | 4.00 | 3.40 | 0.48 |

GPA across groups

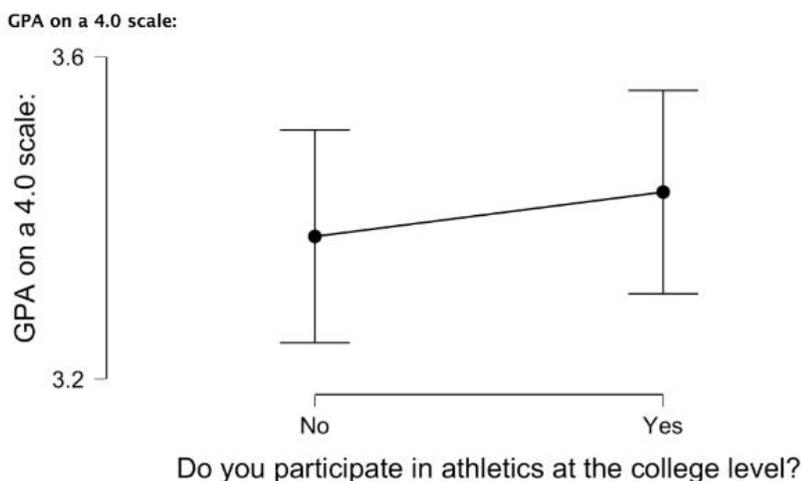
An independent sample t-test, was calculated to compare the GPAs of individuals who were high school athletes with non-athletes. The average GPA for individuals who did not participate in athletics during high school was $M=3.38$ ($s = 0.53$), whereas the average GPA for individuals who did participate in athletics during high school is $M=3.34$ ($s = 0.36$) (Figure 2). The results of the t-test, $t(96)=-0.54$, $p=.59$, $d=.11$, indicate there is no statistically significant difference between those participants who were high school athletes and those who were not.

Figure 2. *Grade Point Average (GPA) by Athletic Participation During High School*



Another independent sample t-test examined the difference in grade point average (GPA) for college athletes and non-athletes. The average GPA for individuals who did not participate in athletics during college was $M=3.38(s = 0.53)$, whereas the average GPA for individuals who did participate in athletics during high school was $M=3.43(s = 0.36)$. There was no statistically significant difference between the groups, $t(96)=-0.54, p=.59, d=.11$. There is overlap in the error bars (Figure 3), therefore, suggesting the GPA does not differ in those who did and did not participate in athletics in college. The results were very similar to those represented in Figure 2.

Figure 3. *GPA of College Athletes and Nonathletes*



Athletic Identity

A correlation was calculated between the total correct score on the academic measures and academic identity. Correct items on the comprehension and mathematical measures were summed. Participants rated a statement of personal identification with the term “athlete” on the Athletic Identity Measurement Scale (Brewer and Corenlius, 2001). The general purpose for running this test is to see if there is a relationship between identifying as an athlete and academic performance. The correlation between these two variables was nonsignificant ($r=0.15, p=0.31$), therefore suggesting level of athlete identity is not related to accuracy on a measure of academic achievement.

Correlations were calculated between GPA and elements of athletic identity for the collegiate athletes. Having goals related to sports was significantly related to the importance of sports in the athletes’ life ($r = .766, p<.001$) and most of their friends being athletes ($r = .727, p<.001$), but not GPA ($r = -.104, p = .56$). Similarly, needing sports to feel good about one’s life was strongly correlated with most of ones’ friends being athletes ($r = .645, p <.001$) and sports being the most important part of ones’ life ($r = .69, p <.001$) but not GPA ($r = -.253, p = .55$).

Academic Skills

An independent samples t test was conducted to compare math scores in collegiate athletes and non-athletes. There was no significant difference between total correct math scores for collegiate athletes ($M = 27.26$, $SD = 27.7$) and non-athletes ($M = 43.08$, $SD = 26.97$), $t(96) = .112$, $p = .91$. Similarly, an independent samples t test was conducted to compare reading scores in collegiate athletes and non-athletes. There was no significant difference between total correct reading scores for collegiate athletes ($M = 34.44$, $SD = 24.58$) and non-athletes ($M = 27.27$, $SD = 25.4$), $t(50) = .975$, $p = .34$. The total reading and math scores were not correlated with any of the athletic identity items.

Time Spent Studying

The number of weeks studied fell within three levels, <4 hours per week, 5-8 hours, and 9+ hours per week. Overall, 23.5% of participants reported 4 or fewer hours spent studying per week, 36.7% study 5-8 hours per week, and 39.8% spend 9 or more hours per week. A chi square analysis compared athletes with non-athletes on the hours studied per week and was nonsignificant, $\eta^2 = 2.21$, $p = .33$.

Discussion

The purpose of this study was to determine the influence of athletic participation on academic performance. The main approach to discovering this relationship was via a survey that included reading comprehension and mathematical measures, self-reported demographics, and an Athletic Identity Measurement Scale (Brewer & Cornelius, 2001). The literature on the impact of athletic participation on academic performance is not consistent throughout. Instead, researchers across the board have found athletics has a positive effect on academic performance, whereas others have found that it has a negative effect. The findings of this study do not support earlier

research presented in this paper. Instead, the study suggests athletic involvement at both the high school and college levels do not influence academic performance.

Interpretations and implications. The results suggest there is no difference in academic performance based on athletic participation at the high school level, nor the college stage. The findings do not support the hypothesis, if a student participates in athletics, then their academic performance is stronger than a student who does not currently participate in athletics. Originally, it was thought being involved in athletics gives individual confidence, understanding of commitment to goals, and working memory, therefore performing successfully in their academic coursework.

However, the findings do support previous research. Like mentioned earlier, the research is not consistent across the board. Instead, researchers have found conflicting results as to whether athletic involvement has a positive or a negative influence on academic success if any at all. The findings may vary from study to study because many other elements need to be examined to determine an individual's academic performance besides athletic participation alone. For example, Keith Harrison (2011) outlines the factors necessary for a college-athlete to achieve academic success, including family background, educational experiences and preparation, individual attributes, initial commitments, social systems, and final commitments. All of these factors play a role in an athlete's academic success. And though, Harrison does not apply these factors to non-athletes, they also play a role in a non-athlete's academic performance. Other researchers have also suggested other confounding variables, including acquired scholarships, hope, goal belief dimensions, life satisfaction, time management, sport-related injuries, etc. may influence an athlete's academic performance (Collins, 2017; Curry, Snyder, Cook, Rubby, &

Rehm, 1997; Kristiansen, 2017; Ridpath, Kiger, Mak, Eagle, & Letter, 2007). Overall, the results both confirm and challenge previous research findings.

Limitations. The findings from this study are limited for several reasons. First, the participants from this study came from one college: Cabrini University, a residential Catholic institution in Radnor, Pennsylvania. Therefore, the results may only apply to institutions that offer similar majors, minors, certificates, extracurriculars, and athletics.

Further, due to the COVID-19 pandemic, the original methodology had to be changed from a paper survey to an electronic format because the university shut down. Because of this, the sample size was only made up of N=98 participants. There was a limited number of participants who took the time to complete the online survey due to electronic errors, therefore the results are not generalizable to the entire population. Of those N=98 participants, 15 identified as males, which made up 15% of the sample, 82 females, which made up 84% of the sample, and 1 non-binary participant, who made up 1% of the sample. The participants' genders are not equally distributed, and for that reason, there might be gender bias.

The study was conducted via an electronic survey. A survey could cause an individual to answer questions untruthfully, therefore causing response-bias. Specifically, in the survey, participants had the opportunity to self-report their grade point average (GPA). They might have reported a false GPA because they wanted to provide a socially acceptable response. Also, during the math measure portion of the survey, participants were instructed to complete the questions without a calculator. Again, this could not be monitored due to the COVID-19 circumstances. Further research is needed to strengthen these findings.

Lastly, many confounding variables may have influenced the results. Examples of confounding variables include the participant's major(s), minor(s), mental health, individualized

education plan (IEP), learning strategies, and home life. The workload of different majors varies, influencing the number of times students need to spend on their assignments. For example, biology and chemistry majors are required to take high-level math courses, including calculus. Communication majors are not required to take as high a level as math. With that being said, differences in course load may influence the amount of time a student needs to dedicate to their academics. Some participants may have a mental illness, such as generalized anxiety disorder (GAD), that influences their academic performance. IEPs and learning strategies may also influence an individual's academic performance. A student that has an IEP is allowed more time for testing and can seek additional help. These resources may put a student at an advantage and/or disadvantage when it comes to schoolwork. Lastly, an individual's home life may influence their athletic participation and academic performance. Parents' involvement may vary, causing students to lack the motivation to excel academically. Or, parents' involvement may encourage students to want to be superior in their academic progress. With that being said, many confounding variables may have influenced the results of this study.

Guide for further research. This study found no significant relationship between participation in athletics and academic performance. The literature shows conflicting support as to whether athletic participation positively or negatively influences academic performance, if at all. Further research is needed to improve upon this finding.

Further search should examine the factors within Keith Harrison's Model for College-Athlete Academic Success (2011). Each of the components outlined in the model play a valuable role in an athlete's achievement. Each of these factors should be analyzed to see if one is more crucial than another. For example, researchers could ask participants about their "Educational Experiences and Preparation." Individuals who are enriched by honors and Advanced Placement

(AP) courses in high school have a stronger grasp of college-level courses than those who do not. Comparing the courses taken by athletes and non-athletes may help narrow result findings. Educational preparation including Scholastic Assessment Test (SAT) coaching and access to private tutors may influence an individual's GPA. At the college level, athletes often have mandatory tutoring sessions and homework hours they need to attend. Taking into consideration these elements may help explain academic performance in athletes and non-athletes. On the contrary, extra tutoring and structured homework hours may deprive athletes of creating a structure of their own. When athletes do not have access to these resources, they may fail to meet their academic needs. Further research should examine the relationship between colleges that provide structured homework time for their athletes versus colleges that do not as this may have an impact on the relationship between athletic participation and GPA.

Conclusion. The findings from this study fail to support the original hypothesis. Athletic involvement does not improve an individual's academic performance. The results suggest there is no significant relationship between athletic involvement and academic success. Because of the inconsistent literature and these findings, further research is needed to improve upon these results. Researchers should also examine other factors that could contribute to an individual's academic success and achievement, including the area of study, gender, race, and home life.

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Appendix A

READING COMPREHENSION PRACTICE TEST 1

Questions 1 through 7 refer to the following passage:

In the 16th century, an age of great marine and terrestrial exploration, Ferdinand Magellan led the first expedition to sail around the world. As a young Portuguese noble, he served the king of Portugal, but he became involved in the quagmire of political intrigue at court and lost the king's favor. After he was dismissed from service by the king of Portugal, he offered to serve the future Emperor Charles V of Spain.

A papal decree of 1493 had assigned all land in the New World west of 50 degrees W longitude to Spain and all the land east of that line to Portugal. Magellan offered to prove that the East Indies fell under Spanish authority. On September 20, 1519, Magellan set sail from Spain with five ships. More than a year later, one of these ships was exploring the topography of South America in search of a water route across the continent. This ship sank, but the remaining four ships searched along the southern peninsula of South America. Finally they found the passage they sought near 50 degrees S latitude. Magellan named this passage the Strait of All Saints, but today it is known as the Strait of Magellan. One ship deserted while in this passage and returned to Spain, so fewer sailors were privileged to gaze at that first panorama of the Pacific Ocean. Those who remained crossed the meridian now known as the International Date Line in the early spring of 1521 after 98 days on the Pacific Ocean. During those long days at sea, many of Magellan's men died of starvation and disease. Later, Magellan became involved in an insular conflict in the Philippines and was killed in a tribal battle. Only one ship and 17 sailors under the command of the Basque navigator Elcano survived to complete the westward journey to Spain and thus prove once and for all that the world is round, with no precipice at the edge.

1. The 16th century was an age of great _____ exploration.

1. cosmic
2. land
3. mental
4. common man
5. None of the above

2. Magellan lost the favor of the king of Portugal when he became involved in a political _____.

1. entanglement
2. discussion
3. negotiation
4. problem
5. None of the above

3. The Pope divided New World lands between Spain and Portugal according to their location on one side or the other of an imaginary geographical line 50 degrees west of Greenwich that extends in a _____ direction.

1. north and south
2. crosswise
3. easterly
4. south east
5. north and west

4. One of Magellan's ships explored the _____ of South America for a passage across the continent.

1. coastline
2. mountain range
3. physical features
4. islands
5. None of the above

5. Four of the ships sought a passage along a southern _____.

1. coast
2. inland
3. body of land with water on three sides
4. border
5. Answer not available

Appendix B

Answer the questions to the best of your ability without a calculator.

For $i = \sqrt{-1}$, what is the sum $(7 + 3i) + (-8 + 9i)$?

- A) $-1 + 12i$
- B) $-1 - 6i$
- C) $15 + 12i$
- D) $15 - 6i$

If $\frac{x-1}{3} = k$ and $k = 3$, what is the value of x ?

- A) 2
- B) 4
- C) 9
- D) 10

Kathy is a repair technician for a phone company. Each week, she receives a batch of phones that need repairs. The number of phones that she has left to fix at the end of each day can be estimated with the equation $P = 108 - 23d$, where P is the number of phones left and d is the number of days she has worked that week. What is the meaning of the value 108 in this equation?

- A) Kathy will complete the repairs within 108 days.
- B) Kathy starts each week with 108 phones to fix.
- C) Kathy repairs phones at a rate of 108 per hour.
- D) Kathy repairs phones at a rate of 108 per day.

$$(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$$

Which of the following is equivalent to the expression above?

- A) $4x^2y^2$
- B) $8xy^2 - 6y^2$
- C) $2x^2y + 2xy^2$
- D) $2x^2y + 8xy^2 - 6y^2$

$$h = 3a + 28.6$$

A pediatrician uses the model above to estimate the height h of a boy, in inches, in terms of the boy's age a , in years, between the ages of 2 and 5. Based on the model, what is the estimated increase, in inches, of a boy's height each year?

- A) 3
- B) 5.7
- C) 9.5
- D) 14.3

Appendix C

An athlete or sports people is a person who competes in one or more sports that involve physical strength, speed or endurance.

Did you participate in athletics during high school? Yes OR No

Did you participate in athletics during college? Yes OR No

How long did you participate in sports?

Less than 1 year 1 year 2 years 3 years 4+ years

Gender: _____

Age: _____

Race/Ethnicity: _____

Current Status: Freshman Sophomore Junior Senior

GPA on a 4.0 scale: _____

What kinds of grades do you normally get? Check one of the following.

- Mostly A's
- Mostly A's and B's
- Mostly B's
- Mostly B's and C's
- Mostly C's
- Mostly C's and D's
- Mostly D's
- Mostly D's and F's

How many hours a week do you spend on school work?

- | | | | | | |
|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|--------------------------------------|------------------------------------|
| <input type="checkbox"/> 0-1 Hours | <input type="checkbox"/> 1-2 Hours | <input type="checkbox"/> 2-3 Hours | <input type="checkbox"/> 3-4 Hours | <input type="checkbox"/> 4-5 Hours | <input type="checkbox"/> 5-6 Hours |
| <input type="checkbox"/> 6-7 Hours | <input type="checkbox"/> 7-8 Hours | <input type="checkbox"/> 8-9 Hours | <input type="checkbox"/> 9-10 Hours | <input type="checkbox"/> 10-11 Hours | <input type="checkbox"/> 12+ Hours |

How many hours a week are you physically active?

- | | | | | | |
|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|--------------------------------------|------------------------------------|
| <input type="checkbox"/> 0-1 Hours | <input type="checkbox"/> 1-2 Hours | <input type="checkbox"/> 2-3 Hours | <input type="checkbox"/> 3-4 Hours | <input type="checkbox"/> 4-5 Hours | <input type="checkbox"/> 5-6 Hours |
| <input type="checkbox"/> 6-7 Hours | <input type="checkbox"/> 7-8 Hours | <input type="checkbox"/> 8-9 Hours | <input type="checkbox"/> 9-10 Hours | <input type="checkbox"/> 10-11 Hours | <input type="checkbox"/> 12+ Hours |

Do you believe that athletics have affected your GPA? YES or NO``

Appendix D

Athletic Identity Measurement Scale (Brenner and Cornelius 2001)

| | | Strongly disagree | | | Neither | | Strongly agree | |
|--|----------|-------------------|---|---|---------|---|----------------|---|
| | Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | | |

| | | | | | | | | |
|----|--|--|--|--|--|--|--|--|
| 1 | I consider myself an athlete. | | | | | | | |
| 2 | I have many goals related to sport. | | | | | | | |
| 3 | Most of my friends are athletes. | | | | | | | |
| 4 | Sport is the most important part of my life. | | | | | | | |
| 5 | I spend more time thinking about sport than anything else. | | | | | | | |
| 6 | I need to participate in sport to feel good about myself. | | | | | | | |
| 7 | Other people see me mainly as an athlete. | | | | | | | |
| 8 | I feel bad about myself when I do poorly in sports. | | | | | | | |
| 9 | Sport is the only important thing in my life. | | | | | | | |
| 10 | I would be very depressed if I were injured and could not compete in sports. | | | | | | | |

Attitudes Towards the Police: Examining the Influence of College Students' Race and Ethnicity
on their Perceptions of Police

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THE INFLUENCE OF RACE AND ETHNICITY ON THE PERCEPTION OF POLICE

Abstract

A recent focus on police-citizen interactions has led to a polarization of attitudes towards police officers. Unfavorable attitudes towards police can have a negative effect on citizens' cooperation with law enforcement. Understanding the factors that influence citizens' attitudes towards law enforcement officers is imperative when seeking to improve their relationship. In the past, research has shown that generally, citizens hold positive attitudes towards police (Wu, 2014). However, according to Dowler and Sparks (2008), Hispanic and Black community members tend to hold more negative attitudes towards police than White members. This study analyzed primary quantitative data through the use of surveys that were distributed to Cabrini University students during the Spring 2020 semester. It was hypothesized that non-White college students would possess a more negative perception of the police than White students and that Hispanic/Latinx students would possess a more negative perception of the police than non-Hispanic/Latinx students. Results from a multiple regression show that non-White/non-Hispanic students had a significantly more negative perception of police than their White/Non-Hispanic counterparts. No other racial/ethnic category was significantly related to perceptions of police.

