The background of the entire page is a complex, fractal-like pattern. It consists of numerous thin, glowing lines in shades of yellow and orange, set against a solid black background. The lines are arranged in a way that creates a sense of depth and movement, with some lines forming larger, more intricate shapes that resemble snowflakes or crystalline structures. The overall effect is that of a digital or scientific visualization.

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THE UNIVERSITY OF LOUISIANA AT LAFAYETTE

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Gender as a Moderator for the Association of Job Satisfaction and Physical Symptoms in Direct Support Professionals

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ABSTRACT

The information on the relation between general job satisfaction and physical symptoms in direct service professionals (DSPs) has been limited in the literature. This study examined the relation between general job satisfaction and physical symptoms and how gender moderated this relation. A sample of 133 DSPs were recruited from the Pinecrest Supports and Services Center (PSSC) in Pineville, Louisiana. Participants responded to a survey including the Somatization Scale of the Symptom Checklist-90- Revised, assessing 12 somatic symptoms, and the Minnesota Satisfaction Questionnaire-Short Form, assessing an employee's satisfaction with job. The results indicated a moderating effect of gender, with only females showing a significant relation between job satisfaction and physical symptoms. Understanding the differences in the experience of somatic symptoms as it relates to job satisfaction is necessary in creating better working environments for all individuals.

1. INTRODUCTION

There is little research on the relation between general job satisfaction and somatic symptoms in the population of direct service professionals (DSPs). These are professionals who provide support for safety and daily functioning of individuals with disabilities who reside in long-term care facilities. Through lack of health insurance and other benefits, the turnover rate for the DSPs is high. In addition, training times are short and lack in depth preparation for the job. Somatic symptoms refer to bodily symptoms such as headaches, pains, or muscle soreness.

This study examined the relation between job satisfaction and somatic symptoms in a population of DSPs, with gender as a moderator. The relation between job satisfaction and somatic symptoms have been studied in other populations, such as nurses. For example, Gandhi et al. (2014) found a negative correlation between total scores on a somatic symptom checklist and perceived job satisfaction in a sample of nurses in a psychiatric hospital in India. They also reported a positive correlation between perceived stress and somatic symptoms. The relation was also reported by Khamisa et al. (2015), indicating that satisfaction with multiple job aspects were all associated with somatic symptoms. In a longitudinal study of long-term care workers, Moos & Schaefer (1996) found that job-related stress at one time point predicted somatic symptoms and lower job satisfaction at a later point in time.

Gender affects the reporting of both job satisfaction and somatic symptoms. Women often report higher levels of job satisfaction across occupations (Grönlund & Öun, 2018; Hauret & Williams, 2017). Among the possible explanations for this phenomenon is the differences in job duties between men and women in the same positions (Hauret & Williams, 2017). In the reporting of somatic symptoms, women reported, "more intense, more numerous, and more

frequent” (Barsky, Pekna, and Borus, 2001, p. 1) somatic symptoms than men did, even excluding specific gynecologic and reproductive symptoms, suggesting that women might experience physical pain differently than men. Based on this literature, the present study predicted to find a relation between job satisfaction and somatic symptoms, with gender differences possibly creating a difference in the reporting of somatic symptoms between men and women.

2. METHOD

2.1 Participants

A sample of 133 DSPs were recruited from the Pinecrest Supports and Services Center (PSSC). The DSPs ages ranged from 20 to 65, with a mean of 35.03 years old ($SD = 11.68$). The sample was comprised of 78% females ($n = 103$) and 22% males ($n = 30$). On average, DSPs had been working at the PSSC for nearly 4 years ($M = 3.84$, $SD = 1.35$). Of the DSPs that participated in the study, 73% were African American ($n = 97$), 17% were European American/Caucasian ($n = 23$), and less than 1% of participants were Asian/Pacific Islander ($n = 1$), American Indian ($n = 4$), or other ($n = 7$).

The PSSC employs around 500 DSPs who work 12-hour-shifts in two-day increments. The DSPs are people that individuals with DDs have the most contact with, although for each individual there is an interdisciplinary team consisting of a psychologist, a psychiatrist, a physician, nurses, assistants to a psychologist, and qualified intellectual disabled professionals.

Inclusion criteria for participating in this study were: 1) being currently employed at the PSSC, 2) working at least 3 shifts per week, and 3) having been employed for at least two months at the PSSC. Exclusion criteria included 1) being out of client care, or 2) still being in the staff training process for newly hired DSPs. When a DSP is “out of client care”, the DSP is being investigated due to complaints filed by an individual with DDs, a family member, or a coworker at the PSSC. Staff training typically lasts about four weeks and aims to educate and teach new DSPs knowledge and skills necessary to work with individuals with DDs.

During the recruitment process, the researcher went around to homes and spoke to potential participants about the study. It was expressed to potential participants that their employer was blind to who were participating in the study and their individual responses would not be shared with individuals other than the researchers. Additionally, the importance of confidentiality was expressed to participants and they were advised to not inform other people who participated in the study. The study was approved by the Institutional Review Board of the University and the Human Rights Committee at the PSSC. All participants provided their consent before responding to the survey.

2.2 Measures

The Somatization Scale of the Symptom Checklist-90—Revised. The Somatization subscale of the Symptom Checklist-90 —Revised (SCL-90-R, Derogatis, 1994) is a self-report measure assessing the extent to which each of the 12 somatic symptoms (headaches, faintness or dizziness, pains in heart or chest, pains in lower back, nausea or upset stomach, soreness of muscles, trouble getting breath, hot or cold spells, numbness or tingling in parts of the body, a lump in the throat, feeling weak in part of the body, and heavy feelings in arms or legs) has caused psychological distress in participants during the past seven days including the day of experiment. Respondents rate each item using a 4-point Likert scale format ranging from 0 (*not at all*), 1 (*a little bit*), 2 (*moderately*), 3 (*quite a bit*), and 4 (*extremely*). Exemplar items from the SCL-90-R include, “*Pains in heart or chest*” and “*Feeling weak in parts of your body.*” The

Cronbach's alpha reported by the scale developer for the scale is .86; for the present study the Cronbach's alpha was .77.

Minnesota Satisfaction Questionnaire-Short Form. The Minnesota Satisfaction Questionnaire (MSQ) Short Form (Weiss, Dawis, England, & Lofquist, 1967) is a 20-item measure assessing an employee's satisfaction with their job. Participants rate each item on a 5-point Likert scale ranging from 1 (*very dissatisfied*), 2 (*dissatisfied*), 3 (*neutral*), 4 (*satisfied*), and 5 (*very satisfied*). The MSQ Short Form includes three subscales: Intrinsic Satisfaction, Extrinsic Satisfaction, and General Satisfaction. Respondents rate each item based on their levels of satisfaction for that aspect of job. An exemplar item from the Intrinsic scale is, "*being able to keep busy all the time*," the extrinsic scale, "*The way my boss handles his/her workers*." The subscales scores will be tallied by summing the item scores within the subscales; the score on the General Satisfaction will be the sum of all the items of the MSQ. The reliability coefficients for Intrinsic Satisfaction ranged from .84 to .92, the Extrinsic Satisfaction scaled from .77 to .82, and the General Satisfaction from .87 to .92. For the present study, Cronbach's alpha was .92 for intrinsic satisfaction, .89 for extrinsic satisfaction, and .95 for general satisfaction.

3. RESULTS

3.1 Correlations

The results indicated that general job satisfaction ($M = 69.07$, $SD = 17.17$) and physical symptoms ($M = 20.44$, $SD = 8.16$) were significantly negatively correlated, $r = -0.42$, $p < 0.0001$.

3.2 Moderation Analysis

In a regression model with general job satisfaction (MSQ) as the main predictor, physical symptoms (SCL) as the criterion variable, and mood symptoms (DASS, depression, anxiety, and stress) as covariates, the main effect of general job satisfaction was significant, $b = -.24$, $SE = .10$, $t = -2.49$, $p = .016$. Further regression analysis adding the cross-product of MSQ and gender indicated a significant interaction effect on physical symptoms, $b = -.31$, $SE = .10$, $t = -3.24$, $p = .002$, suggesting that gender moderated the relation between job satisfaction and physical symptoms. *Figure 1* summarizes this interaction, showing the prediction for physical symptoms from three levels of job satisfaction (-1SD, mean, +1SD) by gender. Subsequent simple slope tests indicated that job satisfaction predicted physical symptoms only for females, slope = $-.33$, $t = -3.54$, $p < .0001$, but not for males, slope = $.30$, $t = 1.57$, $p = .122$. The findings revealed a moderating role of gender in the association of job satisfaction with physical symptoms, such that higher levels of job satisfaction were associated with fewer physical symptoms only for females but not for males.



Figure 1. In females only, general job satisfaction (MSQ) predicts levels of physical symptoms (SCL), with high job satisfaction being associated with fewer physical symptoms. Mood symptoms were controlled.