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Introduction

Police officers strive to serve the community, which requires cooperation and confidence from the people they serve. Generally, the police have been respected and admired by the general population (Wu, 2014). Smith, Steadman, Minton, and Townsend (1999) reported that a survey conducted in 1998 by the Bureau of Justice Statistics concluded that 85% of those surveyed proclaimed that they were ‘satisfied’ or ‘very satisfied’ with the police. Additionally, a more recent study from 2002 concluded that 64% of American citizens indicated ‘a great deal’ of confidence in police officers (Maguire & Pastore, 2003). Nonetheless, having a negative attitude towards the police can culminate in a loss of respect and a lack of confidence in law enforcement officers, which may influence how citizens interact and collaborate with police officers (Callanan & Rosenberger, 2011).

Perceptions of police are influenced by several factors. Of those factors, race and ethnicity have been influential elements when studying citizens’ attitudes toward the police. Dowler and Sparks (2008) reported that Hispanic and Black people tend to convey a lower satisfaction with the police compared to White people. The more negative perception of the police by Hispanic and Black groups may be attributed to the recent coverage of police brutality against Black citizens (Girgenti-Malone, Khoder, Vega & Castillo, 2017). Some of the most prominent cases of use of force by the police against Black men have been the cases of Michael Brown in Missouri and Philando Castile in Minnesota (Girgenti-Malone et al., 2017). These cases have sparked anger and protests across the country over the years.

Reported incidents of police brutality in New York City and Los Angeles were interpreted by Weitzer (2002) to have a significant influence on the perceptions of police by Hispanic and Black community members. More recently, the murder of 46-year-old, George

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Floyd, a black man by the Minneapolis Police Department sparked indignation across the country. Protests began to surface as footage of a Minneapolis officer kneeling on Mr. Floyd's neck and killing him emerged (Hill et al., 2020). Graphic footage showing Mr. Floyd pleading for mercy at the hands of police stirred outrage across social media. The recent role of social media coverage exposing police brutality has accentuated a national outcry by the public and consequently has impacted the general perception of police.

The focus on the attitudes of the Black community does, however, ignore the demographic heterogeneity of the U.S. given that the U.S. Bureau of the Census (2010) reported that the two most rapidly growing racial/ethnic groups in the U.S. are Hispanics and Asian Americans. Although Asian American perceptions of police differ from that of Hispanics, they are both more negative than Whites' perceptions (Wu, 2014). Weitzer and Tuch (2002) concluded that the consistent growth of minority communities may increase the perception of racial profiling on those specific communities, which can negatively influence the attitudes of minorities towards the police. Ultimately, the perception of police held by the citizens they serve can weaken or strengthen the ties of these parties (Schuck & Rosenbaum, 2005). Understanding the connection between police officers and citizens can determine how to improve their relationship.

Positive attitudes serve as a measure to determine the efficiency of the police force, deeming it necessary to recognize the disparity in the perception of the police amid different races (Ren, Cao, Lovrich & Gaffney, 2005). The use of surveys pertaining to the level of confidence that citizens have in the police can help to understand the relationship between these groups. It is important to study this relationship to increase the understanding of how to ensure the cooperation of civilians for efficient policing. This study seeks to research the attitudes of

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Literature Review

Perceptions of Police

Generally, citizens' views of police are constructed by their admiration of the power and authority that officers possess. A positive view of police can only derive from the perceived legitimacy of their power and authority (Girgenti-Malone et al., 2017). In most cases, citizens have a positive perception of police and their problem-solving abilities within their communities. Wu (2014) concluded that the majority of citizens believed that police were efficient at their jobs. However, in some instances, citizens believe that police do not act in favor of those that they serve (Chaney & Robertson, 2013). Some people perceive the police more negatively as they believe officers hold a privileged status in society (Chaney & Robertson, 2013). Fine, Kan and Cauffman (2019) reported that adolescents' level of confidence in the police has been decreasing since 2012.

Citizens' views of police do not only result from a general understanding of their efficiency in society but also from factors such as police contact and victimization (Ren et al., 2005; Schuck & Rosenbaum, 2005). Police contact plays an important role in how citizens construct their attitudes towards the police. Although unexpected, Ren et al. (2005) concluded that an increase in contact with the police positively influenced the confidence that citizens had in law enforcement officers. In other words, individuals who encountered police more frequently had a more affirmative perception of law enforcement officers. However, it is important to note that those who had negative encounters with the police in their neighborhoods had a more negative perception of the police (Schuck & Rosenbaum, 2005). The circumstances and nature of

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police encounters directly affect the opinions of citizens (Schuck & Rosenbaum, 2005; Ren et al., 2005). The effect of negative attitudes towards police creates a reduction in crime reporting patterns and a lack of cooperation from citizens (Desmond, Papachristos & Kirk, 2016; Schuck & Rosenbaum, 2005).

Victimization further impacts citizens' attitudes towards the police (Ren et al., 2005). The fewer victimization experiences that citizens have, the more confidence they perceive in the police force (Ren et al., 2005). That is, when individuals are not usually victims of crime, they tend to develop more trust in the officers that serve them. Although victimization certainly affects how citizens feel about the police, Campos-Manzo, Flores, Perez, Halpert, and Zevallos (2018) found that some communities do not believe that victimization is a focus for law enforcement officers. Campos-Manzo et al. (2018) reported that youth of color living in low socioeconomic areas who were frequently victimized did not feel like the police in their neighborhoods cared about their victimization experiences. Campos-Manzo et al.'s (2018) study also concluded that their interview respondents attributed the police's lack of attention to their victimization experiences to the officers' inability to determine who was the victim and the offender in each case. Additionally, victimized Latina women tend to seek out formal help through medical attention before seeking out for help from the police (Sabina, Cuevas & Schally, 2012). These studies show that victims do not fully trust the police force and are not confident about the police officers' ability to help them.

Race and Ethnicity

Although factors such as police contact, and victimization affect the attitudes of citizens toward police, race and ethnicity add another layer to these matters. In terms of demographic characteristics, race and ethnicity are said to be highly influential on the attitudes towards police

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(Tyler, 2005). Dowler and Sparks (2008) reported that Black and Hispanic groups tend to be less satisfied with the police compared to their White counterparts. Additionally, Black people were more likely to perceive the police as unfair, and their use of force as excessive (Callanan & Rosenberger, 2011; Sethuraju, Sole, Oliver & Prew 2019). Therefore, race certainly influences how different racial groups feel about the police. Hispanics fall between Black and White groups in terms of perception (Schuck & Rosenbaum, 2005). In other words, Hispanics have a more positive perception of police than Black people but a more negative perception than White people. Similarly, Wu (2014) reported that Asian Americans' perception of police was more positive than Black people but more negative than White people.

Black and White people remain the most divided groups in terms of perceptions of police (Wu, 2014). In recent years, this deep division of perceptions has been attributed to racial profiling by police officers as well as their excessive use of force (Weitzer, 2002; Chaney & Robertson, 2015). Black community members perceive a higher level of racial profiling compared to other minority groups (Wu, 2014). More evidence of this claim comes from Solis, Portillos, and Brunson (2009) who examined encounters of police with youth of color in a New York City neighborhood. Solis et al. (2009) reported that police viewed Afro-Caribbean youth as criminals in their neighborhoods which influenced how this group cooperated with the police. Additionally, Campos-Manzo et al. (2018) concluded that police over-scrutinized young Black men in impoverished areas which also affected their relationships with the police.

Police misconduct and the use of force further deepen the division of perceptions between minorities and Whites. People of color are more likely to perceive police misconduct as more common (Girgenti-Malone et al., 2017). Likewise, minority groups tend to think that cases in which police officers have acted inappropriately happen with a higher frequency (Sethuraju et

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al, 2019). In Solis et al.'s (2009) study, the youth of color interviewed reported that police abused their power in their neighborhoods. Additionally, Girgenti-Malone et al.'s (2017) findings discovered that non-White individuals are less likely to perceive police use of force as justifiable, which further impacts the division of perception between Whites and non-Whites.

Other Factors

Although this study will focus on the effects that race and ethnicity have on the perceptions of police, it is important to acknowledge the influence that other factors have on attitudes towards law enforcement officers. Sethuraju et al.'s (2019) study of college students concluded that higher exposure to crime-related media increased the perception of police misconduct. In other words, police misconduct is perceived as more common than it is when presented with crime-related media that negatively portray the police. White people were positively influenced by crime-related media which differed from Black and Hispanic groups (Callanan & Rosenberger, 2011). A more positive impression of police was constructed by White individuals than Black and Hispanic individuals when being exposed to crime-related media.

In addition to that, socioeconomic characteristics also seem to impact citizens' attitudes towards the police. Dowler and Sparks (2008) reported that those who are older, more educated, and earn a higher salary tend to be more satisfied with the police. Similarly, Callanan and Rosenberger (2011) found that higher income was positively correlated with the perception of police fairness. This claim is supported by Campos-Manzo et al. (2018) who reported that in areas of high socioeconomic class, youth encounters with police were deemed more positive. Police have a more positive influence in areas of higher socioeconomic status because of the nature of their encounters with the citizens that reside there which tend to be more affirmative.

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Theoretical Foundation

The study at hand will examine the influence of race and ethnicity on police perception through the lens of critical race theory (CRT). CRT was developed in the 1980s at Berkeley or Harvard University and advanced by those who seek to explore a new concept to understand institutional racism in a post-Civil Rights Era (Delgado & Stefancic, 2007). Currently, other versions of CRT have been developed such as the LatCrit theory which has adopted the ideas of the CRT but concentrates on the experiences of Latinxs in the criminal justice system (Solis et al., 2009). In this study, the tenets of CRT will be considered to make conclusions about the findings.

The first generally accepted tenet of CRT is that “racism is ordinary, not exceptional” (Delgado & Stefancic, 2007, p. 136). That is, racism is embedded in society to the point that it becomes part of the daily experiences of people of color. CRT emphasizes the concept of interest convergence, which is the idea that racism benefits the White majority, and that ending racist practices is not in the best interest of the majority (Chaney & Robertson, 2013). The third feature of CRT is the idea that race is a social construct that generates differential racialization (Delgado & Sefancic, 2007). Differential racialization refers to how the majority categorizes different racial groups, which ultimately benefits the majority group (Delgado & Stefancic, 2007). The key tenets of CRT provide a framework about the expected outcome of the study, which is that is the overexposure to the criminal justice system that people of color experience ultimately shapes their views on law enforcement.

The recent focus on the killing of Black men by police in the United States has been used to support the claim that White Supremacy continues to emerge and flourish today (Chaney & Robertson, 2015). Chaney and Robertson (2015) studied the number of police officers who were

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indicted for murdering unarmed Black men from 1999 to 2015. Researchers examined 78 cases in which Black men were murdered by police and concluded that 15% were indicted, 63% not indicted and 21% settled for financial compensation (Chaney & Robertson, 2015). CRT was utilized by Chaney and Robertson (2015) to emphasize the disproportion of indictments, which adds to the mounting evidence that Black lives are not valued by society. Their findings are used to explain the lack of trust in the police, particularly from the Black community, in this study.

Similarly, a recent concern with undocumented immigrants entering the United States has sparked a renewed anti-immigrant sentiment in the country (Kil & Menjivar, 2006, as cited by Gonzalez & Portillos, 2007). The militarization of the border in recent years has supported the anti-immigration rhetoric of Congress (Ponce, 2014), which has further justified the criminalization of the Latinx community. Latinxs are more frequently stopped by police and oftentimes are linked with drug-related crimes (Cordner, William & Velasco, 2002; Lundman, 2004, as cited by Gonzalez and Portillos, 2007). Gonzalez and Portillos' (2007) study used CRT to analyze the criminalization of the Latinx community. They concluded that the criminalization of Latinxs in the U.S. can negatively influence this group's attitudes towards law enforcement officers. This study builds on these previous studies, hypothesizing that non-White college students will possess a more negative perception of the police than White students. Additionally, this study also hypothesizes that Hispanic/Latinx college students will possess a more negative perception of the police than non-Hispanic/Latinx students.

Methodology

Sample and Procedure

Quantitative primary research was conducted using surveys during the 2020 Spring semester at Cabrini University. Students were approached using a non-probability sampling

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design. Through the use of availability sampling, students were inquired to answer the survey questions at the convenience of the researcher. Undergraduate classes, one Graduate class, the library, and the cafeteria were used to administer the surveys.

The researcher contacted respondents in classes and public spaces to voluntarily complete the survey. Professors of various classes were contacted to ensure availability of class time to administer the surveys. Researchers contacted both criminology and sociology classes as well as non-criminology and non-sociology classes in an attempt to evenly survey different majors. In classes, researchers invited students to participate while informing them of their right to abstain from participation and ensure voluntary participation. Surveys administered in public spaces were simply done at the convenience of the researcher by approaching students and inviting them to participate. Before the administration of each survey (whether in a class or in public), researchers provided the respondents with a form of consent for research which included the purpose, risks, benefits, participants' rights and the researchers' contact information. In addition to the physical form of consent, researchers verbally informed respondents of the information on the form, including the risks, benefits, voluntary nature of the study, and that all information would be kept confidential.

One hundred surveys were administered ($N=100$) and no missing data emerged. The sample consisted of 24% ($n=24$) male respondents and 76% ($n=76$) female respondents. The racial distribution of the sample was composed of 51% ($n=51$) White, 21% ($n=21$) Black, 17% ($n=17$) who identified as Other and finally 9% ($n=9$) who identified as Mixed with only 2% ($n=2$) of respondents identifying as Asian. Almost one-fourth of the sample (24%; $n=24$) identified as Hispanic/Latinx. Of the students surveyed, 7% ($n=7$) were Freshman, 27% ($n=27$) were Sophomores, 32% ($n=32$) were Juniors, 30% ($n=30$) were Seniors and only 4% ($n=4$)

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associated with the Other category. Lastly, 50% ($n=50$) of the students were criminology and or sociology majors and minors while the remaining 50% ($n=50$) were non-criminology majors and minors. See Table 1 for the demographic distribution of the sample.

Table 1.

Sample Demographics

| | <i>Frequency</i> | <i>Valid Percent</i> |
|---------------------------------------|------------------|----------------------|
| <i>Gender</i> | | |
| Male | 24 | 24.0 |
| Female | 76 | 76.0 |
| <i>Race</i> | | |
| Asian | 2 | 2.0 |
| Black | 21 | 21.0 |
| White | 51 | 51.0 |
| Mixed | 9 | 9.0 |
| Other | 17 | 17.0 |
| <i>Ethnicity</i> | | |
| Hispanic/Latinx | 24 | 24.0 |
| Non-Hispanic/Latinx | 76 | 76.0 |
| <i>Class Level</i> | | |
| Freshman | 7 | 7.0 |
| Sophomore | 27 | 27.0 |
| Junior | 32 | 32.0 |
| Senior | 30 | 30.0 |
| Other | 4 | 4.0 |
| <i>Major/Minor</i> | | |
| Criminology/Sociology Major/Minor | 50 | 50.0 |
| Non-Criminology/Sociology Major/Minor | 50 | 50.0 |

Independent Variables: Race and Ethnicity

The first independent variable of the study is race. This study defines race as a socially constructed concept that is backed by social, historical, and political institutions (Omi & Winant, 1986; Smedley, 2007 as cited by Healey & O'Brien, 2015). Respondents were asked to identify their race using the question: Which of the following BEST describes you? 1 = American Indian

THE INFLUENCE OF RACE AND ETHNICITY ON THE PERCEPTION OF POLICE or Alaskan Native, 2 = Asian, 3 = Black or African American, 4 = White, 5 = Mixed, and 6 = Other (Delaware School Survey, 2019). Of the overall sample, no respondents identified as American Indian or Alaskan Native, only 2 (2%) identified as Asian, 21 (21%) as Black or African American, 51 (51%) as White, 9 (9%) as Mixed and 17 (17%) as Other. A binary variable was created to characterize the respondents who selected either answers 1, 2, 3, 5, or 6 as non-White while keeping those who selected 4 as White. In total, 51 (51%) respondents identified as White while the remaining 49 (49%) identified as non-White. The new variables were coded 1= White and 2= non-White.

The second independent variable of the study is ethnicity. Ethnicity is defined as the shared culture which includes language and heritage (Walker, Spohn & Delone, 2004). The study at hand is primarily concerned about whether respondents identified as Hispanic/Latinx or as non-Hispanic/Latinx. Using the Delaware School Survey (2019) the question inquiring respondents to state their ethnicity read: Are you Hispanic or Latino?; 1 = No, 2 = Yes, I am Mexican, Mexican American, or Chicano, 3 = Yes, I am Puerto Rican, 4 =Yes, I am Cuban or Cuban American, and 5 = Yes, I am some other Hispanic or Latino. A binary variable was created to characterize the respondents who selected answers 2-5 as Hispanic/Latinx while those who selected 1 were characterized as non-Hispanic/Latinx. The sample consisted of 24 (24%) respondents who identified as Hispanic/Latinx and 76 (76%) of respondents who identified as non-Hispanic/Latinx. The new variables were coded 1= Non-Hispanic/Latinx and 2= Hispanic/Latinx.

Dependent Variable: Perceptions of Police

Perceptions of police were defined as the level of confidence in the police, which was described by Ren et al. (2005, p. 61) as police officers' "effectiveness in community policing".

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Ren et al. (2005) developed a multi-item confidence index to study the relationship between demographic, contextual and contact variables and confidence in the police. The entire confidence index developed by Ren et al. (2005) is used in this study to measure confidence in the police using a Likert scale measure ranging from 1 = strongly disagree to 5 = strongly agree on statements that ranged broadly from a general opinion of police officers to officers' perceived competence. The question used to introduce the statements is: How much do you believe that police officers... (1) Are usually fair, (2) Are usually courteous, (3) Are usually honest, (4) Are usually not intimidating, (5) Work with citizens together in solving problems, (6) Treat all citizens equally in general, and (7) Show concern when asked questions (Ren et al., 2005).

The statements presented inquired the respondents to think about their attitudes towards the police to produce a confidence measure that ultimately reflected their perception of police. The general scope of the statements in Ren et al.'s (2005) measure was deemed appropriate for the sample to account for college students' potential lack of contact with the police. It is important to note that Ren et al. (2005) also found a significant correlation between the confidence in the police (measured by their confidence scale) and their other variables which included age, social disorder, informal collective security, victimization, fear of violent crime, volunteer, information/service request, traffic tickets and number of contacts. This correlation further substantiates the relationship between confidence in the police and other variables at play.

A scale was created to incorporate the responses of the seven statements into a single value for each participant. Cronbach's Alpha was used to determine the scale's reliability in measuring attitudes towards police. The Cronbach's Alpha value was 0.822 (7 items), which exceeds the needed value of 0.7, and thus concluded that using an additive scale to measure the attitudes towards police was an appropriate course of action. The scale seeks to place students in

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an index ranging from more negative perceptions of the police to more positive perceptions with the middle scores representing neutral attitudes towards the police. The higher the score the more confidence an individual has on police officers themselves and trust on their ability to serve the community. After creating the scale, scores ranged from 7 to 29 with lower scores representing more negative perceptions of police and higher scores representing more positive perceptions of police. Although the scale seeks to measure the general attitude of college students towards the police, it overlooks the contextual basis of their attitudes. The majority of respondents fell within the middle of the distribution suggesting a generally neutral perception of police. The most frequent score, as well as the median score, was 19 and the average score was 18.99 ($M = 18.99$; $SD = 4.48$). See *Figure 1* for the distribution of police attitudes scores.

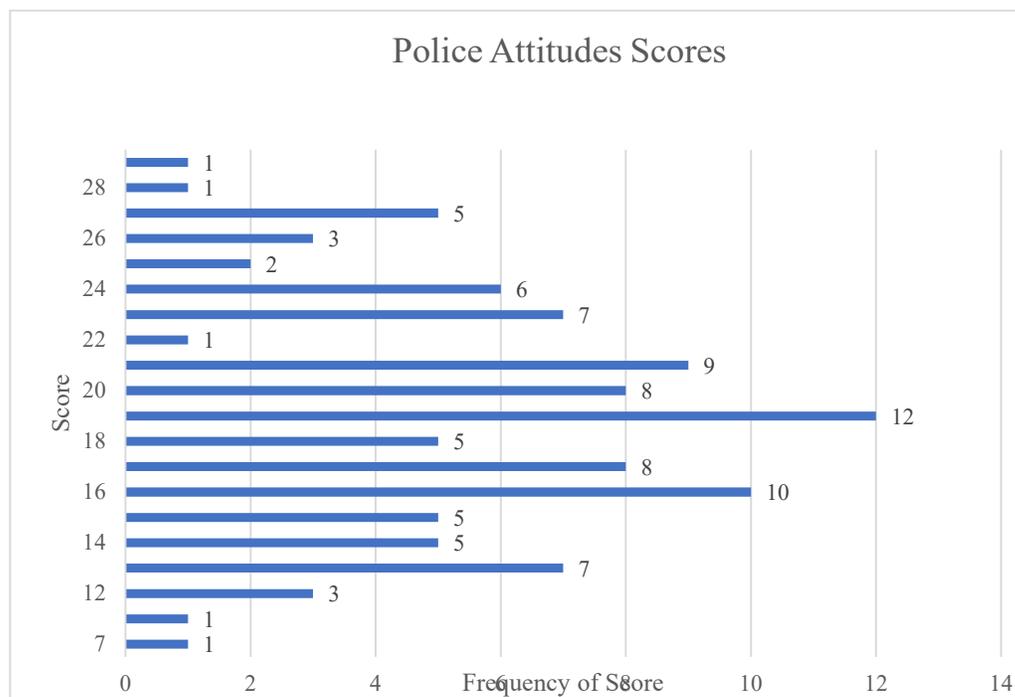


Figure 1. Distribution of police attitudes scores by college students

Control Variables: Gender, Major and Class Level

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There were three control variables used in the study: gender, major, and class level.

These variables were used to account for any causal effects that could potentially influence the dependent variable. The first control variable was gender and it was recorded using the Delaware School Survey's (2019) question which read: What is your gender? 1= Male, 2= Female and 3= Other. There were 24 (24%) respondents who identified as male and 76 (76%) who identified as female while no respondents selected Other. The second control variable was major/minor in relation to a criminology and or sociology-related discipline. The question used to inquire respondents on their associated majors/minors read: Is your major/minor criminology and/or sociology? 1= Yes, 2= No, and 3= I don't know (Falco & Martin, 2012). Exactly half of the sample ($n = 50$; 50%) associated themselves as criminology/sociology majors or minors and the other half ($n = 50$; 50%) as non-criminology/sociology majors or minors. No respondents answered with the third option. Lastly, the third control variable determined the class level of the participants. The question used to inquire about the class level of the participants was adapted from Falco and Martin (2012) which read: What is your class year? 1= Freshman, 2= Sophomore, 3= Junior, 4= Senior and 5= Other. The sample consisted of 7 (7%) Freshmen, 27 (27%) Sophomores, 32 (32%) Juniors, 30 (30%) Seniors, and 4(4%) students who associated with the Other category. A binary variable was created to characterize the respondents who selected answers 1-4 as Undergraduate students and those who selected 5 as Graduate students. The overwhelming majority of the sample fell within the frame of Undergraduate students ($n = 96$, 96%) while the remaining were Graduate students ($n = 4$, 4%). The new variables were coded 1= Undergraduate and 2= Graduate.

Plan for Analysis

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Two independent sample *t*-tests, one for each independent variable were conducted to determine the difference between the means of the independent variables and the dependent variable. Independent sample *t*-tests are used when the independent variable is nominal and include two mutually exclusive groups while the dependent variable is continuous. Race is a nominal variable with two groups (White and non-White) which is being compared with perceptions of police, a continuous dependent variable. Ethnicity is also a nominal variable with two groups (Hispanic/Latinx and non-Hispanic/Latinx), which is also being compared to the continuous variable of perceptions of police. An independent sample *t*-test was the appropriate statistical test to analyze the differences between the means of each independent variable and the dependent variable. The first independent sample *t*-test was conducted to analyze if the mean of non-White students' perceptions of police differed significantly from the mean of White students' perceptions of police. The second independent sample *t*-test was conducted to examine if the differences in means between Hispanic/Latinx students' perceptions of police were significantly different from non-Hispanic/Latinx students' perceptions of police.

In addition to the independent sample *t*-tests, a multiple regression test was conducted to account for the potential influence that gender, major and class level could have on the perceptions of police.

Results

Perceptions of Police Based on Race

The independent sample *t*-test was significant; $t(98) = 2.740, p < .01$. Levene's Test was not significant ($F = 1.199$ with $p = .276$), which indicated that equal variances were assumed. White students reported more positive perceptions of police ($M = 20.16, SD = 4.49$) than their non-White counterparts ($M = 17.78, SD = 4.18$). Thus, supporting the hypothesis that non-White

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students possessed more negative perceptions of police than White students. The effect size between means was computed using Cohen's D ($d= 0.55$) and it was determined that a medium effect size existed. The 99% Confidence Intervals for the difference in means was small ranging from .09863 to 4.66408. Additionally, the eta square index determined that 7% of the variance between perceptions of police was accounted for by whether the student identified as White or non-White. Results for police perceptions based on race are shown in Table 2.

Perceptions of Police Based on Ethnicity

The independent sample *t*-test was not significant at any level; $t(98) = -.637, p = .526$. Levene's Test was not significant and thus equal variances were assumed ($F= 1.919$ with $p = .169$). Consequently, it was concluded that no significant difference in means existed between non-Hispanic/Latinx students ($M= 18.83, SD= 4.59$) and Hispanic/Latinx students' ($M= 19.50, SD= 4.20$) perceptions of police. Therefore, not supporting the hypothesis that Hispanic/Latinx students would possess more negative perceptions of police in comparison to non-Hispanic/Latinx students. See Table 3 for the police perceptions results based on ethnicity.

Table 2.

Independent Sample t-Test for Police Perceptions Based on Race

| | <i>F</i> | <i>Significance (Levene's)</i> | <i>t</i> | <i>df</i> | <i>Significance</i> |
|--------------------------------|----------|--------------------------------|----------|-----------|---------------------|
| Equal variances assumed | 1.199 | .276 | 2.740 | 98 | .007** |

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

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Table 3.

Independent Sample t-Test for Police Perceptions Based on Ethnicity

| | <i>F</i> | <i>Significance (Levene's)</i> | <i>t</i> | <i>df</i> | <i>Significance</i> |
|--|----------|------------------------------------|----------|-----------|---------------------|
| Equal variances assumed | 1.919 | .169 | -.637 | 98 | .526 |

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

Given the significance of the one of the independent samples *t*-test, a multiple regression was conducted to predict perceptions of police based on race/ethnicity (White/non-Hispanic [constant], non-White/non-Hispanic, White/Hispanic and non-White/Hispanic). The multiple regression included three control variables as well: gender, major and class level. The overall model was significant, $F(6, 89) = 3.273, p < .01, R^2 = .126$. The only individual predictor that was significant on perceptions of police was non-White/non-Hispanic ($b = -3.404, p < .01$). This means that in comparison to the White/non-Hispanic category, those that are non-White/non-Hispanic have a decreased level of perceptions of police. More specifically, this means that those who are non-White/non-Hispanic will score 3.40 points less than White/non-Hispanic in the perceptions of police scale. This group holds more negative views of police compared to White/non-Hispanics. See Table 4 the multiple regression results for perceptions of police.

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 Approximately 13% of the variance of police perceptions can be accounted by the linear relationship of the predictors.

Table 4.

Multiple Regression Results for Perceptions of Police

| Coefficients | <i>b</i> | SE | Beta |
|---------------------------------|-----------------|-----------|-------------|
| Constant | 24.405* | 3.103 | |
| Non-White/Non-Hispanic** | -3.404* | 1.059 | -.339 |
| White/Hispanic | -.009 | 3.148 | .000 |
| Non-White/Hispanic | -.382 | 1.162 | -.034 |
| Gender | -2.040 | 1.038 | -.196 |
| Major | .426 | .945 | .047 |
| Class | -.833 | .971 | -.088 |
| Model Summary | 24.405 | 3.103 | |
| R-Squared | | .181 | |
| Adjusted R-Squared | | .126 | |

* $p < .01$

**Reference group, White/Non-Hispanic

Discussion

The study at hand considered the impact that race and ethnicity have on students' attitudes towards the police. Race was found to have a significant effect on college students' attitudes towards law enforcement. More specifically, non-White students' confidence index score in the police was significantly lower than White students' scores. These findings support

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the hypothesis that non-White students would possess more negative attitudes towards the police than their White counterparts. These results can be attributed to the experiences of non-Whites with the police that based on past literature suggests that these racial groups tend to be hyper-surveilled and profiled by police (Campos-Manzo et al., 2018; Sethuraju et al., 2017; Wu, 2014).

Consequently, the overexposure of non-Whites in the legal system has been shaped by the belief that individuals of these groups are prone to criminality (Duarte, Salas-Hernandez & Griffin, 2020). The notion of non-Whites' tendency for criminality is deeply embedded in society and has become a part of the daily experiences of people of color as stated by CRT (Duarte et al., 2020). Although the existing findings cannot concretely verify the assumptions of CRT, it does suggest that differential racialization has been practiced through the criminal justice system to systemically oppress minority groups and people of color in particular.

Moreover, the recent coverage of police brutality in the United States has raised concern over policing strategies in the country. There is an overwhelming number of cases in which unarmed Black men and women are killed by law enforcement officers and their killers are exonerated. With the recent role of social media, the realities of police brutality are more visible than ever and further impact the everyday experiences of people of color in this country.

On the other hand, ethnicity did not have a significant effect on college students' attitudes towards law enforcement. Hispanic/Latinx students did not have significantly lower confidence index scores in comparison to their non-Hispanic/Latinx counterparts. Consequently, non-Hispanic/Latinx students reported a less positive perception of police than Hispanic/Latinx students. Findings do not support the hypothesis that Hispanic/Latinx students would possess more negative perceptions of police compared to non-Hispanic/Latinx counterparts. Previous literature has reported that Hispanic/Latinx attitudes towards police tend to be more positive than

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Black attitudes but more negative than White attitudes (Schuck & Rosenbaum, 2005; Sethuraju et al., 2019). Similarly, Callanan and Rosenberger (2011) found that Hispanics/Latinxs had similar levels of confidence in the police to Whites.

Although this study looks at race and ethnicity as mutually inclusive as opposed to mutually exclusive, these findings can be used to explain the slight difference in means of the perceptions of police between non-Hispanic/Latinx and Hispanic/Latinx students. A possible explanation could be deduced from the assumption that some non-White students also identified as non-Hispanic/Latinx, and thus these identities produced a generally more negative perception of police. Consequently, in Callanan and Rosenberger's (2011) study Latinxs did not differ significantly from White people's perceptions of police (more positive than Black people's) yet they perceived excessive use of force and unfair treatment by police as more prevalent in their neighborhoods. These findings suggest that although Latinxs may hold similar attitudes about police practices with the Black community, their fundamental perception of police continues to be more positive.

A one-way ANOVA reported no significant differences in means of the binary race and ethnicity variables combined (eg. White/ Hispanic, White/non-Hispanic, non-White/Hispanic and non-White/non-Hispanic). It is also important to note that only 24% ($n = 24$) of respondents identified as Hispanic/Latinx which was potentially influential on the statistical results. Additionally, in the ANOVA gender was found to have a significant impact on students' perceptions towards law enforcement. Male students had a significantly more positive perception of police than female students. This could be explained by male students' perception of justifiable use of force which tends to be higher than that of female students' and thus male students tend to perceive police more positively (Girgenti-Malone et al., 2017). The sample was

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predominantly female (76%, $n= 76$), which could have impacted the statistical results. Although this study did not directly address the impact that students' gender has on their perceptions of police, future studies should focus on this aspect of the issue. Major and class level did not have a significant impact on students' perceptions towards law enforcement in the ANOVA.

In addition to the conducted independent sample t -tests, the multiple regression test provided further analysis to control for other factors that could be statistically significant predictors of perceptions of police. Although results concluded that race/ethnicity, gender, major and class level were significant predictors of perceptions of police, the only individual predictor that significantly impacted perceptions of police was the non-White/non-Hispanic racial/ethnic group. This group was assumed to be composed of Black students because it is expected that they would identify as both non-White and non-Hispanic. As per the literature consulted, Black attitudes towards police are the most negative compared to other racial/ethnic groups (Wu, 2014). The attributed attitudes stem from perceived hyper-surveillance by police, racial profiling, use of force and police misconduct towards the Black community in particular (Wu, 2014; Weitzer & Tuch, 2002; Chaney & Robertson, 2015; Girgenti-Malone et al., 2017) which differs from that of other racial/ethnic groups (Dowler & Sparks, 2008; Callanan & Rosenberger, 2011; Solis et al., 2009).