4. DISCUSSION

This study examined the relation between job satisfaction and somatic symptoms in a population of DSPs, finding a moderating effect of gender on the relation. For women only, there was a significant negative correlation between job satisfaction and somatic symptoms; this relation was not found in men. These findings were in line with Barling & Janssens' (1984) findings about gender differences in the experience of job satisfaction and somatic symptoms in a population of nurses--the relation between these two variables was significant for women and not for men. Men and women do experience work environments differently, and there are different social pressures on women in comparison to men. (Barling & Janssens, 1984). Role conflict for women at work heighten their perception of potential job stressors, increasing job dissatisfaction and its relation to physical health (Barling & Janssens, 1984). Addressing these differences and improving working environments for women may help alleviate some of the somatic symptoms female DSPs experience at work, which in turn may enhance their ability to take care of their patients. Another explanation for the gender effect on the relation between job satisfaction and somatic symptoms is job stressors. Job stressors contribute to physical unwellness both cross-sectionally and over time (Nixon, Mazzola, Bauer, Kruger, & Spector, 2011). Additionally, women report higher levels of somatic symptoms in response to job stressors than men do. (Li et al., 2016). Future research may investigate specific aspects of job satisfaction that may be better predictors of somatic symptoms than simply general job satisfaction.

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General Self-efficacy Predicting Anxiety Symptoms through Stress in Direct Support Professionals

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ABSTRACT

Self-efficacy is a person's belief in the ability to effectively handle challenging situations. This study examined how general self-efficacy (GSE) and anxiety symptoms were related and the mediation of stress on this relation in the context of direct support professionals (DSPs). The job of DSPs is to provide care for individuals with disabilities, which can be demanding and stressful. This study included 133 (103 females, 30 males) DSPs who completed multiple self-report measures, including the General Self-Efficacy Scale and the Depression Anxiety and Stress Scale for the assessment of general self-efficacy, anxiety symptoms, and stress, respectively. Regression analysis was applied to examine the mediating role of stress in the association between GSE and anxiety symptoms. The results indicated that GSE negatively predicted anxiety symptoms, and that stress mediated this prediction. The findings suggested that direct support professionals with high general self-efficacy experienced less stress, thus exhibited less anxiety symptoms. Fostering a sense of self-efficacy and properly managing perceived stress would improve well-being in DSPs and ultimately for the individuals in their care.

Key words: General self-efficacy, anxiety, stress, direct support professionals

1. INTRODUCTION

Direct support professionals (DSPs) play a vital role in improving life qualities of individuals with severe developmental disabilities (DDs). The demanding nature of working as a residential DSP is reflected in their negative experiences, which have relevance to DSP workforce issues (Hatton et al., 1999; Piko, 2006; Willemse, Smit, de Lange, & Pot, 2011) (Brandt, 2017; National Core Indicators [NCI], 2019). With individuals, families, communities, and even the U.S. economy impacted by a crisis in the DSP workforce caused by stress, efforts are being made at the local, state, and federal levels to find solutions (Brandt, 2017). It is important to take into consideration each DSP's professional identity, general competence, and job satisfaction in order to increase self-efficacy and decrease anxiety in each individual. This research aimed at examining self-efficacy as a predictor for anxiety symptoms in DSP's, and stress as a mediator for the relation between self-efficacy and anxiety symptoms.

Self-efficacy is a person's belief in the ability to effectively handle challenging situations (Abbasi, 2017; Evers, Welko, & Brouwers, 2001; Manzano-Garcia & Ayala, 2017). One develops self-efficacy through experiences of task mastery and receiving positive feedback from others for completing task requirements (Bandura, 1988). High levels of self-efficacy suggest a positive sense of self and high degrees of commitment to responsibilities and are associated with better competence in solving problems and adjusting to environment. Individuals with high

self-efficacy welcome challenges, are interested in learning, are more resilient to difficulties, and are more likely to achieve personal goals (Bandura, 1988; Manzano-Garcia & Ayala, 2017; Molero, Pérez-Fuentes, & Gázquez, 2018). Low self-efficacy is associated with low self-confidence, negative views of oneself, and the inability to meet goals (Abbasi, 2017).

An individual's level of self-efficacy is a predictor for success in stress management and job performance (Abbasi, 2017; Molero et al., 2018). Stress is commonly perceived as the result of a person's evaluation and achievement of their agenda in their environment (Lazarus, DeLongis, Folkman, & Gruen, 1985). Anxiety is defined as apprehensive expectation, which causes impairment in functioning. Symptoms include fatigue, trouble with concentrating, irritability, etc. (*American Psychiatric Association, 2013*).

In literature, it is found that people who believe they have control over situations (high levels of self-efficacy) are less likely to experience anxiety. People who do not believe that they have control are more likely to have symptoms of anxiety (Bandura, 1988). The literature finds that people with high levels of self-efficacy believe that they can control life stressors (Schwarzer, 2014). Those with lack of control are subjected to the effects of stress. Stress and anxiety are closely related. Stress leads to a variety of different health-related problems, including anxiety (Ulas et al., 2012).

The purpose of this study was to analyze the relation between self-efficacy and anxiety symptoms in DSP's, and the role of stress as a mediator. Based on the existing literature, the present study predicted to find a pathway from self-efficacy to anxiety symptoms from stress symptoms, thus self-efficacy predicted stress symptoms, which then predicted anxiety symptoms.

2. METHOD

2.1. Participants and Procedure

A sample of 133 DSPs were recruited from the Pinecrest Supports and Services Center (PSSC). The DSPs ages ranged from 20 to 65, with a mean of 35.03 years old ($SD = 11.68$). The sample was comprised of 78% females ($n = 103$) and 22% males ($n = 30$). On average, DSPs had been working at the PSSC for nearly 4 years ($M = 3.84$, $SD = 1.35$). Of the DSPs that participated in the study, 73% were African American ($n = 97$), 17% were European American/Caucasian ($n = 23$), and less than 1% of participants were Asian/Pacific Islander ($n = 1$), American Indian ($n = 4$), or other ($n = 7$).

The PSSC is an intermediate care facility located in Pineville, Louisiana. The population served by PSSC includes approximately 600 individuals with DDs, which includes both lower and higher functioning individuals with behavioral, psychiatric, and other medical needs. The PSSC employs around 500 DSPs, who work 12-hour-shifts in two-day increments.

Inclusion criteria for participating in this study were: 1) being currently employed at the PSSC, 2) working at least 3 shifts per week, and 3) having been employed for at least two months at the PSSC. Exclusion criteria included: 1) being out of client care (being investigated due to complaints), or 2) still being in the staff training process.

The researcher expressed to participants that their employer was blind to who would participate in the study and that their responses would only be shared with other researchers. The study was approved by the Institutional Review Board of the University and the Human Rights Committee at the PSSC. All participants provided their consent.

2.2. Measures

General Self-Efficacy Scale. The General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) is a 10-item scale that measures a general sense of perceived self-efficacy. The scale aims to predict coping with daily hassles and adaptation after experiencing stress. An exemplar item from the GSE is, "I can always manage to solve difficult problems if I try hard enough." The Cronbach's alpha for the GSE ranges from .76 to .90, for the present study the Cronbach's alpha was 0.93.

The Depression Anxiety and Stress Scale. The Depression Anxiety and Stress Scale (DASS) (Lovibond & Lovibond, 1995) assesses the severity and frequency of symptoms of depression, anxiety, and stress during the past week. Participants rate each item on a 4-point Likert scale. An exemplar item of the Depression subscale is, "I felt that life was meaningless," the Anxiety subscale, "I felt scared without any good reason," and the Stress subscale, "I found it hard to wind down." The Depression subscale consists of 14 items with Cronbach's alpha of .91, the Anxiety subscale 14 items with Cronbach's alpha of .81, and the Stress subscale 14 items with Cronbach's alpha of .89. Cronbach's alpha's for depression, anxiety, and stress subscales in the current study were .94, .83, and .92, respectively.

3. RESULTS

3.1. Correlations

The results indicated that GSE ($M = 31.49$, $SD = 6.50$) negatively correlated with anxiety symptoms ($M = 5.29$, $SD = 5.20$), $r = -0.28$, $p = 0.010$, and stress ($M = 8.15$, $SD = 7.13$) positively correlated with anxiety symptoms, $r = 0.77$, $p < .0001$. Also, GSE and stress negatively correlated with each other, $r = -0.31$, $p = 0.004$.