Limitations

Various limitations of the study affect the generalizability of the findings. First, the sample size obtained is relatively small for it to be generalizable to other universities/colleges. Additionally, availability sampling generates potential bias since it prevents true representativeness of the sample. Students were not chosen using a probability sampling methodology; therefore, the results are not generalizable to the larger population. It is possible

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that by using availability sampling of those professors/courses that were readily available to the researchers may have produced a bias in the research and skewed the findings. Although Cabrini's enrollment is mostly female students, they were still overrepresented in the sample according to the Cabrini factbook. Students who identified as Mixed or Other under racial categories were overrepresented as well as Hispanic/Latinx students while White students were underrepresented. Undergraduate students were also overrepresented as well as criminology/sociology students. Lastly, the study design was cross-sectional which limits its ability to conclude the causal mechanism of the findings. In other words, because data were collected at only one point in time, it is difficult to ascertain that race and ethnicity caused the change in perceptions of police.

Future Research

Future research seeking to explore the factors that influence perceptions of police should look into gender more thoroughly. Additionally, other demographical factors that may affect attitudes towards law enforcement are socioeconomic class and age. Past research has found that income and geographical location plays a role in shaping the attitudes that citizens have towards police (Campos-Manzo et al., 2018; Dowler & Sparks, 2008). Addressing the type of contact that citizens may have had with police whether it is direct or indirect contact can provide additional insight into the topic (Shuck & Rosenbaum, 2005; Ren et al., 2005; Sethuraju et al., 2019). Widening the scope of consideration when determining the factors that affect the perception of police can create a much more comprehensive research study.

Overall Findings

The findings of the study suggest that race is an unequivocally relevant factor that influences the attitudes towards police among different groups. Policy changes are needed to

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instill more confidence in law enforcement and to rectify past community-police conflicts. The community policing approach has been discussed as a means to repair the relationships between citizens and law enforcement, specifically in minority communities. Community policing involves police officers' efforts to connect with the communities they serve through a number of programs that promote positive police-citizen contact (Girgenti-Malone, et al., 2017). Although this approach presents promising results in the improvement of community-police relationships, it is crucial to acknowledge the racialized component of the issue (Raschig, 2018; Sytsma & Piza, 2018). Any policy programs designed to improve police-citizen relationships in minority communities must do so through a racially cognizant lens in which officers are receptive to the past experiences of these community members.

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Sexual Assault Prevention Education Effectiveness

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Abstract

This article explores the relationship between collegiate sexual assault prevention education (SAPE) programs and students' attitudinal changes of sexual consent and rape myths (Kress et al., 2006). Past research suggests that existing same-sex and mixed-sex SAPE programs are not providing students with effective prevention education (Milhausen, McBride, & Jun, 2006; Jozkowski & Humphreys, 2014). This study examined Cabrini University's non-mandatory, coeducational SAPE workshop that is offered during freshmen orientation weekend each year. Participants consisted of incoming Cabrini University freshmen who attended the workshop in the fall of 2019. A fixed-panel design was used through the administration of a self-report survey before the presentation, immediately after, and six-weeks later. Results show that there is no significant effect on participants' attitudinal changes towards sexual consent and rape myths, regardless of the length of time in between each survey.

Keywords: sexual violence, sexual consent, rape myths, SAPE

for victimization, which is indicated by the “red zone”. This concept was created to explain the increased risk of sexual assault that freshman females experience during their first few weeks of college (Flack et al., 2008). Incident rates during this time tend to be higher than at any other point during the college year (Flack et al., 2008). It is crucial that students are provided the correct information during orientation so that they can, not only protect themselves, but learn right from wrong, in terms of consensual sexual activity.

Literature Review

Elaboration Likelihood Model

Determining the effectiveness of collegiate SAPE programs can be a difficult task, mainly because of the lack of a universal theoretical orientation that is used to develop such programs (Morrison, Hardison, Mathew, O’Neil, 2004; DeGue et al., 2014). Many of these interventions do not rely on a theory-based foundation, which can lead to the utilization of ineffective and unreliable prevention efforts (Banyard, Plante, & Moynihan, 2005; Morrison et al., 2004; Schewe, 2001). Programs that do possess a theory-based foundation, cite a diverse set of principles, which contributes to the prevalence of inconsistent evaluations (Morrison et al., 2004). Existing reviews on collegiate SAPE interventions emphasize the disparities within the measures of change and the inability to regulate the true effectiveness of available programs (Foubert & Perry, 2007; Edwards et al., 2019; DeGue et al., 2014). The most common theory that is present within SAPE programs are Petty and Cacioppo’s (1986) Elaboration Likelihood Model (Newlands & O’Donohu, 2016; Morrison et al., 2004).

The Elaboration Likelihood Model (ELM) of persuasion suggests that variations in the practice of persuasion are an important indicator of whether an individual will participate in an

engaging elaboration of the subject matter that they are exposed to (O’Keefe, 2008; Morrison et al., 2004). Petty and Cacioppo (1986), proposed that individual receptiveness to new information is influenced by the personal relevance of the topic, or the degree to which a person is “involved” with said topic (O’Keefe, 2008). In relation to collegiate SAPE programs, the ELM claims that education can change certain rape-supportive attitudes and that a change in attitude will result in a reduction of sexual violence and the normalization of rape acceptance (Morrison et al., 2004). Colleges and universities that implement this model typically develop programs that associate victimization with women and perpetration with men, in order to maintain student engagement and motivation towards the roles that are socially assigned to those gender groups (O’Keefe, 2008; Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O’Donohue, 2016). This effect has never been proven, however, and lacks substantial empirical testing (Morrison et al., 2004). The utilization of the ELM as a paradigm for the establishment of SAPE programs in colleges has caused adverse consequences, including an increase in gender-segregated interventions and the continued dissemination of rape myths (Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O’Donohue, 2016).

Different Forms of Sexual Assault Prevention Education Programming

Female-based programs. There are several different forms of sexual assault prevention education (SAPE) programs that exist on college campuses. Most coeducational programs follow a similar structure, which includes an hour-long workshop and discussion that focuses on rape myths, victim blaming, gender stereotypes, and dating habits (Milhausen, McBride, & Jun, 2006). The aim of these presentations is to decrease the acceptance of rape-supportive behaviors and attitudes amongst the student body (Milhausen et al., 2006). One of the most prevalent forms of SAPE centers on the promotion of assertiveness and risk-reduction amongst female victims

Introduction

Sexual violence is a term that can be utilized to encompass a broad range of unwanted sexual actions (McKinney, 2017). Although the legal definition varies from state to state, there are several factors that are necessary to label an encounter as “sexually violent” (McKinney, 2017). This includes, “... a sexual act against an unwilling participant who has not given consent, where the perpetrator may be an acquaintance, family member or stranger; and where the act resulted in harm of the survivor (physically, emotionally, and/or socially),” (McKinney, 2017, pp. 1). Rape and sexual assault are prevalent throughout society; however, individuals are the most at-risk while attending college (Jozkowski & Humphreys, 2014; Hanson & Gidycz, 1993; Choate, 2003). According to the Bureau of Justice’s National Crime Victimization Survey (NCVS), the rate of sexual assault victimization amongst 18 to 24-year-old college students was about 1.2 times higher compared to nonstudents (NCVS, 2013). Approximately 20-28% of female college students will be sexually assaulted during their college career, while 11.2% of all college students will experience some form of sexual violence while enrolled in a college or university (Mellins et al., 2017; Choate, 2003).

Due to the high frequency of sexual assault on college campuses, it is important to analyze the efforts that are being made by colleges to increase sexual violence education amongst students. One of these methods is the integration of sexual assault prevention activities, specifically during freshmen orientation. Sexual assault prevention activities are the implementation of a program that focuses on the education of faculty, staff, and students, in terms of the prevention of gender-based violence on campus (McKinney, 2017). Although research is limited on these programs, studies that have been done show that college programming surrounding the topics of consent and sexual assault are lacking effectiveness

(DeGue et al., 2014; Rothman & Silverman, 2007; Milhausen et al., 2006). This is important to note because sexual violence prevention activities are meant to act as informative and transitional programs for students to become educated on the effects of sexual violence, as well as the different approaches to prevent sexual assault.

Sexual violence can lead to a multitude of debilitating effects, such as the development of psychological and physical issues (Yeater, Miltenberger, Laden, Ellis, & O'Donohue, 2001). Mental health issues are a common result of interpersonal violence and include post-traumatic stress disorder (PTSD), depressive and anxiety symptoms, substance abuse, and eating disorders (Kress et al., 2006). These conditions can lead to the progression of more serious issues, such as suicide or suicidal thoughts, re-experience of the assault, and hyper-arousal (McKinney, 2017; Littleton et al., 2018). Victims can also experience short- and long-term physical issues, such as sexually transmitted diseases (STDs), unintended pregnancies, and gynecological complications (McKinney, 2017; Littleton et al., 2018). Due to the extensiveness of sexual violence on college campuses, it should be a public health priority to provide college students with proper, prevention activities (Alegria-Flores, Rake, & Pleasants, 2015).

If provided with effective sexual assault prevention programs on campus, will college students be able to develop a better understanding of consent and how to deter sexual misconduct? This question is important to pose because college campuses are some of the most common places for sexual misconduct to occur. While there are a variety of factors that contribute to this issue, it most likely because students are in a new environment and, for some, are experiencing independence for the first time (Boucek, 2016). Freedom and adulthood, mixed with the introduction of illegal substances and parties, increases the chances, and opportunities, for sexual assault to occur (Boucek, 2016). Freshmen females, especially, are at the highest risk

(Lonsway, 1996; Newlands & O'Donohue, 2016). In a study conducted by Vladutiu, Martin, and Macy (2010), female based SAPE programs were successful in improving rape attitudes, rape awareness, and sexual assault knowledge. While these changes in attitudes and behaviors are notable, programs that claim success due to a reduction in rape myth acceptance amongst their female audiences fail to examine rates of future victimization (Newlands & O'Donohue, 2016; Lonsway, 1996; Baynard, Moynihan, Plante, 2007). By placing a majority of the responsibility onto women to avoid sexual violence, female based SAPE programs can be exceedingly detrimental to potential victims (Lonsway, 1996; Baynard, Moynihan, Plante, 2007).

There are a multitude of gendered issues within SAPE programs that focus on female audiences. The first is that the strategies utilized during this form of SAPE encourage the protection of individual women, rather than the vulnerability of women as a group (Lonsway, 1996). Because of this, programs targeting strictly female audiences fail to teach effective prevention strategies, due to the persistent nature of offenders (Lonsway, 1996). This is problematic because female based SAPE is not looking at sexual assault as a universal problem, instead, it is focusing on how an individual woman could prevent a possible rape. This can lead to an increased risk of victim blaming by shifting the responsibility of stopping rape from the perpetrators to the victims (Lonsway, 1996; Baynard et al., 2007; Schewe & O'Donohue, 1996). Instead of informing individuals on how they should not commit a sexual assault, these programs are implying that if a woman does not properly prevent her victimization, like she was taught, then she will be held accountable for the consequences. This is a concerning matter because it can hinder the reporting behaviors of potential victims and decrease the likelihood that they will seek help, whether that be through legal services, medical care, or psychological support (Lonsway, 1996). A second limitation of female-based programming is that it is strongly

centered around heterosexual, female victimization and heterosexual, male perpetration (Rothman & Silverman, 2007; O’Keefe, 2008; Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O’Donohue, 2016). This is a common pattern throughout many college rape education programs, which is a problem because it devalues the safety and credibility of male and LGBTQ+ victims (Rothman & Silverman, 2007).

Male-based programs. Another form of SAPE that is used on college campuses is male-targeted, proactive prevention. Unlike other SAPE programs, proactive prevention focuses on perpetration and the environmental factors that support sexual assault (Edwards, 2009; Newlands & O’Donohue, 2016). The topics that are discussed through these interventions can include: bystander intervention, the promotion of victim empathy, and the examination of social norms (Edwards, 2009). While these topics can provide significant information regarding sexual assault and the falsification of rape myths, they still fail to discuss the significant role that men continue to play in rape and rape culture. All-male programs also neglect to highlight the idea that people, specifically men, should engage in the practice of consensual sexual activity (Schafer, Ortiz, Thompson, & Huemmer, 2018). Vladutiu, Martin, and Macy (2011) found that programs with all-male audiences were effective in ameliorating rape attitudes and reducing rape myth acceptance. However, while these findings should be considered, research shows that male-targeted programs typically do not cause long-term attitudinal impacts (Edwards, 2009; Newlands & O’Donohue, 2016). This is mainly because men do not view themselves as potential perpetrators of sexual violence and find prevention information irrelevant (Newlands & O’Donohue, 2016). Although there has been a push to increase male-targeted rape prevention education, coeducational programs continue to be the dominating form of SAPE on college campuses (Milhausen et al., 2006).

Mixed-sex programs. The final SAPE method utilized by colleges and universities is coeducational workshops. This type of programming focuses on communication styles and dating expectations between males and females (Milhausen et al., 2006). While female-based programs discuss how women can prevent their victimization and male-based programs center on the social norms of gender, many mixed-sex interventions argue that both victims and perpetrators are responsible for sexual assault (Lonsway, 1996). Although these types of SAPE programs are the most popular, they are also the least effective compared to same-sex programs (Milhausen et al., 2006). Vladutiu et al. (2011) found that mixed-sex programs do not show a significant, long-term change in rape behavior and attitudes. Even though this is a frequent pattern amongst all forms of SAPE programs, it is especially true when the effectiveness of said programs are evaluated immediately after they have been completed (Edwards, 2009). The main reason for this is because it is difficult to create a non-polarizing program within a coeducational dynamic (Morrison et al., 2004).

Individuals who attend coeducational programs may receive information that results in an ineffective and detrimental learning experience (Morrison et al., 2004). In a study conducted by Newlands and O'Donohue (2016), it was found that one of the possible explanations as to why mixed-sex programs do not work is because of the different needs that men and women possess. For example, coeducational programs that emphasize high frequency of male perpetration, low rates of reporting behaviors amongst women, and risk-reduction, may cause an availability heuristic, which reinforces the normalization of rape (Morrison et al., 2004; Newlands & O'Donohue, 2016). Men may view these forms of programs as accusatory, while women may develop increased fear and responsibility surrounding the risk of sexual assault (Morrison et al., 2004).

Cabrini University's "Real Talk" SAPE Program

The "Real Talk" SAPE program that Cabrini University offers to its incoming freshman class operates with a combination of same-sex, and mixed-sex, prevention methods. The first half of the program consists of a coeducational, comedic presentation, which touches on topics related to sexual consent, secondary victimization, and rape myths. A large portion of the presentation is directed towards reinforcing the notion that only women can be victims and only men can be perpetrators, which is one of the damaging effects of SAPE programming (Morrison et al., 2004). Following this portion of the program, the students are then split into their self-identified gender groups, which is when the intervention transitions into a same-sex methodology. During these seminars, female students were primarily taught risk-reduction practices, while the male student lecture discussed perpetration rates.

Cabrini University's SAPE program seemingly follows an ELM methodology. The intervention establishes topics that are assumed to be personally relevant to the students who are attending the program (O'Keefe, 2008). Due to the high rates of male perpetration and female victimization within sexual assault cases, the "Real Talk" program implemented a prevention structure that focuses solely on those two aspects. By doing this, the current methodology could be contributing to the persistence of rape normalization, rather than providing students with substantial sexual assault reduction measures (Newlands & O'Donohue, 2016).

Hypotheses

The first hypothesis for this study is that Cabrini University's sexual assault education prevention program does not have a short-term impact on students' attitudinal changes. Based on empirical literature, both same-sex and mixed-sex SAPE programs have a pattern of providing

ineffective sexual assault prevention, due to the prevalence of numerous issues (Milhausen et al., 2006; Lonsway, 1996; Vladutiu et al., 2011; Edwards, 2009). The first issue is that SAPE programs do not possess strong, theoretical orientations to back up their prevention methodology (Morrison, et al., 2004; DeGue et al., 2014). A lack of theoretical foundation has led to inconsistencies within the effectiveness of certain programs, which has aided in the development of unrepresentative evaluations (Foubert & Perry, 2007; Edwards et al., 2019; DeGue et al., 2014). Without proper evaluations, colleges and universities can continue to implement ineffective programs that aid in the persistence of rape myths and the lack of proper sexual consent education.

The second issue is that the SAPE programs that do possess a theoretical foundation, cite a multitude of different theories that can create harmful effects (Morrison et al., 2004). Theories, such as the Elaboration Likelihood Model, are implemented with the intent of establishing a program that motivates individuals to be persuaded by the information being presented to them (O’Keefe, 2008). This is applied through gendered implications, such as the idea that women are associated with victimization and men are connected to perpetration (O’Keefe, 2008; Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O’Donohue, 2016). Ultimately, this has led to an increase of rape normalization within such programs, rather than providing students with an effective prevention experience (Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O’Donohue, 2016). When an ELM approach is taken within a same-sex program, women are typically held responsible for reducing their risk of sexual assault and men are more likely to remove themselves from their potential roles in perpetration (Lonsway, 1996; Banyard, Moynihan, Plante, 2007; Newlands & O’Donohue, 2016). Coeducational programs, however, fail to completely address the needs of both, men, and

women, which can lead to a polarizing effect within the intervention (Morrison et al., 2004; Newlands & O'Donohue, 2016). This leads to major disconnections between the prevention program and the target audience, which may affect short-term attitudinal changes.

The second hypothesis for this study is Cabrini's SAPE program will not have a long-term effect on the freshmen who attended during their orientation. Programs tend to focus more on increasing knowledge of sexual assault, rather than addressing ways in which sexual assault can be reduced over an extended period (Morrison et al., 2004). This is congruent with the first hypothesis, in that, the ELM theory places a lot of emphasis on the idea that providing education on rape myths, consent, and risk-reduction, will cause long-term changes in attitudes (Morrison et al., 2004).

Methods

Data Collection and Sample

This study utilized a non-probability, purposive sampling method. Data was collected from 208 (n=208) participants at Cabrini University in August of 2019, and then again six-weeks later in October of 2019. The data in this study comes from a group of Cabrini University freshmen students who attended the "Real Talk" SAPE program during orientation. The researcher used a fixed-panel design to distribute a self-report survey to students at three points: before the beginning of the program ("time one"), immediately after the program ("time two"), and then six-weeks later ("time three"). To collect surveys via purposive sampling, the researcher attended the "Real Talk" program, as well as freshmen COL 101 ("college success") classrooms six weeks later. The researcher was an Orientation Leader for the freshman Orientation Weekend and was granted access to survey students who attended the "Real Talk"

program by Cabrini University's Student Engagement and Leadership office. Six-weeks after the intervention, the student obtained virtual permission from faculty members to attend COL 101 courses and distribute surveys over the course of two weeks in the fall of 2019.

Before attending the program and freshman classrooms, the researcher had to get approval from the Institutional Review Board (IRB). The researcher was granted IRB approval after the necessary paperwork was submitted. This paperwork included a consent form for the students, which was distributed to participants. Students were informed that the survey was voluntary, anonymous, and confidential at each time point. The sample was composed of 50% (n=103) white students, 28.4% (n=59) black students, 10.6% (n=22) students who identified as other, and 1.4% (n=3) students who selected multiple answers. 81.3% (n=169) of students did not identify as Hispanic/Latino, while 16.8% (n=35) did. Most participants were 18 years old (77.1%, n=205). Regarding gender, 58.2% (n=121) of students identified as female, while 40.4% (n=84) of students identified as male. The gender variable was re-evaluated in the fall of 2020 and four, one-way repeated-measures ANOVAs were tested to determine if gender played a significant role in attitudinal changes towards sexual consent and rape myths.

Immediately before the beginning of the comedic performance, the researcher distributed surveys to students who were in attendance of the prevention program. Once students had completed them, the surveys were collected. After the comedic performance, students were then asked to separate into their self-identified gender groups, either "male" or "female". Males remained in the same building that the comedian performed in, while the females were asked to relocate to a separate building. Students then participated in an hour-long presentation on a variety of topics related to sexual violence. Immediately following the presentations, the researcher administered the second survey and collected them once the students had completed

the questions. Six-weeks after the initial “Real Talk” program, the researcher requested access to freshman students’ COL 101 classes. The same survey was distributed to students, however, there was an added question, “Did you attend the “Real Talk” sexual assault prevention education program in August?” This question was included to determine which freshman had attended the SAPE program.

Independent Variable

“Real Talk” SAPE program. The independent variable for this study was Cabrini University’s “Real Talk” SAPE program. The program is conceptualized as a 2-hour long co-educational workshop for incoming freshmen students. It was designed to increase awareness on topics of sexual violence, as well as the added risks that can occur when alcohol and drugs are involved (Cabrini University, 2019). The intervention consists of an hour-long comedic act about sexual consent, followed immediately by an hour-long information session. For the information session, students were split up into their self-identifying gender groups. The female students were asked to relocate to a different building, while the male students remained in the same building that the comedian presented in. The program was then examined at three different time points: before, immediately after, and six-weeks later.

Dependent Variables

Sexual consent knowledge. This study consisted of two dependent variables, the first of which is sexual consent knowledge. Sexual consent can be conceptualized as, “Informed and freely given words or actions that indicate a willingness to participate in mutually agreed upon sexual activity,” (Hullenaar, 2016, p. 4). To ensure that the definition of sexual consent was fully encompassed, participants were asked to read 16 statements from the Sexual Consent Scale

(SCS) (Humphreys, 2009) and rank their beliefs on a 7-point Likert-scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Content validity was achieved through the utilization of phrases that cover most definitions of sexual consent (Humphreys, 2009; Hullenaar, 2016; Schafer et al., 2018). Five attitudinal subscales were measured within these phrases: “(lack of) behavioral control” (“*I would have difficulty asking for consent because it would spoil the mood*”), “positive attitudes toward establishing consent” (“*Not asking for sexual consent some of the time is okay*”), “sexual consent norms” (“*I think that obtaining sexual consent is more necessary in a new relationship than in a committed relationship*”), and “awareness of consent” (“*I have not given much thought to the topic of sexual consent*”) (Humphreys, 2009). The 16 statements are listed in Appendix A.

To create an additive scale, five of the statements were recoded because they consisted of positively worded phrases, (“*I feel confident that I could ask for consent from my current partner*”), while the other statements about sexual consent were negatively worded (“*I am worried that my partner might think I’m weird or strange if I asked for sexual consent before starting any sexual activity*”) (Humphreys, 2009). The researcher then combined the statements into three additive scales, to create an overall sexual consent variable (“*SC time 1*”, “*SC time 2*”, “*SC time 3*”). Cronbach’s Alpha was reported for all three of them and they were all greater than .7 (SC Time 1, $\alpha=.788$; SC time 2, $\alpha=.841$; SC time 3, $\alpha=.837$). The strength of Cronbach’s Alpha indicated inter-item reliability, which ascertained that creating additive scales were appropriate. The sexual consent scale for time one ranged from 16 to 91, the range for time two was 16 to 83, and the range for time three was 16 to 82. Participants with higher scales possessed more negative views on sexual consent. The most common ranking for time one was 37 (5%, $n=7$) and the mean score was 44.2. For time two, the most frequent scores were 16 and 39 (6.2%, $n=7$),

while the mean was 41.6. Finally, for time three, the most common score was 35 (8.2%, n=5) and the mean was 39.7. All three time points indicate that there is an overall relatively neutral level of negative views on sexual consent amongst Cabrini University freshmen, meaning that there was not a high, or low, level of negative views towards sexual consent amongst participants.

Rape myth acceptance. The second dependent variable was rape myth acceptance. Rape myths can be defined as, “Prejudicial, stereotyped, or false beliefs about rape, rape victims, and rapists,” (Burt, 1980, p. 217). To measure rape myth acceptance, participants were asked to read a series of statements and rank them on a 5-point Likert-scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Content validity was achieved through the utilization of phrases that cover most definitions of rape myths (Burt, 1980; Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O’Donohue, 2016). Four subscales were measured within these statements: “she asked for it” (*“When girls go to parties wearing slutty clothes, they are asking for trouble”*), “he didn’t mean to” (*“Rape happens when a guy’s sex drive goes out of control”*), “it wasn’t really rape” (*“If a girl doesn’t physically resist sex-even if protesting verbally-it can’t be considered rape”*), “she lied” (*“A lot of times, girls who say they were raped agreed to have sex and then regretted it”*) (McMahon & Farmer, 2011). The twenty statements are listed in Appendix B.

The researcher combined the statements into three additive scales, (“*RM time 1*”, “*RM time 2*”, *RM time 3*”) to create an overall rape myth acceptance variable. Creating the additive scales for rape myth statements was appropriate since the Cronbach’s Alpha for each was determined to be greater than 0.7 (RM time 1, $\alpha = .907$; RM time 2, $\alpha = .919$; RM time 3, $\alpha = .913$). The strength of Cronbach’s Alpha indicated inter-item reliability, which ascertained that

creating additive scales were appropriate. The scale for time one ranged from 21 to 89, the scale for time two ranged from 21 to 93, and the scale for time three ranged from 21 to 76. Lower scores on the scales indicated a lower level of rape myth acceptance, while higher scores suggested a higher level of rape myth acceptance. The most frequent rankings for time one was 40 and 43 (5.1%, n=7), while the mean score was 40.7. For time two, the most frequent rankings were 21 and 27 (6.5%, n=7), and the mean score was 38.9. Finally, the most frequent ranking for time three was 33 (8.1%, n=5). Like sexual consent, the overall respondent rankings indicate a relatively neutral level of negative views on rape, which suggests that the sample did not possess a high, or low, level of negative views on rape. Descriptive statistics for all six variables are reported in Table 1.

Table 1. *Variable Descriptive Statistics*

| <i>Variable</i> | <i>N</i> | <i>M</i> | <i>SD</i> |
|-----------------------|----------|----------|-----------|
| Rape Myth Time 1 | 138 | 40.7 | 13.3 |
| Rape Myth Time 2 | 107 | 38.9 | 13.9 |
| Rape Myth Time 3 | 62 | 38.3 | 12.9 |
| Sexual Consent Time 1 | 139 | 44.2 | 12.6 |
| Sexual Consent Time 2 | 113 | 41.6 | 15.6 |
| Sexual Consent Time 3 | 61 | 39.7 | 13.8 |

Plans for Statistical Analysis

To analyze the relationship between the “Real Talk” SAPE program and students’ attitudinal changes towards rape myths and sexual consent, a one-way repeated-measures

ANOVA was conducted. This form of analysis was most appropriate for the research question because the independent variable consisted of more than two categories, and the dependent variable was continuous. Additionally, the researcher decided to use a one-way repeated measures ANOVA because the levels of within-subjects factors represented the scores of different scales. The means of these scales were then evaluated to examine any differences that occurred over time before the SAPE program, immediately after the program, and then six-weeks later.

Results

Sexual Consent Knowledge

The first hypothesis, which predicted that Cabrini University's SAPE program would have no short-term effect on the participants' attitudinal changes towards sexual consent, was supported by the data in this study. The one-way repeated-measures ANOVA for overall sexual consent knowledge amongst freshmen students was found to be not significant at any level, $F(2, 46) = 1.835, p = .171$. This indicates that there were no attitudinal changes towards sexual consent amongst freshmen students who attended the "Real Talk" program. The results also indicated a not significant time effect, Wilk's $\Lambda = .872, F(2, 22) = 1.610, p = .223$, multivariate $\eta^2 = .128$. This suggests that there was no significant difference in respondents' sexual consent scores between time one ($M = 40.33, SD = 12.80$), time two ($M = 37.83, SD = 16.17$), and time three ($M = 36.6, SD = 12.80$). Because the overall ANOVA and Wilk's lambda were both not significant, follow-up polynomial contrasts were not reported. The first hypothesis, which predicted that Cabrini University's SAPE program would have no short-term effect on the participants' attitudinal changes towards sexual consent, was supported. The second hypothesis, that predicted that there would be no long-term change in students' attitudes towards sexual

consent, was also supported. The distribution of scores can be viewed in Table 2 and the results for the ANOVA can be found in Figure 1.

Table 2. *One-Way Repeated-Measures ANOVA for Sexual Consent*

| Source | Sums of Squares | df | Mean Square | F |
|------------------|-----------------|----|-------------|-------|
| Between Subjects | 171.694 | 2 | 85.847 | 1.835 |
| Within Subjects | 2152.306 | 46 | 46.789 | |
| Total | 2324.000 | 48 | 132.636 | |

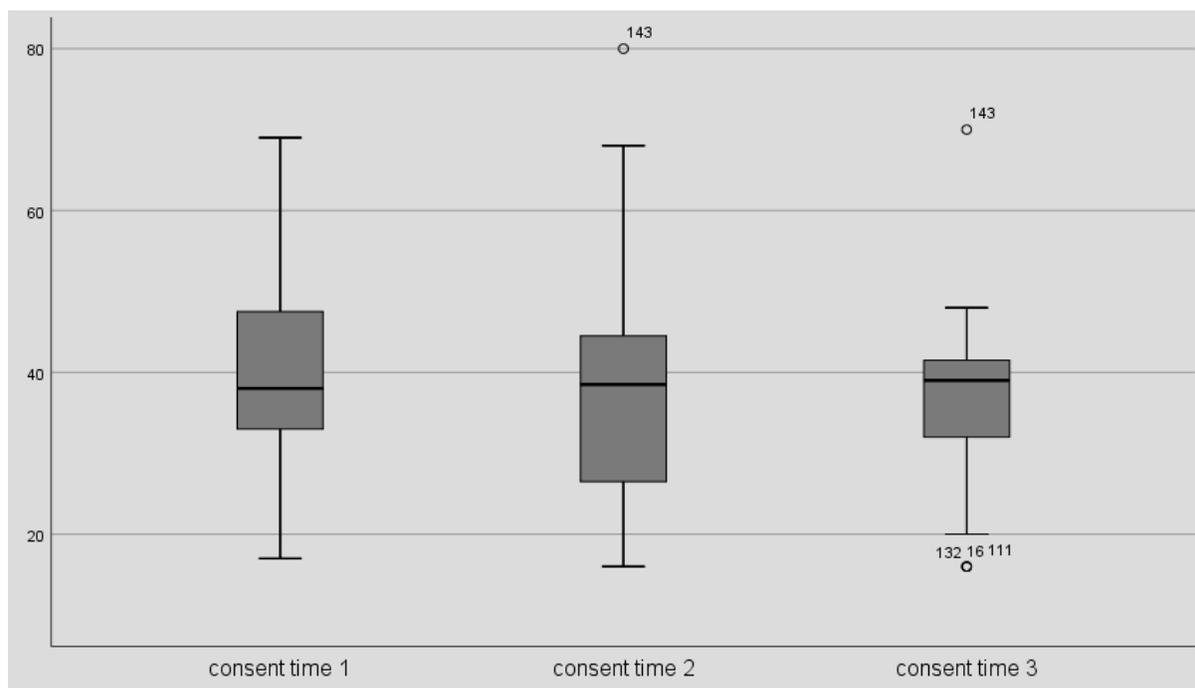


Figure 1. Box plot for the distribution of rape myth acceptance scores amongst participants at each time point.

Sexual consent knowledge among female participants. The one-way repeated-measures ANOVA for overall sexual consent knowledge amongst self-identified females was found to be not significant at any level, $F(2, 30) = .157, p = .855$. This indicates that there were no attitudinal changes towards sexual consent amongst freshmen women who attended the “Real Talk” program. The results also suggested a not significant time effect, Wilk’s $\Lambda = .982, F(2, 14) = .128, p = .881$, multivariate $\eta^2 = .018$. This suggests that there was no significant difference

in female respondents' sexual consent scores between time one ($M = 37.25$, $SD = 12.44$), time two ($M = 36.31$, $SD = 16.58$), and time three ($M = 36.31$, $SD = 13.35$). Because the overall ANOVA and Wilk's lambda were both not significant, follow-up polynomial contrasts were not reported. The first hypothesis, which predicted that Cabrini University's SAPE program would have no short-term effect on the participants' attitudinal or changes towards sexual consent, was supported. The second hypothesis, that predicted that there would be no long-term change in students' attitudes towards sexual consent, was also supported. The distribution of scores can be viewed in Table 3.

Table 3. *One-Way Repeated Measures ANOVA for Sexual Consent Knowledge Among Women*

| <i>Source</i> | <i>Sums of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> |
|------------------|------------------------|-----------|--------------------|----------|
| Between Subjects | 9.375 | 2 | 4.688 | .157 |
| Within Subjects | 895.958 | 30 | 29.865 | |
| Total | 905.333 | 32 | 34.553 | |

Sexual consent knowledge among male participants. The one-way repeated-measures ANOVA for overall sexual consent knowledge amongst self-identified males was found to be not significant at any level, $F(2, 14) = 2.272$, $p = .140$. This indicates that there were no attitudinal changes towards sexual consent amongst freshmen men who attended the "Real Talk" program. The results also suggested a not significant time effect, Wilk's $\Lambda = .585$, $F(2, 6) = 2.131$, $p = .200$, multivariate $\eta^2 = .415$. This suggests that there was no significant difference in male respondents' sexual consent scores between time one ($M = 46.50$, $SD = 11.89$), time two ($M = 40.88$, $SD = 15.97$), and time three ($M = 37.25$, $SD = 9.4$). Because the overall ANOVA and Wilk's lambda were both not significant, follow-up polynomial contrasts were not reported. The first hypothesis, which predicted that Cabrini University's SAPE program would have no short-term effect on the participants' attitudinal or changes towards sexual consent, was

supported. The second hypothesis, that predicted that there would be no long-term change in students' attitudes towards sexual consent, was also supported. The distribution of scores can be viewed in Table 4.