3.2. Mediation Analysis

The results of regression analyses indicated that, with gender controlled, general self-efficacy significantly predicted anxiety symptoms, $b = -.31$, $SE = .11$, $t = -2.74$, $p = .008$. To test the mediating role of stress in the association of general self-efficacy with anxiety symptoms, stress was added to the model as a second predictor. After controlling for stress, the association of general self-efficacy and anxiety symptoms became non-significant, $b = -.03$, $SE = .07$, $t = -.44$, $p = .662$, suggesting a mediating role of perceived stress. The results indicated an indirect pathway from general self-efficacy to anxiety symptoms, so that self-efficacy negatively predicted stress, $b = -.32$, $SE = .10$, $t = -3.25$, $p = .002$, which in turn positively predicted anxiety symptoms, $b = .86$, $SE = .08$, $t = 11.42$, $p < .0001$. The indirect effect was significant, $b = -.28$, $SE = .08$, $t = -3.27$, $p = .001$, CI: $[-.45, -.12]$, (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

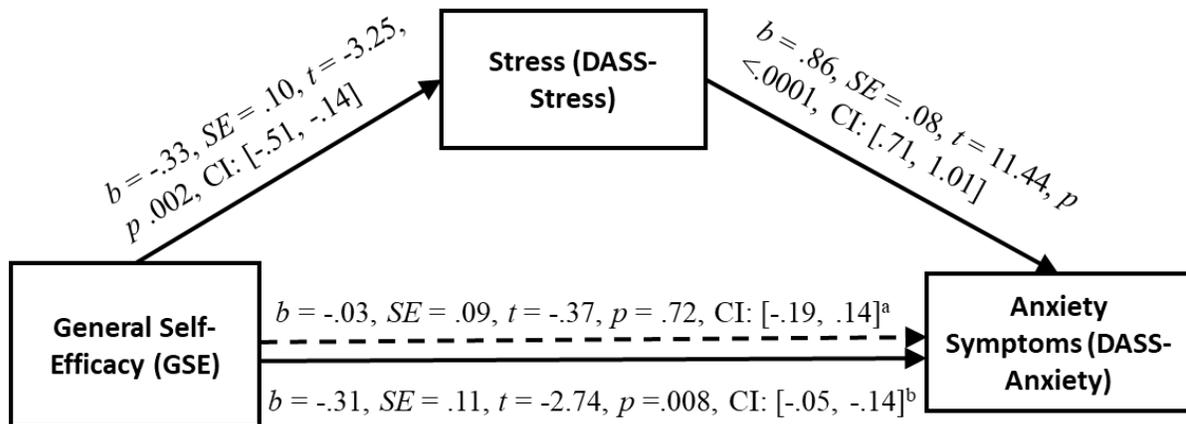


Figure 1. Path diagram of the prediction for anxiety symptoms from general self-efficacy (GSE). All variables were standardized. Gender was controlled. a: Path value next to the dashed line indicating the direct effect of GSE on anxiety symptoms after controlling for perceived stress. b: Path value next to the solid line indicating the total effect of GSE on anxiety symptoms. The indirect effect was significant, $b = -.28$, $SE = .08$, $t = -3.27$, $p = .001$, $CI: [-.45, -.12]$, (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

4. DISCUSSION

This study analyzed the relation between general self-efficacy (GSE) and anxiety symptoms in DSP's, and how stress functioned as a mediator for this relation. The results revealed an indirect pathway from GSE to anxiety symptoms through stress with gender controlled. Specifically, GSE negatively predicted stress, which in turn positively predicted anxiety symptoms. The literature is limited on the relations of the three variables, especially those that are relevant to DSPs. The findings from the current study support existing literature that found self-efficacy to be a correlate of psychological well-being (Siddiqui, 2015; Soysa & Wilcomb, 2015). Our findings found self-efficacy to negatively predict anxiety symptoms, supporting the findings by Muris (2002). Thus, DSPs should work on fostering self-efficacy to reduce their anxiety symptoms. The finding of the mediating role of stress suggest that properly managing stress is vital when trying to enhance self-efficacy as a means of reducing anxiety symptoms. When perceived levels of stress are properly controlled, low levels of self-efficacy no longer have an impact on anxiety symptoms. Therefore, training programs of DSPs need to target self-efficacy and stress management to improve anxiety symptoms.

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Suicide Contagion: Examining the Effects of Celebrity Suicides

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ABSTRACT

Deaths by suicide of celebrities and other influential people within any community or culture may have a substantial impact on the mental health of their followers. Considering this, certain media reporting methods concerning these deaths may be detrimental to those listening. Reporting methods that include excessive coverage and focus on the details of the case may result in what is termed as “suicide contagion”. Suicide contagion is defined as an increase in suicide rates of those exposed to this reporting, especially those who share similar characteristics or feel connected in some way to the celebrity in question. Due to suicide contagion being a relatively new topic of discussion, this research is exploratory in nature. This project seeks to understand more about the impacts of media reporting on mental health through surveying students on their personal experiences regarding reporting of celebrity suicides. The results of this research aim to identify how students primarily learn about celebrity suicides and the coping mechanisms they use afterwards. Policy implications of these results include promoting responsible reporting methods and resources for fans following the death by suicide of a celebrity.

Key Words: Suicide Contagion, Imitation Suicide, Celebrity Suicide, Media Reporting

1. INTRODUCTION

Irresponsible media reporting of celebrity suicides is widely considered to be a major predictor of imitation suicides, or suicide contagion. Previous studies have found that most media corporations do not show much consideration for the mental health of their audiences following a celebrity suicide, despite the existence of ethical guidelines for reporting suicides published by the World Health Organization (Lee, J., Lee, W. Y., Hwang, and Stack, 2014). Too many media corporations report details of the suicide, such as the method of suicide used, that are likely to incite suicidal ideation and suicide contagion in their audience members. People who share the same physical characteristics and who have connected in some way to the celebrity in question are also very likely to be at risk for suicide contagion (Cheng, Hawton, Lee, and Chen, 2007; Fu, Chan, and Yip, 2009; Chen et al., 2010). This project primarily intends to uncover more information about the effects of celebrity suicides on mental health by surveying a broader population than have previous studies. It also hopes to provide a better understanding of people’s perceptions of the media coverage of celebrity suicides as well as their views of the stigma surrounding suicides in general.

2. METHOD

Data will be collected via surveys given to university students. The participating students will be asked about their personal experiences of learning about and coping with celebrity suicides, as well as their views on media reporting of the suicides and the stigma surrounding suicide and suicide prevention.

3. OUTLOOK

This project anticipates the need for future large-scale studies which involve mindful change in media reporting methods, such as following the World Health Organization's guidelines for reporting suicides, and the subsequent rates of imitation suicides after a celebrity suicide. Encouragement of audience members by media corporations to seek help for improving their mental health is particularly needed. Future research on this subject is also recommended to determine the effectiveness of different types of treatment following the death by suicide of a celebrity, such as individual therapy, group therapy, support groups, etc.

4. DISCUSSION

As previous studies have focused solely on either the analysis of suicide rates before and after a celebrity suicide or interviewing those who are known to have had suicidal ideation following a celebrity suicide, not much more is known about other potential effects of celebrity suicides on mental health. The results of this project are predicted to reveal more of the aftermath of celebrity suicides and provide insight on the mass grieving process after one such death. Results of this project also intend to promote responsible and mindful media reporting practices when it comes to suicides in order to encourage audience members to be aware of their mental health state and seek help if needed, as well as to work towards eradicating the stigma generated by media surrounding suicide and suicide prevention.

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Effect of Freezer Storage on *Anguilla rostrata* Gonadal Tissue

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ABSTRACT

The aim of this study is to determine the optimal window of time for processing delay of *Anguilla rostrata* (American eel) gonads in freezer storage, in order to ensure reliable histological analysis. In field studies, there is often a significant delay between collection and processing dates of tissues which can cause severe damage to the samples due to long periods of freezer exposure. In a previous study, eels were caught throughout the state of Louisiana with the purpose of assigning sex, and many of those eels were in frozen storage for an extended period of time. When the histology of the gonads was analyzed, there were significant artifacts due to tissue damage. A qualitative analysis of the gonadal histology for this eel species was done at multiple stages of sexual development to compare the quality of ovarian structures. In total, fifty-three eel gonads with varying delay times were thoroughly inspected to rank the quality of these cellular structures. A scoring system was developed to objectively rank the quality of the tissue for a more precise conclusion. It is worth noting that conclusions from this study have a wide range of applications for aquatic studies and are not limited to eel tissue.

Key words: Freezer Storage, Eel Gonads, Gonadal Histology, Qualitative Analysis

1. INTRODUCTION

It is known that the American eel, *Anguilla rostrata*, is a common inhabitant of Louisiana waterways. Due to a lack of studies on Gulf coast populations, there is little known about their conservation status in Louisiana. In a previous study, McNeese State University partnered with the Louisiana Department of Wildlife and Fisheries (LDWF) to collect and analyze eel gonads. A thorough histological assessment of over 100 eel gonad samples was done to define the sex of the eels at multiple stages of maturity and sizes. Microscopic analysis of the gonadal tissue revealed evident damage to the tissue. It was hypothesized that this damage was due to long periods of freezer storage. To further build upon the knowledge base that exists on these ambiguous eels, it is necessary to know the most efficient techniques for processing gonadal tissues. The focus of this study is to determine the best sampling techniques for eel gonads and to show that delay in processing has detrimental effects for histological evaluation.

While not always precise, there are approaches to distinguishing males from females macroscopically. It is generally known that the female reproductive organ is a frilled, accordion-like structure with connected ridges. Conversely, eel testes span across the abdomen with lobe-like 'protrusions.' Morphological data such as age and size are considered in assigning sex visually, but this information alone is not enough. Assigning sex for eels smaller than 400 millimeters poses a challenge due to the size of the gonads. To arrive at an accurate conclusion, it is necessary to evaluate the gonads for the presence of oocytes or spermatoocytes. For endeavors heavily dependent on quality histology—like assigning sex—it is

simply not possible to conduct a reliable assessment when there is excessive damage to the sampled tissue.

It is apparent that long-term exposure to freezing temperatures (-20°C) dry out and damage the tissue. Because of this, numerous eel gonadal samples with varying degrees of exposure to freezing temperatures were examined. The data was divided into groups consisting of increasing delay times to directly compare the effect of freezer exposure. Additionally, those groups were further subdivided up to (4) maturation stages of the ovary to maintain the homogeneity of the size and shape of the structures. The data was assembled in this fashion to avoid any maturity dependence in the histology. The eels that were analyzed were no smaller than 400 millimeters and at the elver and yellow eel life stages. None of the eels analyzed were fully mature, as expected.

As this study is limited to a sample size of 53 female eels and no males, this study will focus on comparing the quality of ovaries. When looking at the ovarian anatomy, oocyte developmental stages correspond with the sexual maturation of the eel. The presence of oogonia, follicular cells, cortical alveoli, smooth muscle, as well as the distribution of these structures throughout the ovarian cavity are key elements to defining the sexual maturation of the eel once the sex is determined. A standard of five basic structures (nucleus, adipocytes, oogonia or oocytes, smooth muscle, and vasculature) was established and specimens were ranked in terms of quality within each group. For more specialized structures present only at certain stages of maturity, a separate ranking in the quality of their state was also done.

There are five identified stages in oocyte development in swamp eels (Ravaglia, Maggese 2002) and similar stages have been identified for other teleost fish (Combs 1969). The five stages were defined based on described characteristics, including physiological and molecular changes. In the present study the emphasis is on the morphological and histological characteristics of the samples; therefore, the focus will be placed on the size, shape, and distribution of various cytoplasmic features of oocytes and the surrounding tissues. It is expected that all ovaries will contain the following structures regardless of maturity stage: nucleus, adipocytes, smooth muscle, oogonia or oocytes, and vasculature.

Table 1. Description of ovarian maturity stages of the swamp eel, *Synbranchus marmoratus*, used as a reference for *Anguilla rostrata*.

Maturity stage	Histological description
Oogonia	Oogonia are homogeneously distributed about ovarian cavity. Nucleus, single nucleolus, and chromatin are visible. Pre-follicular cells surround the oogonia.
Oocyte 1	Primary growth stage of oocyte. The newly formed oocyte is surrounded by follicular cells and a thecal cell layer. The nucleus is visible. A nuage of lipid globules can be located near the nucleus.
Oocyte 2	Cortical alveoli stage. The oocytes are larger, and the nuclei are now more than double their original size. Irregular shape of nuclear envelope. Oocyte cytoplasm is characterized by presence of cortical alveoli (yolk droplets) in peripheral area.

Oocyte 3

Vitellogenesis, the process which accounts for 90% increase in oocyte size. Yolk globules accumulate throughout ooplasm, pushing cortical alveoli to peripheral area of oocyte. Nucleus is displaced to animal pole.

Ovulated oocytes covered by the vitelline envelope.

Oocyte 4

(adapted from Ravaglia, Maggese 2002)

2. METHODS

The gonadal tissues provided by LDWF were frozen after collection and maintained at -20°C for varying durations. The collected gonadal tissues were fixed in 10% formalin and paraffin embedded. Tissue blocks were cut to a thickness of 7 µm and mounted on glass slides. The tissue was stained with hematoxylin and eosin (H&E). Slides were viewed and imaged using a Nikon 50i microscope and NES Elements software. The quality of various cellular structures was histologically assessed in eel gonads at different developmental stages.

3. RESULTS

There were significant differences in the quality of the tissue for groups with different delays in processing. Gonads left in freezer storage with a delay of 200 days were lacking many features. As these eels were between 5 and 6 years old, it was expected that they would be at the elver stage and likely have visible oögonia. It was the case for all these specimens that the ovary was comprised of amorphous, oögonia lacking nuclei and damage to adipose tissue. The nuclei were absent, perhaps destroyed during storage/processing, and the ooplasm was discontinuous. The quality of eels with a single day of delay (yellow eel stage) showed a great difference in visibility and condition. The oocytes were distributed about the ovary in a peripheral manner, due to the maturity. The basophilic, oval-shaped nuclei were present for all the specimens. The borders of adipocytes and oocytes were clearly defined. Most oocytes contained numerous cortical alveoli distributed about the ooplasm. The overall image was clearer.

4. DISCUSSION

It was possible to see clear differences between 1-day and 200-days delay time gonads. All non-maturity dependent structures were intact for the 1-day delay gonads, while key features like nuclei and smooth muscle were missing for the 200 days delay gonads. This can all be attributed to excessive periods of freezer exposure destroying and/or damaging the anatomy of the ovary.

5. FUTURE ENDEAVORS

More defined standards will be set to rank and assess the data among delay time groups and maturity-based subgroups. Statistical tests will be run to support that there is a trend between processing and delay times and the effect that it has on the quality of the tissue at the histological level.

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Perceived Social Reactions and Their Effect on Disclosure Recommendations for Sexual Assault Victims

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ABSTRACT

Because negative social reactions can be harmful for sexual assault victims' recovery and disclosure processes, it is important to understand how social reactions influence others' impressions of victims. Thus, this study aims to understand if individuals' opinions about survivors will be influenced by others' reactions. 278 college students read one of three vignettes varying the types of reactions a sexual assault survivor expects to receive from family members and answered questions about their opinion of what the survivor should do. Participants also completed a rape myth acceptance questionnaire. There were no overall significant findings. However, we did find a strong positive correlation between rape myth acceptance and victim blame ($r = 0.50$).

Key Words: Sexual Violence, Disclosure Recommendations, Perceptions

1. INTRODUCTION

After most crimes, people will contact the police or other authorities immediately to report the crime. However, this is not the case for sex crimes; in fact, in most cases, it is just the opposite. Both men and women often delay disclosing sexual violence (Hakimi, Bryant-Davis, Ullman, & Gobin, 2018). Although many people do disclose a sexual assault at some point, there is still a large number of assaults that go unreported, especially on college campuses (Paul, Gray, Elhai, & Davis, 2009). After disclosing a sexual assault, survivors may receive positive or negative social reactions (Dworkin, Newton, & Allen, 2018). Examples of negative social reactions include victim blame and victim disbelief (Ullman, 2010). Some survivors do experience negative social reactions that have powerful negative impacts on them after disclosing (Ullman & Peter, 2014). Prior research indicates that individuals are less likely to be supportive or sympathetic towards a victim if she received negative social reactions from family or close friends (Brown, 2019). It is important to see if the potential for negative social reactions can influence disclosure recommendation patterns.

2. METHODS

2.1 Participants

We recruited 278 students from the University of Louisiana at Lafayette's Psychology Department through the university's SONA system to participate in this study. After removing 2 scores because they were completed in under two minutes, and 1 score because it was taken by someone under that age of 18, the total number of scores that were analyzed was 275. The majority of participants identified as white (71.6%), female (75.6%), freshmen (61.1%). The mean age of the participants was 19.1 years old.

2.2 Measures and Procedures

This study was an online study conducted through Qualtrics. After signing up for the study and opening survey, the participants first read a consent form. Through the consent form, they were told that if they agree to be a part of the study, then they were to click to the next screen to continue. After agreeing to participate, each participant was asked to fill out a demographics questionnaire. Then, participants were randomly assigned to read one of three vignettes. Each vignette contained a story about a college student named Cheryl who went to a party and had sex with Michael despite saying “no” to him. The story then goes on to the next morning when Cheryl is going to tell her mom and sister about the previous night, but over hears them talking. What Cheryl hears them talking about varies between the three groups. One vignette had her mom and sister making comments about victim blame, such as saying that sexual assault victims are to blame for their assault because they put themselves in a dangerous situation. In the second, her mom and sister said a statement that was about victim disbelief, such as the implication that women who claim rape are making it up for attention. The final vignette was the control, in which Cheryl’s mom and sister made comments unrelated to sexual assault. After reading one of the vignettes, participants were asked to complete a questionnaire based on what they read. The questions were designed to see how the participants would perceive the victim and how they would recommend that the victim disclose the sexual assault. Specifically, participants saw statements about victim blame, such as “what happened to Cheryl was at least partially her fault,” and disclosure recommendations, such as “Cheryl should tell someone about her sexual assault/encounter.” Some additional items stated “Cheryl was raped” and “Cheryl should keep quiet about her assault.” Participants rated how much they agreed with these statements. Lastly, participants were asked to complete a 21 question rape myth acceptance survey (McMahon & Farmer, 2011). Composite scores for victim blame (2 items) and disclosure recommendations (2 items) were created by averaging the relevant component items. The overall score for RMA was computed by averaging the 21 RMA items, which has a strong internal reliability (Cronbach $\alpha = 0.906$). After completing the follow-up questionnaires, each participant was brought to a debriefing page explaining the purpose of the study.

3. RESULTS

We conducted 2-way ANOVAs to examine the effect of condition, gender, and condition x gender interaction on victim blame, disclosure recommendations, if Cheryl was raped, if Cheryl should keep quiet about the assault. The model for victim blame showed a significant effect for gender, $F(2,267) = 8.72$, $p = 0.0034$, no significant effect for condition, and no significant effect for gender x condition. The model for whether Cheryl should keep quiet about her assault showed no significant effects for gender or condition, but did show a significant gender x condition interaction effect, $F(2,266) = 2.83$, $p = 0.0087$. In the victim blame condition, women ($M = 1.52$) were more likely to recommend that Cheryl keep quiet about her assault than men ($M = 1.00$). In the victim disbelief condition, men ($M = 1.54$) were more likely to recommend that Cheryl keep quiet than women ($M = 1.19$). The model for disclosure recommendation did not show significant effects for gender, condition, or condition x gender interaction. The model for defining the event as rape did not show significant effects for gender, condition, or condition x gender.