Table 4. *One-Way Repeated Measures ANOVA for Sexual Consent Knowledge Among Men*

| <i>Source</i> | <i>Sums of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> |
|------------------|------------------------|-----------|--------------------|----------|
| Between Subjects | 347.583 | 2 | 173.792 | 2.272 |
| Within Subjects | 1071.083 | 14 | 76.506 | |
| Total | 1418.666 | 16 | 250.298 | |

Rape Myth Acceptance

The first hypothesis, which predicted that Cabrini University's SAPE program would have no short-term effect on the participants' attitudinal changes towards rape myth acceptance, was supported by the data in this study. The ANOVA for rape myth acceptance overall was found to be not significant at all levels, $F(2, 40) = 0.29, p = .971$. This shows that the SAPE program had no effect on the participants' attitudinal changes towards rape myths. The results also indicated that there was no significant time effect, Wilk's $\Lambda = .998, F(2, 19), p = .983$, multivariate $\eta^2 = .002$. This suggests that there was no significant difference in respondents' rape myth scores between time one ($M = 35.28, SD = 9.30$), time two ($M = 35.33, SD = 10.52$), and time three ($M = 35.05, SD = 9.36$). Because the overall ANOVA and the Wilk's lambda were both not significant, follow-up polynomial contrasts were not reported. The first hypothesis, which predicts that the SAPE program will not have a significant short-term effect on rape myth attitudinal changes on students who attended, was supported. The second hypothesis, that states that the intervention will not have a significant long-term effect on the rape myth attitudes of participants, were also supported. Results for the ANOVA are reported in Table 5 and the distribution of rape myth scores can be found in Figure 2.

Table 5. *One-Way Repeated-Measures ANOVA for Rape Myth Acceptance*

| Source | Sums of Squares | df | Mean Square | F |
|------------------|-----------------|----|-------------|-----|
| Between Subjects | .984 | 2 | .492 | .29 |
| Within Subjects | 671.683 | 40 | 16.792 | |
| Total | 444.666 | 42 | 17.284 | |

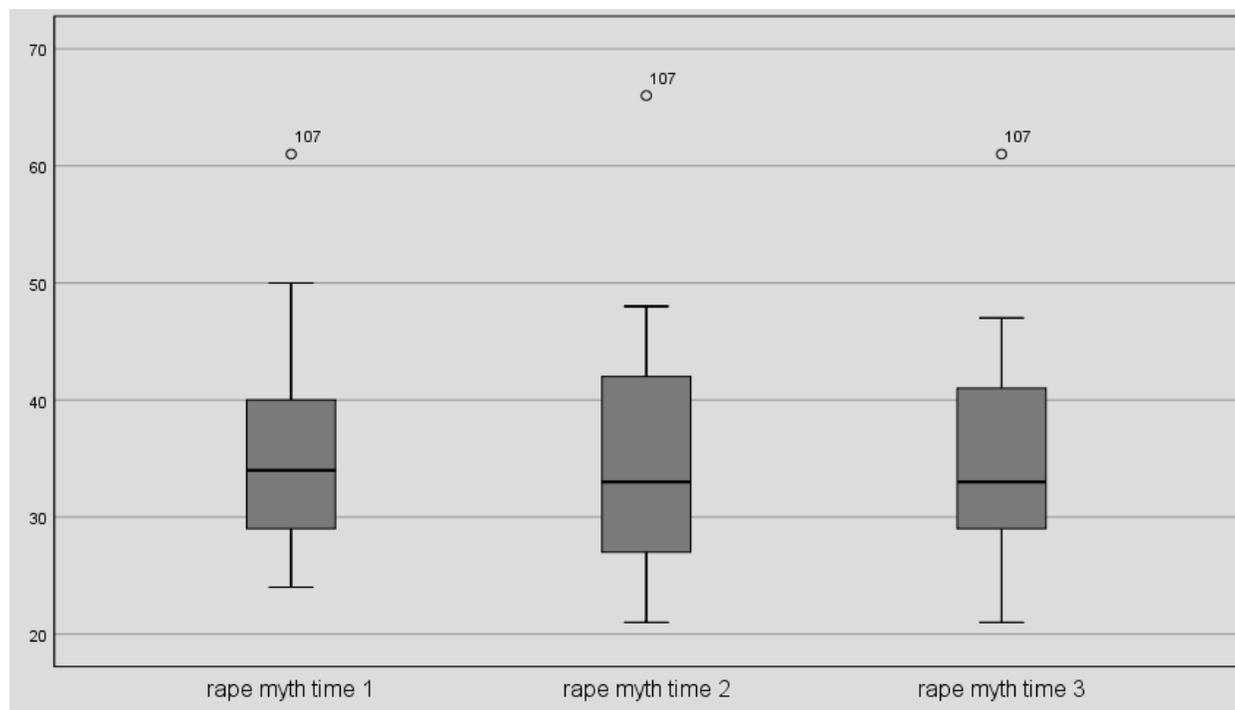


Figure 2. Box plot for the distribution of rape myth acceptance scores amongst participants at each time point.

Rape myth acceptance among female participants. The ANOVA for rape myth acceptance amongst female participants was found to be not significant at all levels, $F(2, 26) = .344, p = .712$. This shows that the SAPE program had no effect on the participants' attitudinal changes towards rape myths. The results also indicated that there was no significant time effect, Wilk's $\Lambda = .971, F(2, 12), p = .836, \text{multivariate } \eta^2 = .029$. This suggests that there was no significant difference in respondents' rape myth scores between time one ($M = 32.76, SD = 7.26$), time two ($M = 32.71, SD = 7.16$), and time three ($M = 33.86, SD = 6.69$). Because the overall ANOVA and the Wilk's lambda were both not significant, follow-up polynomial

contrasts were not reported. The first hypothesis, which predicts that the SAPE program will not have a significant short-term effect on rape myth attitudinal changes on students who attended, was supported. The second hypothesis, that states that the intervention will not have a significant long-term effect on the rape myth attitudes was also supported. Results for the ANOVA are reported in Table 6 and the distribution of female rape myth scores can be found in Figure 5.

Table 6. *One-Way Repeated Measures ANOVA for Rape Myth Acceptance Among Women*

| <i>Source</i> | <i>Sums of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> |
|------------------|------------------------|-----------|--------------------|----------|
| Between Subjects | 11.476 | 2 | 5.738 | .344 |
| Within Subjects | 433.190 | 26 | 16.661 | |
| Total | 444.666 | 28 | 22.399 | |

Rape myth acceptance among male participants. The ANOVA for rape myth acceptance amongst male participants was found to be not significant at all levels, $F(2, 12) = 1.366, p = .292$. This shows that the SAPE program had no effect on the participants' attitudinal changes towards rape myths. The results also indicated that there was no significant time effect, Wilk's $\Lambda = .591, F(2, 5), p = .268$, multivariate $\eta^2 = .409$. This suggests that there was no significant difference in respondents' rape myth scores between time one ($M = 40.29, SD = 11.43$), time two ($M = 40.57, SD = 14.49$), and time three ($M = 37.43, SD = 13.61$). Because the overall ANOVA and the Wilk's lambda were both not significant, follow-up polynomial contrasts were not reported. The first hypothesis, which predicts that the SAPE program will not have a significant short-term effect on rape myth attitudinal changes on students who attended, was supported. The second hypothesis, that states that the intervention will not have a significant long-term effect on the rape myth attitudes was also supported. Results for the ANOVA are reported in Table 7.

Table 7. *One-Way Repeated Measures ANOVA for Rape Myth Acceptance Among Men*

| <i>Source</i> | <i>Sums of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> |
|------------------|------------------------|-----------|--------------------|----------|
| Between Subjects | 42.286 | 2 | 21.143 | 1.366 |
| Within Subjects | 185.714 | 12 | 15.476 | |
| Total | 228.000 | 14 | 36.619 | |

Discussion

The purpose of this study was to examine the relationship between Cabrini University's "Real Talk" SAPE program, and the effect that it had on students' attitudinal changes towards sexual consent and rape myths. Based on the findings in previous literature, two hypotheses were established. Both were supported, with one of them predicting that there would be no short-term effect on students who attended the presentation. The results support this hypothesis because the difference in the average sexual consent scores and rape myth scores amongst participants was approximately two points lower between time one and time two. Although there was a slight difference, this is not enough to claim that the SAPE program is effective. The change in average scores indicate that students' attitudes towards both, sexual consent, and rape myths, did not immediately change over the course of the presentation. The second hypothesis, which was also supported, stated that there would be no long-term effect on participants' attitudes towards sexual consent and rape myths. This statement was reinforced by the results, in that the average sexual consent score for time three was approximately four points lower than time one, and two points lower than time two. The average rape myth score for time three was three points lower than time one and equivalent to the score at time two. Both findings are supported in previous literature, which states that collegiate SAPE programs are not effective in providing students with efficient information on sexual violence and related topics (Lonsway, 1996; Edwards, 2009; Vladutiu et al., 2011; Newlands & O'Donohue, 2016; Morrison et al., 2004; DeGue et al., 2014).

The chosen theoretical basis for this study sufficiently answered the research questions. The utilization of the ELM model in SAPE programs focuses strictly on the education of sexual violence to change attitudes (Morrison et al., 2004; O'Keefe, 2008). Programs that follow this structure tend to incorporate gender segregated aspects of their interventions, such as the one implemented by Cabrini University (Morrison et al., 2004; Newlands & O'Donohue, 2016). This is mainly because the ELM model suggests that individuals are more likely to be persuaded by, or think about, the information that is presented to them if it possesses personal relevance (O'Keefe, 2008). Regarding sexual violence, universities and colleges apply SAPE programs that place men and women in two, different categories: perpetrators and victims (Morrison et al., 2004). Although this is meant to motivate individuals to become engaged in the subject matter, research has shown that the ELM model has adverse effects on the effectiveness of SAPE programs (O'Keefe, 2008; Banyard, Plante, Moynihan, 2005; Morrison et al., 2004; Schewe, 2001; Newlands & O'Donohue, 2016). It has been shown that, during same-sex and mixed-sex programs, rape is continuously normalized, and individuals are not provided with short-term, or long-term, education surrounding the impact of sexual violence (Lonsway, 1996; Baynard, Moynihan, Plante, 2007; Newlands & O'Donohue, 2008).

This study was limited because there were no questions within the survey that asked participants about past victimization. The inclusion of this question could have aided in the researcher's understanding of the effects that SAPE programs have on individuals who have experienced sexual violence. Additionally, there was melt present throughout the sample between the time one variables and the time two variables. This can be attributed to the separation of females and males, following the comedic performance. Since the female group was asked to transfer buildings for the gendered presentations, some participants may have

decided to leave the intervention early. There was also a significant amount of melt between the first two times and time three, because the researcher was only able to attend approximately seven COL 101 classrooms during the allotted time frame in the fall of 2019. When the surveys were distributed during time three, an additional question was asked, regarding student attendance to the “Real Talk” SAPE program. If students did not attend the prevention program, their surveys were removed from the sample. Finally, the study also dealt with rushed timing due to the strict schedule of the program. The researcher was provided with a restricted amount of time to distribute and collect the surveys from participants, both before and immediately after the presentation. Because of the time constraints and the extensive length of the program, some attendees may not have received a survey to complete. This could have affected the sample size, and, therefore, the results of the sexual consent scores and rape myth scores that were reported in the pre-test and immediate post-test.

Future research may want to explore the relationship between the “Real Talk” SAPE program and gender. As stated in previous literature, sexual assault, and the prevention programs associated with it, effect males, females, and non-binary individuals differently (Lonsway, 1996; Sculos, 2017; Kernsmith & Hernandez-Jozefowicz, 2011; Newlands & O’Donohue, 2016; Morrison et al., 2004). It would be interesting to examine the differences in scores amongst a variety of races over an extended period. This would allow for greater generalizability towards victimization and perpetration patterns that are present within greater society. Future research should also consider conducting a qualitative study to further assess the impact (or lack thereof) of the “Real Talk” SAPE program. By utilizing qualitative methodology, the researcher would be able to receive more in-depth and detailed answers from those who attended the program.

The results from this study support the idea that collegiate SAPE programs do not provide students with effective information, regarding topics of sexual violence. Therefore, universities and colleges are contributing to the continued prevalence of societal rape culture. These programs are shifting the responsibility of sexual assault onto potential victims, by insisting that it is their fault if they are unable to successfully prevent their rape from occurring (Lonsway, 1996; Baynard et al., 2007; Schewe & O'Donohue, 1996). Prevention programs also tend to promote the widespread presence of rape myths, such as the idea that only men can be perpetrators and only women can be victims (Rothman & Silverman, 2017). The combination of these two effects can negatively impact the reporting behaviors of victims, both male and female (Lonsway, 1996).

To successfully educate students on the importance of sexual consent, as well as eliminate rape myth acceptance, the structure of Cabrini University's SAPE program should be re-evaluated. The university should make efforts to implement a peer-led intervention program that emphasizes the importance of bystander-awareness (Alegria-Flores et al., 2015; Milhausen et al., 2006; Baynard et al., 2007). This form of rape-prevention programming is found to be the most effective amongst collegiate populations, both short-term and long-term (Milhausen et al., 2006; Baynard et al., 2007). If colleges and universities utilized these types of interventions, then it may aid in the universal diminishment of rape myth acceptance, as well as higher levels of sexual consent understanding. Overall, the findings of this study demonstrate the ways in which educational institutions can improve their prevention programs and create a safer college experience for students.

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Appendix A

Measures for assessing sexual consent knowledge. Adapted from the Sexual Consent Scale (SCS) (Humphreys, 2009).

1. (Lack of) Behavioral Control

- I would have difficulty asking for consent because it would spoil the mood.
- I am worried that my partner might think I'm weird or strange if I asked for sexual consent before starting any sexual activity.
- I think that verbally asking for consent is awkward.
- I believe that verbally asking for sexual consent reduces the pleasure of the encounter.
- I feel confident that I could ask for consent from a new sexual partner.
- I feel confident that I could ask for consent from my current partner.

2. Positive Attitudes Toward Establishing Consent

- I feel that sexual consent should always be obtained before the start of any sexual activity.
- I think it is equally important to obtain sexual consent in all relationships regardless of whether or not they have had sex before.
- Before making sexual advances, I think that one should assume "no" until there is clear indication to proceed.
- Not asking for sexual consent some of the time is okay.

3. Sexual Consent Norms

- I think that obtaining sexual consent is more necessary in a new relationship than in a committed relationship.

- I think that obtaining sexual consent is more necessary in a casual sexual encounter than in a committed relationship.
- I believe that the need for asking for sexual consent decreases as the length of an intimate relationship increases.
- I believe that sexual intercourse is the only sexual activity that requires explicit verbal consent.
- I believe it is enough to ask for consent at the beginning of a sexual encounter.

4. Awareness and Discussion

- I have not given much thought to the topic of sexual consent.

Appendix B

Measures for assessing rape myth acceptance. Adapted from the Illinois Rape Myth Acceptance Scale (IRMAS) (McMahon & Farmer, 2011).

1. She Asked for It

- “If a girl is raped while she is drunk, she is at least somewhat responsible for letting things get out of hand.”
- “When girls go to parties wearing slutty clothes, they are asking for trouble.”
- “If a girl goes to a room alone with a guy at a party, it is her own fault if she is raped.”
- “When girls get raped, it’s often because the way they said ‘no’ was unclear.”
- “If a girl initiates kissing or hooking up, she should not be surprised if a guy assumes she wants to have sex.”

2. He Didn’t Mean To

- “When guys rape, it is usually because of their strong desire for sex.”
- “Guys don’t usually intend to force sex on a girl, but sometimes they get too sexually carried away.”
- “Rape happens when a guy’s sex drive goes out of control.”
- “If a guy is drunk, he might rape someone unintentionally.”
- “It shouldn’t be considered rape if a guy is drunk and didn’t realize what he was doing.”
- “If both people are drunk, it can’t be rape.”

3. It Wasn't Really Rape

- “If a girl doesn't physically resist sex-even if protesting verbally-it can't be considered rape.”
- “If a girl doesn't physically fight back, you can't really say it was rape.”
- “A rape probably doesn't happen if a girl doesn't have any bruises or marks.”
- “If the accused 'rapist' doesn't have a weapon, you really can't call it rape.”
- “If a girl doesn't say 'no' she can't claim rape.”

4. She Lied

- “A lot of times, girls who say they were raped agreed to have sex and then regret it.”
- “Rape accusations are often used as a way of getting back at guys.”
- “A lot of the times, girls who say they were raped often led the guy on and then had regrets.”
- “A lot of the times, girls who claim they were raped have emotional problems.”
- “Girls who are caught cheating on their boyfriends sometimes claim it was rape.”

Problem and Solution: Mental Health and Education

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22% percent of students below the age of 18 years old have a diagnosed psychiatric illness (McCarter). As an aspiring educator who is about to enter the world of education, this statistic is overwhelming. In light of it I questioned how I, as a future English teacher, could teach literature in ways that would support the mental health of my students. The idea of teaching a demanding curriculum, while being aware of the mental health status of my students consumed me. Children and young adults are facing mental health crises across the United States. According to University Hospitals, suicide is the second most common cause of death in Americans age 7-24, first is vehicular accidents (UHBlog 1). We have the power to limit suicides and mental health illnesses in our youth and it starts with education. I concluded that while these two forces, education and mental health, may not traditionally be integrated, we can modify them to become so. Together, educators and administrators can shape curriculum to be academically enriching, while prioritizing mental health well-being.

Before addressing the epidemic of mental illness, one must understand the complexity of the term. Researchers have found that a significant number of students misunderstand the definition of mental illness (Richmond). One mental health advocate expressed how several hurtful adjectives are mislabeling mental illness. “Disturbed, nuts, freak, psycho, and crazy” are used by individuals who are ignorant to the nuances of mental health (Richmond 22). These offensive and deceptive names contribute to the negative stigma surrounding mental illness that educators have the power to change.