Lastly, we examined correlations between rape myth acceptance and victim blame and rape myth acceptance and disclosure recommendations. RMA was positively correlated with victim blame ($r = 0.50$), but not correlated with disclosure recommendation ($r = -0.04$), suggesting that people who score higher on the RMA scale are more likely to blame the victim.

4. DISCUSSION

There was a lack of variability in disclosure recommendation because the majority of our participants indicated that Cheryl should disclose to someone about her assault. This could suggest why the effects related to disclosure are not significant, since the responses were similar across the study. Because the participants were reluctant to blame Cheryl for her assault and overwhelmingly recommended that she disclose the assault across each condition, this may suggest that people's perceptions of victims are not easily influenced by social information. Further research could be done to better understand how much social influence is necessary for a person's perceptions to change. Also, our findings that RMA is positively correlated with victim blame was consistent with previous research (Romero-Sánchez, Krahé, Moya, & Megías, 2018).

This study did have limitations. One limitation arises because our participants were all undergraduate psychology students from one university and the majority of our participants were white and freshman. Therefore, the results may not relate to the general public. Another limitation is that participants' scores on the rape myth acceptance questionnaire could have been influenced by the scenario read and questions answered before they took the RMA questionnaire.

Further research could be done to identify why women are more likely to recommend against disclosures when exposed to victim blame and why men are more likely to recommend against disclosures when exposed to victim disbelief.

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Cell-Penetrating MK2 Inhibitory Peptide Blocks LPS-Induced Expression of Pro-inflammatory Cytokines in HepG2 Hepatocytes

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ABSTRACT

Mitogen-activated protein kinase-activated protein kinase 2 or MK2 plays an important role in inflammation. We synthesized and evaluated the functionality of two selective MK2 inhibitors: anti-inflammatory peptide (AIP-1) and AIP-1 conjugated to a novel cell-penetrating peptide (CPP-AIP-1). CPP-AIP-1 reduced the expression of CXCL8 and TNF in HepG2 human hepatoma cells challenged with lipopolysaccharides (LPS), whereas AIP-1 had no significant inhibitory effect. Our results demonstrate the application of a cell-penetrating peptide to enhance drug delivery in an *in vitro* model of liver inflammation.

Key Words: p38 MAPK, CXCL8, IL-8, TNF

1. INTRODUCTION

Although inflammation is a protective response to infection or injury, unresolved inflammation is responsible for numerous chronic inflammatory diseases. Inflammation is regulated by complex signaling networks that orchestrate immune responses through the release of inflammatory mediators (Friere and Dyke 2013). Mitogen-activated protein kinases (MAPKs) play significant roles in this process by linking the receptors that sense insults to downstream effectors (Broom et al. 2009). The present study focuses on inflammation regulated by the p38 MAPK family. Because p38 regulates multiple cellular processes, p38 inhibitors tend to have adverse side effects. The p38 substrate MAPK-activated protein kinase 2 (MAPKAPK2) or MK2 has attracted attention as a potential anti-inflammatory drug target. A recent review of the literature (Soni, Anan, Padwad 2019) summarizes the pathological role of MK2 in chronic inflammatory diseases.

To act on intracellular targets such as MK2, inhibitors need to cross the plasma membrane barrier. Cell-penetrating peptides (CPP) are short sequences (5–30 residues) that have been widely used to carry diverse cargo into cells (Borrelli et al. 2018). The aim of this study was to investigate the effects of conjugating a novel CPP to a selective peptide inhibitor of MK2 which we refer to as anti-inflammatory peptide-1 or AIP-1. We evaluated the cytotoxicity, efficacy, and intracellular uptake of the therapeutic peptides in an *in vitro* model of liver inflammation. Our results demonstrate the functionality of the cell-penetrating peptide in inhibiting the MK2-mediated inflammatory response.

2. METHODS

2.1 Anti-inflammatory peptide synthesis

Therapeutic peptides (AIP-1 and CPP-AIP-1) were synthesized on Knorr resin by 9-fluorenylmethyloxycarbonyl (Fmoc) solid phase methodology (Poh, Lin, Panitch 2015).

2.2 Cell culture and viability

HepG2 liver cells (ATCC) were cultured in EMEM containing 10% FBS at 37 °C and 5% CO₂. Cells were seeded into 96-well plates for cell viability and microscopy studies and 6-well plates for RT-qPCR and ELISA studies. Cells were treated for 24 hours with doses of AIP-1 and CPP-AIP-1 ranging from 0.1–1000 µM or 1 ng/mL LPS from *E. coli* O55:B5 (Calbiochem). Cell viability was measured using Cell-TiterGlo 2.0 (Promega).

2.3 RNA isolation and RT-qPCR

Cells were treated for 24 hours with 100 µM AIP-1 or CPP-AIP-1, alone or in combination with 1 ng/mL LPS. Cells were harvested in Trizol (Invitrogen) and total RNA was isolated using PureLink RNA Mini kit (Invitrogen). Total RNA was reverse transcribed using gDNA Clear cDNA synthesis kit (Bio-Rad). The expression of *CXCL8* and *TNF* mRNA was measured by qPCR using SsoAdvanced Universal SYBR green supermix on a CFX Connect instrument running CFX Manager 3.1 (Bio-Rad). C_q values of target genes were normalized to 3 reference genes. Fold-change in mRNA expression relative to control was calculated as 2^{-ΔΔC_q}. Primer sequences are listed in Table 1.

Table 1. Primer information

Gene symbol Gene name (alias)	Accession No.	Primer sequences Forward Reverse	Amplicon size (bp)
<i>CXCL8</i> C-X-C motif chemokine ligand 8 (IL-8)	NM_000584. 4	F: CTTGGCAGCCTTCCTGATTT R:GGGTGGAAGGTTTGGAGTATG	111
<i>TNF</i> tumor necrosis factor (TNFα)	NM_000594. 4	F: CCAGGGACCTCTCTAATCA R: TCAGCTTGAGGGTTTGCTAC	106
<i>ACTB</i> actin beta (β-actin)	NM_001101. 5	F:CACTCTTCCAGCCTTCCTTC R:GTACAGGTCTTTGCGGATGT	104
<i>B2M</i> beta-2-microglobulin	XM_005254 549.3	F:CCAGCGTACTCCAAAGATTCA R:TGGATGAAACCCAGACACATAG	94
<i>RPLP0</i> ribosomal protein lateral stalk subunit P0	NM_001002. 4	F:GGAGAACTGCTGCCTCATATC R:CAGCAGCTGGCACCTTATT	107

2.4 ELISA

Cell culture media supernatants from the RT-qPCR studies were collected at 4 °C and stored in aliquots at -80 °C until later analysis. Detection of CXCL8 and TNF cytokines in the supernatant was carried out using ELISA kits (Boster Bio, Cayman Chemical).

2.5 Fluorescence microscopy

Cells were incubated for 24 hours with 100 μM fluorescein-labeled AIP-1 (AIP-1F) or fluorescein-labeled CPP-AIP-1 (CPP-AIP1-F). After washing with medium to remove any unbound peptides, cells were imaged via fluorescence microscopy (BioTek Cytation Multi-Mode Imaging Reader) and fluorescence intensity was quantified using ImageJ.

2.6 Statistical analysis

Assays were conducted in 3 biological replicates ($n = 3$). Data were analyzed by ordinary one-way ANOVA or two-way ANOVA followed by multiple comparisons tests using GraphPad Prism 7.05. Data are shown as mean with SEM.

3. RESULTS

3.1 Cell viability

After 24 hour treatment, a significant decrease in cell viability was observed with 1000 μM CPP-AIP-1 (Figure 1). There was a slight decrease with 1000 μM AIP-1 that was not statistically significant. Treatment with LPS at 1 ng/mL had no effect on cell viability (data not shown).

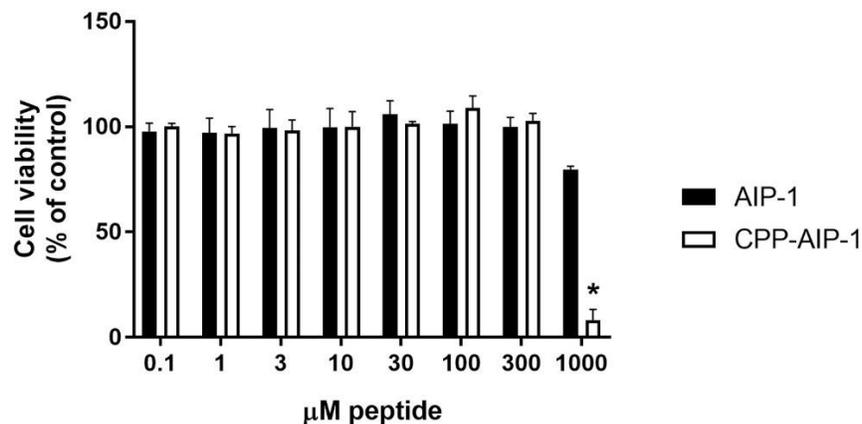


Figure 1. Cellular ATP was assayed as a measure of cell viability after 24 hour treatment with the indicated concentrations of peptides. Data are expressed as % of untreated control. (* indicates $p < 0.0001$). $n = 3$

3.2 Gene expression

Based on the dose-response where peptide concentrations ≤ 300 μM had no effect on cell viability or morphology (data not shown), we selected 100 μM as the treatment dose. After 24 hour treatment with 100 μM of the peptides alone, or in combination with 1 ng/mL LPS, there was no effect on the mRNA expression of the reference genes *ACTB*, *B2M*, and *RPLP0* (Figure 2).

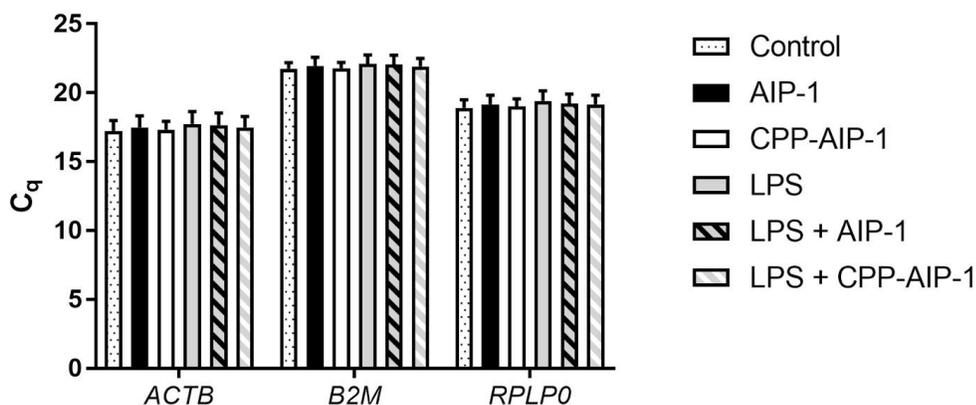


Figure 2. The suitability of three potential reference genes was assessed by RT-qPCR after 24 hour incubation with the indicated treatments (100 μ M AIP-1, 100 μ M CPP-AIP-1, 1 ng/mL LPS, or combination). $n = 3$

In contrast, LPS significantly upregulated expression of both *CXCL8* (2.41-fold) and *TNF* (13.72-fold) mRNA relative to untreated control after normalization to the reference gene panel (Figure 3). LPS induction of *CXCL8* and *TNF* mRNA was blocked by co-incubation with 100 μ M CPP-AIP-1. Co-incubation with 100 μ M AIP-1 blunted the induction but this did not reach statistical significance. The peptides without LPS had no effect on the expression of these genes.

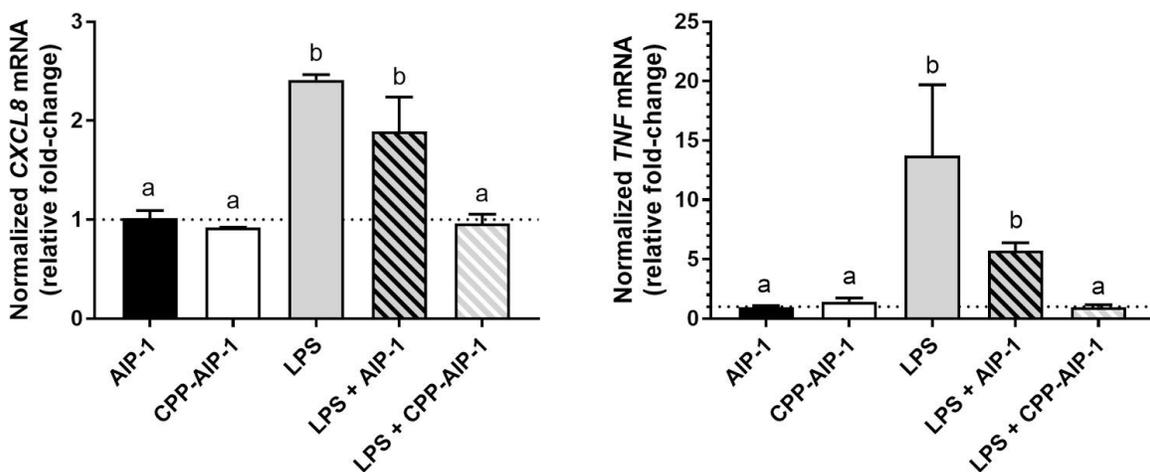


Figure 3. Expression of *CXCL8* (left) and *TNF* (right) mRNA was quantified by RT-qPCR after 24 hour incubation with the indicated treatments (100 μ M AIP-1, 100 μ M CPP-AIP-1, 1 ng/mL LPS, or combination). Data are normalized to 3 reference genes and expressed as relative fold-change of untreated control (horizontal dash represents control expression). Bars with different letters indicate a statistically significant difference ($p < 0.05$). $n = 3$

3.3 ELISA

LPS significantly increased CXCL8 detected in the media (1552 pg/mL) relative to untreated control (985 pg/mL) (Figure 4). Similar to the results for CXCL8 mRNA expression, CPP-AIP-1 (but not AIP-1) at 100 μ M inhibited CXCL8 secretion to control levels. TNF was not detected in any of the samples.

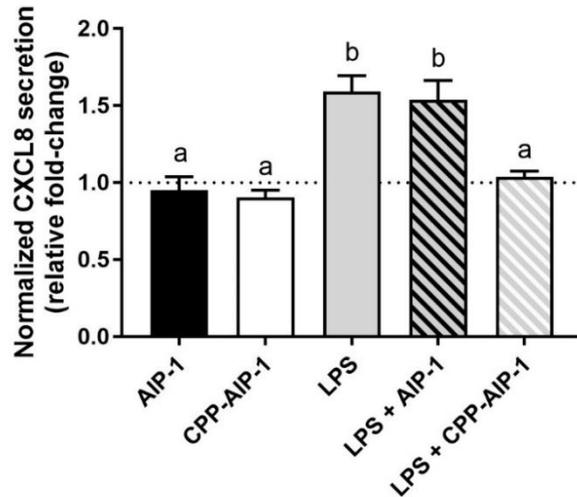


Figure 4. Secreted CXCL8 was quantified by ELISA after 24 hour incubation with the indicated treatments (100 μ M AIP-1, 100 μ M CPP-AIP-1, 1 ng/mL LPS, or combination). Data are expressed as relative fold-change of untreated control (horizontal dash represents control level). Bars with different letters indicate a statistically significant difference ($p < 0.05$). $n = 3$

3.4 Intracellular uptake

The ability of the cell-penetrating peptide (CPP) to deliver the therapeutic peptide (AIP-1) across the plasma membrane was tested by comparing AIP-1 and CPP-AIP-1 tagged with fluorescein. Enhanced intracellular uptake of CPP-AIP-1 was visually confirmed using fluorescence microscopy (Figure 5).