Mental health deficiencies among young adults was once described as, “a global public health challenge” (O’Toole 15). However, the mental health of young adults and children has been deteriorating all across the world. Mental health does not stereotype; all genders, ages, social classes, and races are suffering. According to “Youth of Gov”, young Latinos have the least access to mental health assistance (“Prevalence” 1). Behind Latinos, is African Americans with 77% of youth that do not have their mental health needs met (“Prevalence” 1). While

white children and young adults are third in this scary statistic, the percentages of students who are not receiving proper mental health services is devastating (“Prevalence” 1). On a larger scale, one in four people suffer from mental illness (Brown and Carr). Half of those suffering from mental illness begin their mental health struggles around the age of fourteen years old (Brown and Carr), so we understand that it is never too early to discuss mental wellness. In England, one in three children are found to have mental illnesses (Brown and Carr 1). Education needs to be reformed to meet the changing times and the evolving needs of our students. Theresa May, the Minister of England, is passionate about focusing on the mental health crisis (Brown and Carr). In one of her public speeches she discusses the importance of being a mental health advocate (Brown and Carr). She believes that combatting the increase in mental health illness begins at a foundational level. (Brown and Carr). Theresa May believes that workplaces, schools, and public spaces should permit free discussion of mental well-being, so that the broader conversation moves beyond the professional sphere of hospitals and healthcare (Brown and Carr). She understands that diagnosing mental health and treating it in adolescence is beneficial to all society (Brown and Carr 2). Making mental health an appropriate and important consideration in the education profession will encourage young people to seek assistance for their symptoms, as they begin to feel more comfortable and less likely to be judged.

Mental health and academic performance are directly tied to one another. University Hospitals listed several indicators of youth mental illnesses and they explained how there is a decrease in academics and overall school activity when a child is suffering (UHBlog 2). With this knowledge of the correlation between mental health and school performance, administrators and educators must work together to promote excellence in both aspects. Theresa May implemented a program in which all educators must undergo training regarding mental health signs in the classroom and the best interventional practices for students who may be struggling (Brown and Carr). England is revamping their educational aims to become more mental health conscious (Brown and Carr). While the United Kingdom may be making efforts in their policies and administration to teach about mental health, there are still countless lives being lost to suicide throughout the world, especially in the United States. According to a 2008 survey for

ages ten to twenty-four years old, 13.8% of respondents claimed to have seriously considered suicide once in their lives (“Prevalence” 1). Within that survey, 10.9% of respondents actually created a suicide plan (“Prevalence” 1). As suicide rates increase and more mental health driven violence occurs, schools, districts, states, and countries are being pressured to fight these crises and are desperately looking for answers to prevent more tragedies.

Mental illness presents a multitude of difficulties and spotlights strengths for many young people. As educators, we have the power of guiding our students along their personal journeys. Many students suffering from mental illness are likely to be a part of the school to prison pipeline (McCarter). It is a reality for too many disadvantaged students. These students are not benefitted by their educational experience and, instead of bettering themselves to be future citizens, they go from school to prison because of the lack of support and preparation. Many of these same students are suffering from the absence of mental health resources available to them. Some children have less access to mental health services and education than others. Fifty percent of children who have been in the foster care system are likely to have a mental illness (“Prevalence” 2). With insufficient mental health education or resources, students can silently suffer and may unknowingly act out given their internal struggles. If a student is struggling and continues to do so silently, they may make serious life-threatening decisions that could cause them harm or cause harm to those around them. The likelihood of students transitioning from high school to prison is statistically significant. Students with mental illnesses do not receive the proper care and thus, are more likely to turn to violence, crime, and other anti-social behaviors. There is a positive correlation between the increase in young jail inmates and mental health illness diagnoses (McCarter). About seventy percent of young adults who have been in juvenile detention have a mental illness (“Prevalence” 2). This statistic speaks to the severity of lack of resources and education. Mental disorders can lead individuals down various tumultuous paths, when they are not handled. When mental health resources are available and promoted, students can become educated about the health of the brain and the ways to access assistance. The evidence is clear that the education and societal system is not properly serving individuals who are mentally unstable. The National Alliance of Mental Illness (NAMI) claims that making educational institutions centered around mental wellness will

decrease the volume of students in the school to prison pipeline (McCarter). If students understand how to properly handle their emotions, they are less likely to act out and more likely to seek help as they understand the consequences of their behavior and the resources available to support them. Researchers believe that understanding the intersection of education, mental health, and the justice system is necessary if we are going to fix the problem (McCarter).

Educators have the power to control the classroom environment. Our actions are magnified by students, especially in adolescence and young adulthood. Teachers should be aware of the extreme weight that their words and behavior have on students. At such a pivotal point of their lives, students may trust educators more than other adults. Educators must constantly remind themselves of the integral role they play in the lives of students and how best to interact with them. There is hope and it starts with driven educators who value mental health initiatives and are committed to incorporating them as a part of their curriculum. Some institutions have developed mental health scales, which allow educators to assess student mental well-being in fair and specific ways (Brown and Carr). The results can follow a child throughout their academic journey and can be referenced. Having a method of monitoring students is essential to providing student assistance when necessary.

School is a daily reality in every student's life, therefore it should be a place for them to receive all types of resources, especially mental health services (McCarter). Schools that prioritize mental health education and mental wellness successfully address the needs of students and provide steps to prevent their further decline in mental wellness (McCarter). Educators have daily interactions with students which allow for professional relationships and conversations to better detect, understand, and respond to student difficulties. Establishing connections with reasonable boundaries leads to the conversations that are necessary for students to seek help. Educators should be trained in how to identify students who are suffering and understand the steps of in the referral process (McCarter). The responsibility is on educators to make mental wellness a topic of importance and properly follow protocols that can ensure that students' needs are being met.

Students are sponges. They take in all they hear and see, then release it at various points without contemplating the truth behind their observations. Educators have the unique opportunity to educate students beyond the classroom and share their adult perceptions about all aspects of life. Correcting false information and educating students about stigmas can ensure them a better future. It is vital that educators are aware of their influence and appreciate the extent to which their leadership is both modeled and observed. Students look to others for inspiration, beliefs, and opinions. Students are “impressionable” and have difficulty separating opinions from facts, so naturally they do not limit their brain when listening to those around them (“Prevalence 3”). Understanding the impact that an educator has on a student is powerful and allows them to support their mental health. Educators can contribute to mental wellness when their techniques promote mental health awareness as a foundational part of academic culture. Understanding mental illness as an education professional is crucial to comprehending the characteristics of those who are suffering. While it may be simple to categorize misbehaving students, many of them may have mental illnesses that contribute to their behavior (O’Toole). Encouraging students to shift their assumptions about mental illness requires educators to shift theirs. Researchers recommend asking, “How can I help you achieve?” instead of, “Why can’t you learn?” (O’Toole). Being aware of the implications of words and their potential interpretations is key to becoming an educator who can contribute to change.

A school year consists of approximately 180 days. Each day is full of curriculum, but there is still room to be a leader and ally for mental health. Trauma informed language is a simple, yet important characteristic as a teacher. While a teacher may not be aware of every child’s background or mental health condition, they can control their tone and vocabulary (O’Toole). Administrators should equip educators with emotional knowledge, not just practical instruction (O’Toole). While teaching techniques are useful in every classroom, students cannot learn if their mental health needs are not being met.

It is important to note that applying mental wellness approaches in the classroom is possible. It may take additional effort and creativity, but students will benefit, as will the educator. Regardless of the content matter, mental health can be discussed. Various mediums

are used in classroom instruction (literature, drama, film, social media, etc.), and discussing the mental wellness aspects in these mediums is important (O’Toole). For example, in a social studies class discussing World War II, it would be advantageous to discuss the mental wellness of the soldiers before and after combat. Having these difficult, yet necessary conversations will allow students to reflect and further understand the implications of mental health. When students can relate and connect, they feel more comfortable seeking help. While creating and maintaining bonds with students is valuable, educators must develop and adhere to their own pedagogy. Having a teaching style that advocates for student mental well-being will empower students (O’Toole). One researcher claimed, “justice, liberation, and compassion” contributed to classroom environments that encouraged mental well-being (O’Toole 18). The aforementioned components of a wellness-based classroom can make students feel empowered to better learn and apply their knowledge beyond the classroom, while being mindful of their individual needs.

Dedicated educators strive to prepare students for the “real-world” reality after their formative education. Beyond the school walls, academia will help students live successful and meaningful lives. While understanding the basics of school subjects, it is arguably more important to understand how to achieve as an adult. Mental wellness is one aspect of adulthood and, perhaps, the most important. Students who have an education, as well as an understanding of mental health wellness, will be better able to thrive in situations and meet the challenges adulthood will inevitably present. Students will not be granted the same resources and assistance normally available in the formal education system. Teachers should begin aligning life skills that complement students’ academic achievement. An example of serving both cognitive and educational purposes is seen in the use of multiple intelligence tests that allow students to explore the way they learn and process (Kury and Kury). Researchers report that educators find positive correlations between discussing mental wellness in their classroom and student intellectual achievement (Kury and Kury). Discussing both the cognitive and emotional aspects of the brain encourages students to discover their unique mental characteristics. Educators should include self-reflection activities that challenge students to

reconsider their own strengths and weaknesses, as a way for students to understand who they are and what they need to accomplish to become successful (Kury and Kury).

Educators have the opportunity to contribute to the mental health and well-being of students. As a future English educator, I value the content and appreciate the multitude of opportunities that literature can present in the classroom. Literature and writing can help students process and reflect on their own mental wellness. The connection between English language and literature instruction and mental health awareness, two seemingly foreign concerns, is actually not dissimilar at all. The study of English is part of the Humanities and research suggests that education is moving in an increasingly humanistic direction (Kury and Kury). Humanities study allows students to grow in their understanding of themselves and those around them. As a new educator, I feel called to teach English as a subject with an abiding concern for my students' mental health and well-being. The task is not impossible; rather it is inspiring and limitless in its potential for success.

In a world with stringent social rules, literature is an escape. Mental health conditions vary for each individual. However, there are several factors that can contribute to a state of well-being. Teens, in particular, feel the increasing pressure to fit in (Richmond). Social media is perhaps one of the greatest pressures students face. Social media invites a need for self-reassurance as people post pictures and videos highlighting their life and hoping to receive acknowledgement from peers ("Prevalence"). Likes and comments praising the user creates a false sense of self-worth and self-identity, while the person may feel content at the moment, they crave this artificial attention ("Prevalence"). While social media does have positive aspects for young adults it also brings cyber bullying, social media anxieties, and a yearning for acceptance from peers. With wise selections of literature, students' mindsets can be adjusted to view individuality as a positive trait (Richmond). If an educator has the power of choice with respect to course texts and media, they have an unlimited ability to positively influence students—and teachers with more limited offerings still have the opportunity to impact mental wellness.

Regardless of the book, writing prompt, or lesson of the day, there are always techniques available that can demonstrate and promote mental health. To apply and

demonstrate the possibilities that literature presents for conversation around mental health, I have created sample lesson plans that are academically enriching and promote mental wellness. The lesson plans are developed on Sylvia Plath's *The Bell Jar*, but can be modified to apply to any book. In the following section, I will explain the process of: 1) starting the conversation; 2) easing the concerns of parents who may object to discussion of mental health; 3) offer techniques to engage students; and 4) discuss ways to ensure the lesson is positive and beneficial for students. In greater detail, I provide teacher instruction throughout the lesson that model ways to confidently lead a mental health discussion among diverse student cohorts. These lesson plans serve as a guide for any classroom, not only English Language arts. Reading the teacher-guided components provides applicable ways to promote mental wellness on a day-to-day basis, regardless of the material. My lesson plans serve as an example for students to learn course content, while expanding their own knowledge about mental health.

In the contemporary era, students are glued to their cell phones admiring celebrities and dreaming of lifestyles very different from their own—but importantly, understanding the lifestyles and cultures of each student is how learning can become more fulfilling. Students must have access to Young Adult Literature as well as classics. Young Adult Literature needs to be relevant and applicable to students (Richmond). There are valuable mental wellness aspects in Shakespeare's finest works and in other canonical classics such as *Beowulf*. Challenging yourself to view literature from a mental health lens is essential when attempting to teach mental wellness. Making classic Young Adult Literature interesting to teenagers is not impossible, but it takes effort. Capturing the attention of teens suffering from mental illness is just as possible too. One could introduce Shakespeare by asking the class, "Who here has ever disagreed with their parents or been forbidden to do something they felt passionate about?" Inviting dialogue and emotion is when learning begins and mental health becomes a more accessible subject. Keeping students' attention may be difficult, but connecting course content to students' lives is key. Making Shakespeare less overwhelming and less confusing allows students to recognize the ways in which he is more contemporary by bringing the humanity of

his characters into the spotlight. By creating engaging and thought-provoking experiences between literature and readers, students begin to connect to characters and feel a sense of relation and similarity.

Young Adult Literature is written to capture the interest of students. Utilizing this type of book can change a learner forever. According to researchers, 25% of Young Adult Literature deal directly with components of mental health (Richmond), and this provides numerous opportunities to discuss the subject. Literature circles are a phenomenal way for students to interact, question, and reflect on texts that are emotional and diverse (Richmond). This technique is used in middle and high school classes with great success. Students are given a list of a books and they must select one of their choice. They then work with other students who are reading the same book and, together, grapple over various elements of the book. Literature circles are beneficial because they serve as book clubs, which are engaging and full of choice. Having a student-directed conversation is a very powerful way for peers to learn from one another. Giving students options for literature circles empowers students to be selective and thoughtful in their choice of texts, so students will feel comfortable about what they are reading having personally selected it. There are countless novels that can impact students to evaluate their mental health. One teacher suggested, “*Perks of Being a Wallflower, Thirteen Reasons Why, The Burn Journal, and Starved*” as a mental health related read (Richmond 22-24). As mentioned above, I have selected *The Bell Jar* for my sample lesson surrounding mental health. *The Bell Jar* serves as an academic resource, as well as mental health conversation starter. The main character, Esther, struggles with mental illnesses and ultimately shares her testimony in an intimate first-person narrative. Students are directly exposed to the internal feelings of a character who is deeply affected by her mental health issues. This book offers a unique perspective to those who may not have experienced mental challenges. To expand on my pedagogy for this lesson, as well as my overall instruction, I will breakdown my sample lesson.

Before approaching this novel or any other piece of literature that may be triggering or emotional for readers, it is vital that educators properly preface the impact it may have. Giving this warning is not to scare students; rather, it is to make them aware of the importance of the

book, as well as the emotional reaction that they will likely have. This simple way to start a new book or unit serves as an opportunity to discuss both expectations and attendant consequences for inappropriate or disrespectful behavior. Before beginning the unit, it may be appropriate to make guardians aware of the mental health content that will be discussed. It is important to explain the unit and make yourself available if guardians are hesitant or have questions. While some guardians may require further clarification about the unit, it is important to remind them of both the state standard outcomes, as well as the intended intrapersonal goals of the lesson. If a guardian is still unsupportive of the content, you can consider having a meeting with them or, in the extreme case, provide an alternative assignment for the student. The positive outcomes of this lesson outweigh the negatives and, with some encouragement and additional information, guardians may begin to understand and value the content that will be discussed. My sample lesson outlines the many possibilities that literature presents in the classroom.

Applying a mental health lens is not difficult, it simply takes a different perspective. Like any other effective lesson, it is necessary to ensure state standards are being met. For my lesson, I apply seven distinct standards, while still discussing the mental health implications of the text. For educators who may feel unsure how to implement mental health education in their class, consider the objectives for your lessons and attempt to add one related to mental wellness. In this lesson, I integrate content objectives as well as mental health information. Since objectives are measurable and should be obtainable, I then work to meet these objectives through my instruction, as I would any other lesson.

Journals are an extremely beneficial tool for students to reflect without fear of judgement from their peers. In my lesson, I have students enter the classroom and immediately develop a reflective journal, allowing room for personal expression in their responses. I ask students to recall an experience when they felt as if they were left without answers, when the meaning of that experience in retrospect seemed unclear. The second question prompts students to reflect on the conclusion of the novel when it too is uncertain or ambiguous. These two simple questions are an effective way to start class, because they encourage students to think on a deeper level. This thinking supports the initial discussion, without having to initiate the exchange in an abrupt or random way. I then provide an opportunity for students to share

their journal if they choose. It is important to encourage students to share, but not to force them, as it can lead to a poor classroom environment in which students cannot fully learn or contribute.

Teachers must utilize resources. In my lesson, I plan to have the school counselor available for the final discussion of the book. Having the counselor in class demonstrates the importance of mental health and serves to identify available resources. After introducing the counselor, I divide students into small groups. Students would discuss the ending of the novel generating questions to begin their conversation. I closely monitor each group to ensure they are on task and invite the counselor to contribute to the discussion. After this content session, I would invite the students to channel their creativity to collaborate and create a reflective take-away project from the book. I leave this assignment open-ended allowing for songs, dance, movies, social media challenges, and more. I would show examples to model my expectations, but ultimately allow each group the freedom to determine how they will proceed. I would also discuss the grading process to fully explain my evaluation criteria.