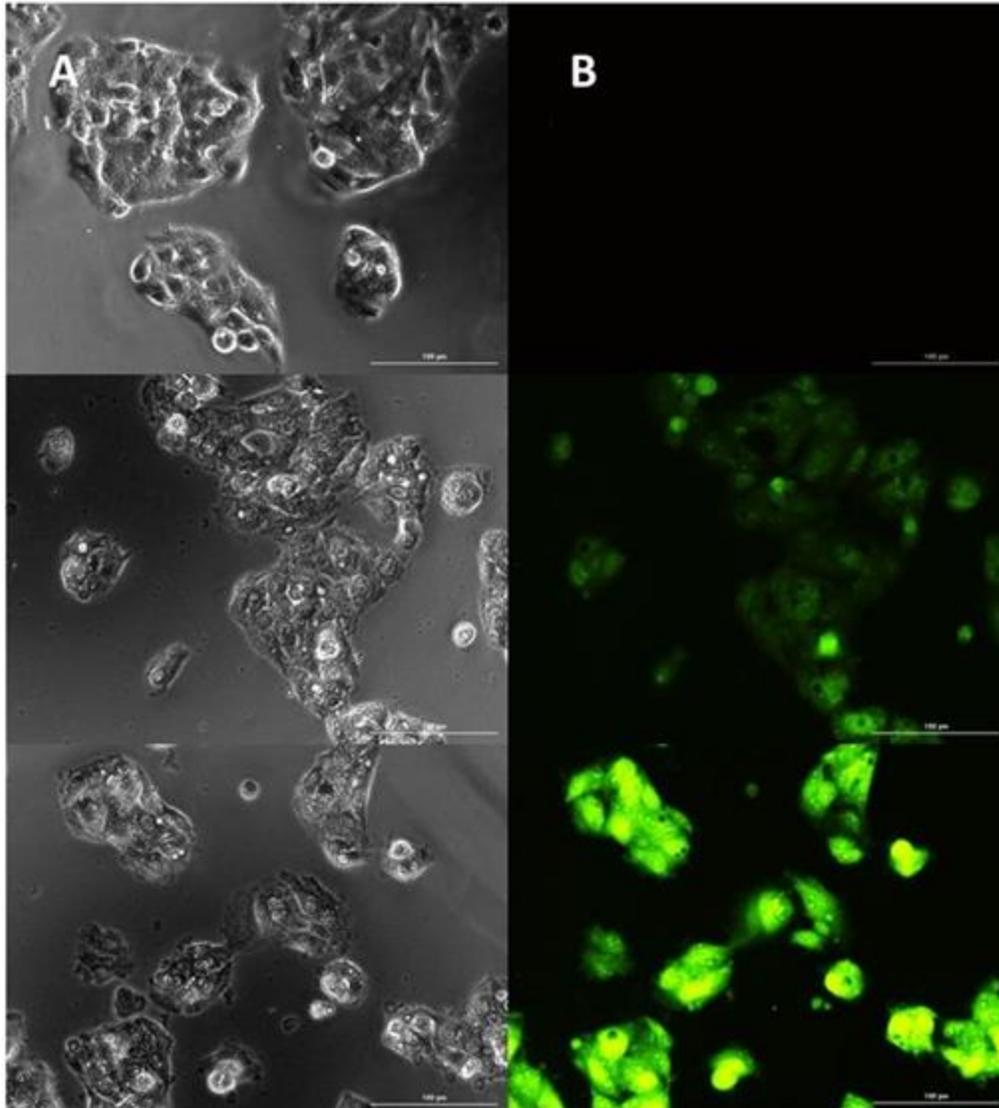


Figure 5. Intracellular uptake of 100 μ M fluorescein-tagged peptides after 24 hour incubation was quantified by fluorescence microscopy. Column A: phase contrast. Column B: fluorescence. Top row: PBS. Middle row: AIP-1-F. Bottom row: CPP-AIP-1-F.

4. DISCUSSION

LPS-induced inflammation is mediated by toll-like receptor 4 (TLR4), which recognizes the pathogen-associated molecule and triggers a signaling cascade that eventually activates the mitogen-activated protein kinase (MAPK) p38. MAPK-activated protein kinase 2 or MK2 is an effector kinase downstream of p38 that has been shown to be central to LPS induction of TNF (Kotlyarov et al. 1999). MK2 promotes proinflammatory cytokine biosynthesis by phosphorylating and inactivating tristetraprolin (TTP), a protein that binds and destabilizes many cytokine mRNA. Both TNF and CXCL8 are known to be regulated post-transcriptionally in this manner (Carballo, Lai, Blackshear 1998; Winzen et al. 2007). Consistent with this LPS/TLR4/p38/MK2/TTP pathway, we found that LPS significantly increased CXCL8 and TNF mRNA expression and that this was blocked by a cell penetrating MK2 inhibitory peptide (CPP-

AIP-1). The inhibitory peptide by itself (AIP-1) did not significantly inhibit expression, highlighting the effectiveness of cell penetrating peptides as a drug delivery mechanism.

ACKNOWLEDGEMENTS

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A Parallelized In-Memory Database System for the Discovery of Predictive Co-Occurrences within Streaming Time Stamped Data

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ABSTRACT

Predictive analytics utilizes information extracted from big data (both real-time and historical) in order to forecast potential future occurrences with an acceptable level of reliability. As time progresses, especially in this information age, trends change at an explosive rate. As a result, it can be especially hard for companies and individuals to react in time to take advantage and/or properly react to these changes. Some examples are emerging disease, increased hospital patients at certain times of the year, increase/decrease in traffic accidents under certain conditions (Agrawal, Imieliński, & Swami, 1993), (Lavergne, Benton, & Raghavan, 2012a), (Lavergne, Benton, & Raghavan, 2012), (Difallah, Benton, Raghavan, & Johnsten, 2011), (Han, Pei, Yin, & Mao, 2004), (Ma, Yao, & Yang, 2013). The main objective of this project is to develop a parallelized in-memory pattern-mining framework for dynamic data mining. Utilizing an in-memory database allows for faster information processing, dynamic structure growth as time progresses, and advanced co-occurrence discovery (Kubat, Hafez, Raghavan, Lekkala, & Chen, 2003), (Li & Kubat, 2006), (Lavergne, Benton, & Raghavan, 2012a), (Lavergne, Benton, & Raghavan, 2012b). By parallelizing and making modifications to the structure, this project plans to increase processing speed, allow for the discovery of new, previously undiscovered cooccurrence types, and to decrease the wait time between discovery of a new occurrence and implementation (Abul & Gökçe, 2012).

Key Words: Data Mining, Association Rule, Information Retrieval, Parallelization 1. Introduction

1. INTRODUCTION

One of the largest problems facing us today is the lack of storage space available to correctly, and reasonably, process the information overload that is our current society . As seen in Figure 1 below, this problem was first official brought to notice in 2007. We have vastly outstripped our ability to predict based upon historical data. We now require up to date analysis on current events, whether disease, finances, etc (Agarwal, Aggarwal, & Prasad, 2000),(Aggarwal & Yu, 1998),(Agrawal, Imieliński, & Swami, 1993). The problem of prediction is no longer trivial (Abul & Gökçe, 2012).

By utilizing an in memory database that can update dynamically, we can stay on top of these trends and changes, and generate more reliable forecasting for timely responses to events (Kubat, Hafez, Raghavan, Lekkala, & Chen, 2003), (Li & Kubat, 2006), (Lavergne, Benton, & Raghavan, 2012a), (Lavergne, Benton, & Raghavan, 2012b). As a result, we can assist in the process of helping companies and individuals to react in time to take advantage and/or properly react to these changes. In Figure 2, one can see how the depreciation of data due to latency will cause a major drop in value for someone who needs to take action sooner in order to save lives.

Information Versus Available Storage

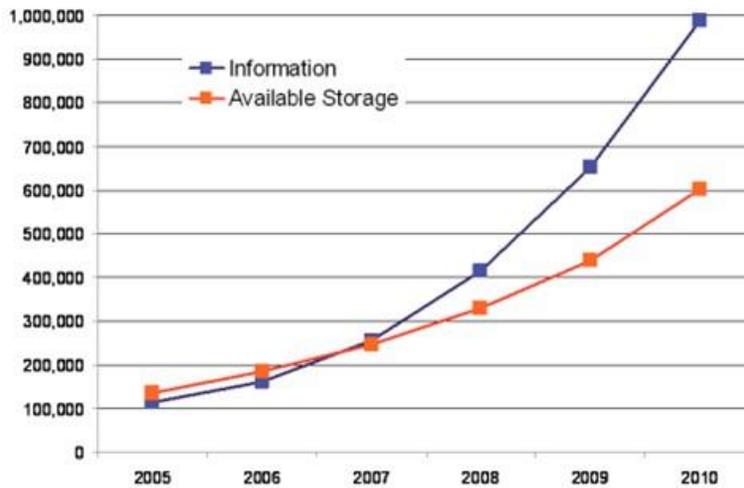


Figure 1: Storage vs Information

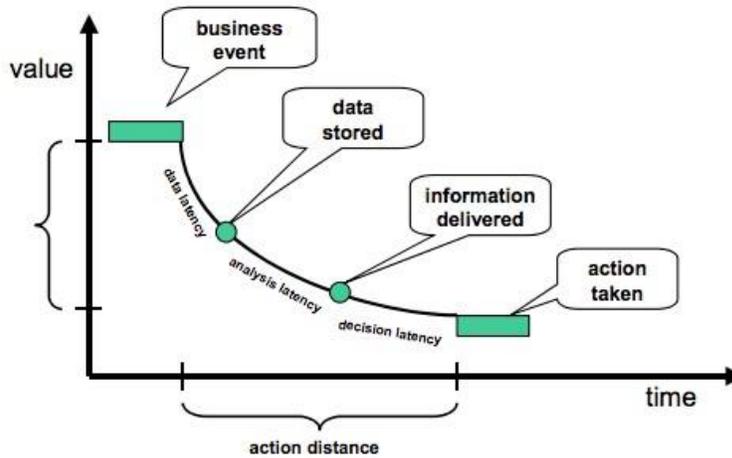


Figure 2: Latency of Information

2. IMPLEMENTATION

The first project objective involves implementing the in-memory data structure in a newer, more flexible programming language like Java. This will allow us faster processing speeds, better portability, and ease of modification for the following objectives. The current implementation utilizes C++ and, therefore has some major limitations (Lavergne, Benton, & Raghavan, 2012a), (Lavergne, Benton, & Raghavan, 2012b). First, Java will allow specialized classes to be created for all portions of the implementation. This will also allow us to insert new classes in order to facilitate the expansion of the set of discoverable co-occurrence types. Next, the new implementation will also allow us to create specialized classes to handle a variety of different input types ranging from traditional market basket style data, traffic accident occurrence data, and patient visitation. An overview of the implementation flow can be seen in Figure 3.