The content and creative components contribute to teaching the hearts and minds of students. Not only will students grow as learners, they will grow as individuals. To fully assess the success of the lesson, I would evaluate discussions, journals and, finally, the creative component. Ending the lesson with the counselor explaining resources again, will emphasize the take-away that good mental health is essential and that there is always help when students experience difficulty. We, as educators, must combine our content with learning that is pertinent to our students' personal growth and their developing compassion if we are going to build future scholars and leaders.

Teaching subject matter and mental wellness can occur simultaneously. Intentionally selecting literature that will move students is necessary to maintain a positive learning environment. Highlighting themes and morals in literature emphasizes the importance of what students are reading, especially when related to mental health (Richmond). *The Bell Jar* is emotional for many students, but like similar works it provides an opportunity to teach

empathy, kindness, forgiveness, and understanding (Richmond). Researchers believe that increasing Young Adult Literature that discusses mental wellness and humanity will decrease bullying (Richmond). The benefits of discussing mental health is different for each student, but nonetheless, they exist. One educator who has intentionally implemented mental wellness awareness in her classroom has seen a change in behavior in her students. She indicated that it encouraged students to feel more comfortable, become more open minded, and to challenge the stigmas associated with mental health (Richmond).

The saying that “knowledge is power” is true for both academia and mental health. Mental wellness is an area of intelligence that some individuals may excel in or lack. While a person may be academically intelligent, mental health intelligence will allow them to excel even more. When a person has greater knowledge of their mind and the importance of wellness, they are more likely to take initiative to better understand themselves. Education is important and mental health should be included in the pursuit to teach and fully prepare students. When students can advocate for their own mental health needs, they are more likely to be successful. As a future educator, I want to be confident that I have holistically prepared my students. Leaders need to be mentally stable and equipped to lead others. While mental health may be a controversial or provocative subject to bring up in the classroom, the benefits outweigh the risks (Richmond). There are numerous resources that can assist educators in discussing the importance of mental health (Richmond). It is important that educators understand their district’s mental health services as well.

Reading literature that is thoughtfully selected can influence students in various ways (Richmond). After reading *The Quiet Room*, one student shared with his educator their impression that the novel was the first he related to as he had a parent who struggled with similar mental health issues (Richmond). Another student utilized an online class blog to finally communicate her mental illness and share with other students (Richmond). She was amazed at the encouraging feedback and felt relieved, considering she had to remain quiet about her illness given that her family cast it in a negative light (Richmond). These realizations are life-changing and lifesaving. Compassion is a trait that can only be learned through experiences (Richmond). Literature can generate experiences that students will grow and benefit from. Part

of reducing mental health stigma is by educating society. Reading novels that challenge readers in their beliefs is necessary to support and sustain individuals with mental health issues. Students are not the only ones who should be reading Young Adult Literature. Reading relevant literature is important for educators as well. Some educators would rather use the same texts year after year. However, relevancy changes and Young Adult Literature in the classroom needs to change as generations succeed one another. Classics are important and should not be discarded, Young Adult Literature needs to become a centerpiece with regard to all we accomplish. It is beneficial for teachers to read new Young Adult Fiction to understand the struggles of their students. Awareness of contemporary cultural issues allows educators to thoughtfully employ techniques that support their students' personal growth.

Education and mental health are two integral aspects of society. Together, education and mental health can truly prepare a young adult for the complexities and challenges life presents. Instead of separating these two factors, we must align them. It starts with driven educators: educators who are passionate about enhancing students' lives academically, socially, and mentally. These are the teachers who will make the difference, the teachers our students are silently crying out for and deserve.

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SCHOOL OF EDUCATION



Universal Design for Learning Research

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Abstract

Universal Design for Learning (UDL) is an educational framework, grounded in neuroscience, for the intentional design of curriculum that fosters more equitable learning experiences (CAST, 2020). The UDL framework includes a way of thinking and designing that supports learner variability and inclusivity (CAST, 2020). Supported by ESSA in grades K-12, UDL is also gaining prominence in higher education to support student success and more personalized learning. UDL is supported by the Higher Education Opportunity Act, which may indicate UDL as providing flexibility and reducing barriers in education (“Higher Education,” 2010). My research questions are as follows: What is UDL? How is the framework applied in curricular design? What does UDL implementation look like in higher education? As a future educator, it is important to perceive the UDL framework in an operationalized manner. I conducted an interview with Dr. Eric Moore, a UDL specialist and instructional designer from the University of Tennessee, for his expertise concerning UDL in higher education. The interview will be featured in an academic poster highlighting the significance of Universal Design for Learning (See Figure 1).

Future educators are constantly striving for student success and improvement of their teaching strategies to accommodate all learners. Many educators dive into principle-based techniques and professional frameworks to support their practice. Universal Design for Learning (UDL) is “a framework that guides the shift from designing learning environments and lessons with potential barriers to designing barrier-free, instructionally rich learning environments and lessons that provide access to all students” (Nelson, 2014, p. 2). The classroom environment will be universally designed, therefore, it is accessible to as many learners as possible. Barriers of any kind, such as physical or educational, are addressed through implementation of the framework, creating a more robust and personalized learning experience for all, not just those with an identified need. The UDL framework was created by the Center for Applied Special Technology (CAST) and their trained neuropsychologists, university professors, and former K-12 educators. Recognizing that challenges for students had little to do with the student’s abilities and more to do with a lack of tools, resources and strategies to meet their needs, they addressed the issue of the insufficient learning environment. The founders of CAST began to work to identify universal structures to support the learning of all students, thus, guiding educators to reflect upon their practices by developing a framework that capitalizes on flexible goals, methods, and assessments.

Universal Design for Learning practices center on teachers constructing instructional decisions that focus on student outcomes. Their decisions must have instructional purpose, gearing students towards self-guidance and goal setting (Nelson, 2014, p. 3). Without this teaching approach, students may not receive the type of instruction that helps them become successful in their own strengths, along with identifying learner variability in the classroom.

UDL is a continual process, including a series of actions that initiate positive change and growth mindsets in the classroom. The structure of the framework incorporates three principles that center on goals to meet the needs of each learner. The principles include Multiple Means of Engagement, Multiple Means of Representation, and Multiple Means of Action and Expression. These principles align with various brain networks, as scientists understand that certain connections or networks light up when stimulated. Teachers should strive to activate the different brain networks to create more individualized and personalized learning experiences that address the diverse learners in today's classrooms.

To begin, creating Multiple Means of Engagement in the classroom activates the affective networks that allow individuals to engage in learning. The affective networks enable individuals to evaluate patterns and connect an emotional significance to them. Within this principle, there are three suggested guidelines that provide teachers with direction, while offering pathways to students for success. The Engagement principle encourages options for self-regulation, sustaining effort and persistence, and recruiting interest (Nelson, 2014, p. 43). Students should recognize themselves as learners and begin to facilitate their own learning. Providing options for self-regulation can be done in a variety of ways, such as optimizing motivation and facilitating personal coping skills. Teachers could also develop self-assessment and reflection. This allows for developing self-conscious learners, acknowledging strengths and weaknesses in the learning process. Providing options for sustaining effort and persistence connects with the goal of the lesson, gaining more ownership of their learning. These options can be accomplished by fostering collaboration and community. Interpersonal relationships heighten insight and collaborative skills, necessary for all career fields. Some options for recruiting interest include optimizing choice and autonomy. This checkpoint suggests structured

choice, to allow students to choose their learning path within reason. With choice, students may feel a sense of freedom and can engage in learning while optimizing their strengths. There are a plethora of strategies to operationalize engagement within learning to increase opportunities for students to feel respected and academically safe.

Furthermore, Multiple Means of Representation allows students to experience receiving information in different forms. The center of this principle is building students' levels of comprehension. Activating the recognition networks of the brain, these paths enable the identification of patterns related to senses and make sense of complex concepts (Nelson, 2014, p. 62). The presentation of information can either expand or limit whether students learn it. With educators utilizing multiple means of representation, students are provided with access to ideas, concepts, and themes present within text-based information. Throughout this principle, the guidelines include providing options for comprehension, language, mathematical expression and symbols, and perception. An example of providing options for comprehension include activating or supplying background knowledge, which could be done using graphic organizers, or KWL charts. These connections emphasize the scaffolding technique to build upon knowledge. To provide options for language, mathematical expression, and symbols, teachers may clarify vocabulary and symbols, considering groupings of vocabulary words such as idioms, figurative language, or jargon. Exploration of these groupings illuminate the importance of complex vocabulary. Offering a variety of ways to customize the display of information can support options for perception. Simple examples of this guideline may include altering text, brightness, color, or more on a particular display of information, such as a PowerPoint or poster. Customizing information and accommodating different types of learners may work towards the teacher's goal of achieving successful knowledge in the classroom.

The final principle of the UDL framework includes Multiple Means of Action and Expression. It is crucial for students to demonstrate their knowledge somehow, and this principle allows for a variety of opportunities to do so. Opportunities to practice goal setting, planning, organizing information, and monitoring their progress are all achieved for students through this principle. Activating the strategic networks, these paths allow individuals to take in information, organize it, and do something with it. The guidelines for Action and Expression include providing options for executive functions, expression, and physical action. To provide options for executive functions, teachers often enhance the capacity for monitoring progress. This may be accomplished through providing students with a visual support to see their progress, such as on a chart or graph. Utilizing multiple media for communication may reinforce providing options for expression and communication. This checkpoint encourages students to explore into other realms and choose a medium to demonstrate their creativity and knowledge (Nelson, 2014, p. 89). To provide options for physical action, teachers may optimize access to tools and assistive technologies, suggesting alternatives for their hardware and accommodating students with learning disabilities. Through the multiple examples of how Universal Design for Learning can be operationalized in the classroom, teachers are supplied many strategies to remove barriers and promote positive learning environments.

Universal Design for Learning has been widely accepted and implemented within K-12 classrooms. Does this acknowledgement and execution halt in higher education? There is a growing expectation that UDL should extend to higher education given inclusivity reflected in today's higher education environments, as today's college students represent greater increased diversity with respect to disabilities, race, gender, and more. These solutions to accessibility to learners should not be stopped when a student reaches higher education. The Higher Education

Opportunity Act (2008) describes the “federal recognition of the potential for UDL to improve practice in classrooms and provide opportunities for students to succeed (“About UDL”). This act emphasizes that pre-service training through teacher education programs integrate instructional strategies consistent with UDL. Future teachers should be taught using the principles of UDL in order to better meet the diverse needs of future students. This is often referred to as the social learning theory, expressing the idea of learning through observation.

Thus, the question of whether UDL is properly implemented and accessible to students in higher education is not researched enough. Postsecondary institutions must provide accessible learning materials for students with disabilities. Although this support is in place, UDL encompasses more than providing information in accessible ways. UDL expands upon Multiple Means of Representation by combining with action and expression to exhibit mastery of concepts and achievement and engaging learners to enhance persistence. An example of how UDL could be implemented in the higher education classroom involves a Masters in School Administration course, presented by the College STAR project (CAST, 2020). The challenges may include being unable to understand how theory translates to practice, lacking opportunities to practice leadership skills, and lacking student engagement in the lecture-style class structure. College STAR provides UDL strategies to address these challenges, incorporating all three UDL principles. To heighten engagement, the instructor utilized service learning projects and group work, while also asking students for feedback every class and weekly reflections. To support student planning and multiple means of expression, the instructor shared weekly objectives, and graphic organizers to practice listening, speaking, reading, and writing language of leadership. The instructor also utilized multiple forms of media including videos and simulations to allow for further processing of information. The outcome of the recognition of the UDL principles

allowed students to respond positively to the class, and the differences in student outcomes were achieved (CAST, 2020). Therefore, the higher education implementations may be similar to K-12 practices, but with more sophistication and professionalism practices.

Additionally, a college course research study conducted by Frances G. Smith, an innovative educator and implementer of UDL in Virginia, allowed for further knowledge exploring the effectiveness of the UDL framework in higher education. Research involving UDL often focuses on the application of UDL principles, rather than the implementation of the UDL principles for instruction. 80 graduate students from Boston College participated in a research study aimed to answer the following questions: Which strategies are both implemented by the instructor and used by the students? What patterns, if any, exist? To what extent is instruction consistent with the principles of UDL? To what extent do students take advantage of options or participate in methods consistent with the principles of UDL? How engaged do students perceive themselves to be in class? What is the relationship between students reported use of UDL strategies and their level of interest and engagement? The students were asked to complete a survey of questions representing practices in the UDL teaching approach, and noted each learning network goal of the college course. The results of this study conclude that continued research is needed related to the effectiveness of UDL principles. The findings “suggest that when faculties consider the UDL framework to plan their course instruction and include UDL approaches and technologies in their classes, there is a positive relationship to student interest and engagement” (Smith, 2012, p. 52). Continuing the exploration within the UDL area will heighten the success rate and empower learners in higher education.

Moreover, I had the opportunity to conduct an interview with UDL specialist, Dr. Eric Moore, from the University of Tennessee, Knoxville. His practice centers on ongoing training

and support for faculty and staff interested in improving accessibility to learning for diverse students, including those with disabilities. He delivered further insight concerning UDL in general and UDL implementation in higher education. Dr. Moore described UDL as a design framework that draws from research in networks for how students learn. UDL gives approaches to design as optimized for everyone in ways that are more pragmatic. Dr. Moore expressed that UDL causes teachers to recognize and identify the barriers in the classroom. When deciding curriculum, all learners and their values must be kept in mind. Utilizing assessments as an example of a relation to learner variability, Moore emphasizes that educators must recognize what skills students already obtain, and the fact that students are variable. There should be a trade off of emphasis on skills, as well as content. Student choice must be represented, facilitating an environment where they can personalize learning themselves. When asked how Dr. Moore operationalizes the UDL components, he stated that the operationalization of UDL has always been a struggle within the field. Utilizing a backwards design, teachers can think about outcomes and assessments, and provide flexible choices based off that. His research seeks to identify how UDL influences outcomes by practices. Dr. Moore claimed that some difficulties surrounding UDL include individuals stating that UDL has not been researched and is not researchable. Some say it is too much work and impractical, as well as the idea that it is difficult to unlearn what teachers have learned by experience. In higher education, Dr. Moore feels that faculty feel that pedagogy is not their job, as teachers in K-12 believe they are not given time efficiency to design these lessons and did not receive the proper training to execute the UDL principles and guidelines. Centering the focus on higher education UDL components, Moore expressed that K-12 principals have a lot more leeway than higher education administration. It is important to instill strategic ways to learn within the younger generations, and less about static.

He emphasized that K-12 is more about skill development and broadening knowledge, and higher education is more professional development oriented.

Overall, the Universal Design for Learning principles achieve the development of flexible learning environments to accommodate learning differences. This approach, grounded in neuroscience, allows teachers full control to intentionally design and make informed decisions. Students can enhance their instruction through being offered an abundance of options. Though the application of UDL techniques require more research in the field, it can be recognized that this approach to teaching grants all individuals equal opportunities to learn. UDL in higher education is possible, yet faculty will need training and appropriate resources to carry out this framework and differentiated type of instruction. Universal Design for Learning guides educators to create cultivated, diverse learners in an equitable learning environment that optimizes access, engagement, and meaningful learning experiences for all.

Figures

What is UDL?

UDL is a framework that guides the shift from designing learning environments and lessons with potential barriers to designing barrier-free, instructionally rich learning environments and lessons that provide access to all students

Benefits of UDL approach

- Teacher will center decisions & attention on student outcomes
- Students will receive instruction that helps them become successful in their own strengths
- Keeps students motivated
- Can benefit ALL students, not just students with disabilities

UDL in Higher Education

- Higher Education Opportunity Act (2008)** - Federal recognition of the potential for UDL to improve practice in classrooms and provide opportunities for students to succeed
- Accessibility** with UDL in Higher Ed - Postsecondary institutions are obligated to provide accessible learning materials and technologies for students with disabilities
- If future teachers are taught the principles of UDL, they will be able to better meet the diverse needs of future students**
- Findings from study suggest that when faculties consider the UDL framework to plan their course instruction and include UDL approaches and technologies in their classes, there is a positive relationship to student interest and engagement

Affective Networks - "WHY" of Learning: Multiple Means of Engagement

- Enables us to evaluate patterns and connect an emotional significance to them
- Responsible for offering options for self-regulation, sustaining effort and persistence, and recruiting interest
- Examples of how Engagement is operationalized: promote expectations and beliefs that optimize motivation, foster collaboration and communication, optimize individual choice and autonomy

Recognition Networks - "WHAT" of Learning: Multiple Means of Representation

- Ways we can provide students access to ideas, concepts, and themes present within text-based information
- Responsible for providing options for comprehension, language, mathematical expression, symbols, and perception
- Examples of how Representation is operationalized: highlight big ideas or patterns, illustrate through multiple media, offer auditory/visual alternatives

Strategic Networks - "HOW" of Learning: Multiple Means of Action & Expression

- Provide students with opportunity to demonstrate what they know through a variety of acts or creations
- Responsible for providing options for executive functions, expression & communication, and physical action
- Examples of how Expression is operationalized: guide appropriate goal setting, use multiple media for communication, vary methods for response

Figure 1: Universal Design for Learning Academic Poster

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