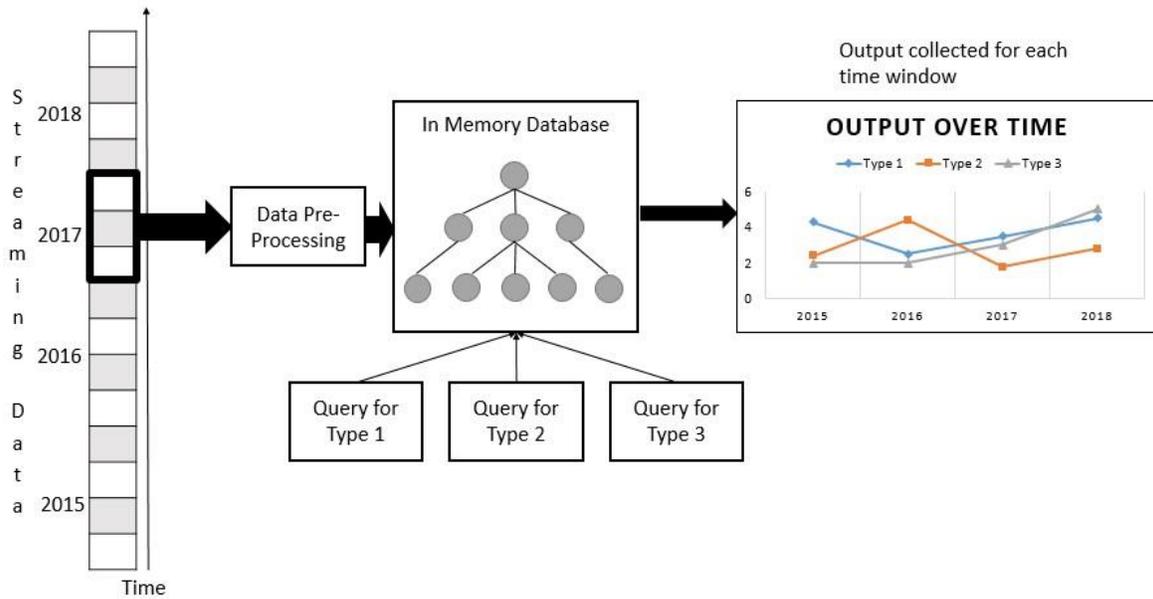


Figure 3: Flowchart for Code Implementation

2.1 Parallelization Implementation

This project tests a parallelization method on the itemset tree by making a copy of the database for each query type and running simultaneously, as seen in Figure 4.

Each copy of the tree will receive a portion of the import query set to process. The portion for experiments will be created by:

- Divide query set into n , evenly distributed query subsets, where n is the number of tree copies.
- Divide the query sets into n subsets containing 1-itemsets, 2-itemsets, ... n -itemsets
- Divide the query sets into n subsets with an even distribution of 1-itemsets, 2-itemsets, ... n -itemsets
- Divide the query sets into n subsets where set 1 will contain itemsets that would appear in the $n\%$ of the tree; the second will contain itemsets that would appear in the second $n\%$ of the tree, etc. We can complete this easily since the itemset tree will be logographically ordered.

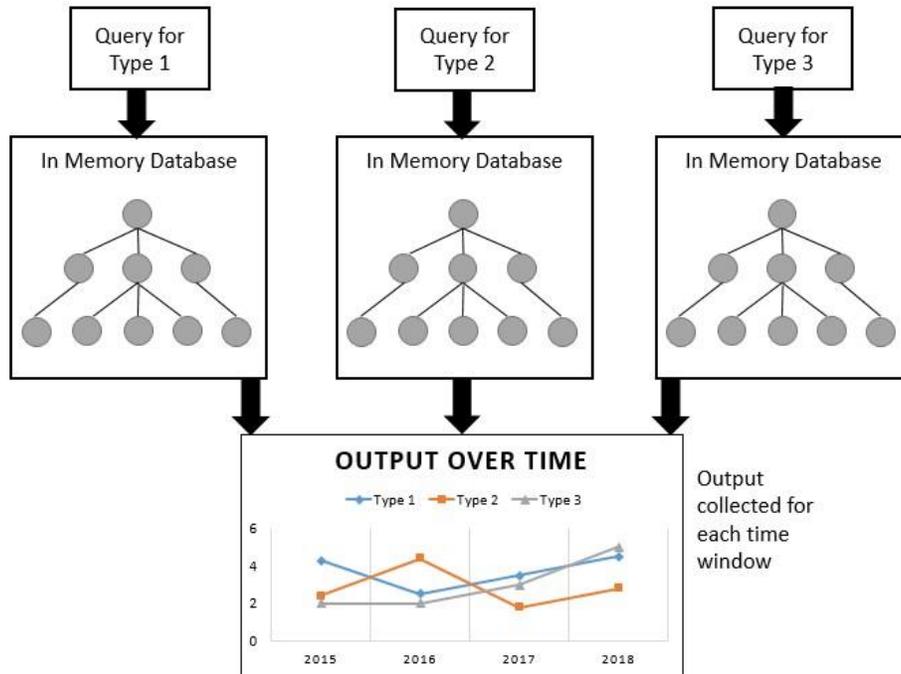


Figure 4: Parallelization Method 1

2.2 Modifications for additional pattern types

The third objective of this project is to make modifications to the new structure in order to facilitate the discovery of various different varieties of co-occurrences (Rozsypal & Kubat, 2005), (Thakkar, Mozafari, & Zaniolo, 2008), (Yun, Ha, Hwang, & Ryu, 2003). The current method generates basic association rules over time varying domains. It can find both emerging and declining trends depending upon traditional association mining parameters. Sample output can be seen below in Figure 5.

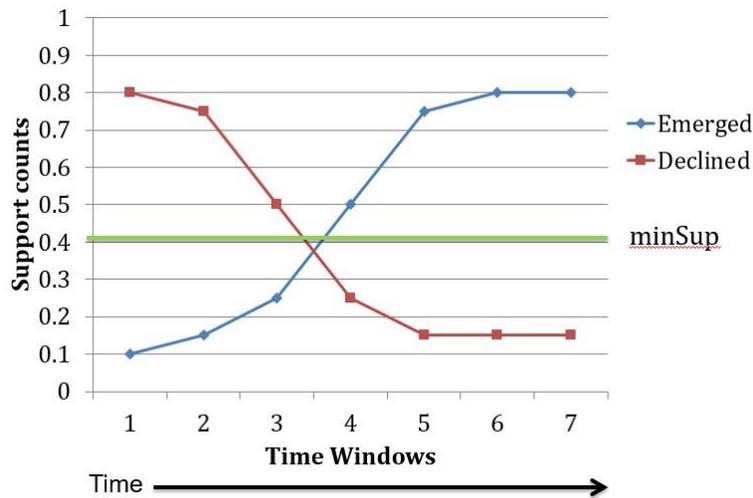


Figure 5: Emerging and Declining Trends Illustrated

This project will expand upon this in order to create more robust prediction abilities and faster detection of when a pattern is changing(Lavergne, Benton, & Raghavan, 2012a), (Lavergne, Benton, & Raghavan, 2012b) (Rozsypal & Kubat, 2005),(Thakkar, Mozafari, & Zaniolo, 2008).

Some of the expansion areas this project plans to expand into are:

- Association Action Rules
- Advanced Emerging and Declining Association Rules with Gradients (new topic)
- Advanced Strong and Rare Association Rules with Gradients (new topic)

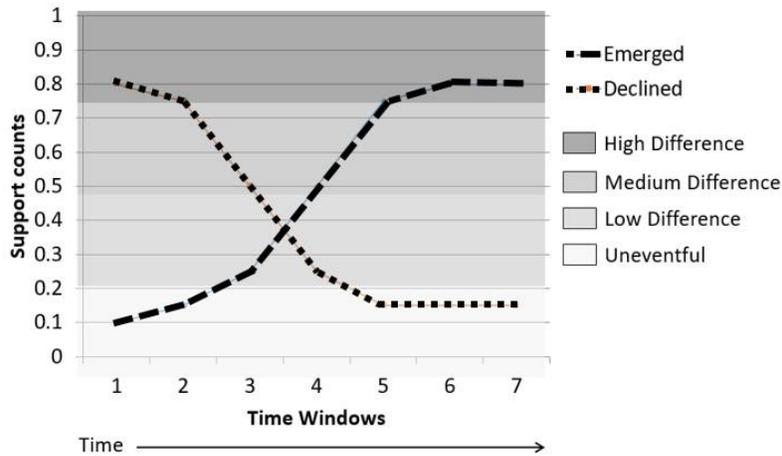


Figure 6: Gradient Example

Gradients will be used to decide if some rules fall into new categories at certain time intervals and allow the use of association mining to detect concept drift. In Figure 6, some basic gradients can be seen illustrated. More gradients will be modified/added/removed as testing progresses depending upon results.

3. DATASETS AND MEASURING RUBRIC:

3.1 Datasets

The datasets utilized for the experiments were built using the IBMQuest data generator discussed in the previous chapter and can be seen in Table 1.

	Transactions	Unique 1-itemsets
Dataset 1	25,000	50
Dataset 2	50,000	50
Dataset 3	100,000	50

Table 1: IBMQuest Synthetic Datasets Description

Various trees of differing sizes were generated using the above datasets. Table 2 illustrates the statistics of the generated trees:

50 1-item datasets		
Dataset Transactions	Nodes In the tree	Width of the tree
25,000	31,993	47
50,000	62,265	47
100,000	62,265	47
200,000	62,265	47

Table 2: IBMQuest Synthetic Datasets Trees Description

3.1 Measuring Rubric

For our parallelization method, this project compares the following. The results are separated into the following categories:

- a) Worst case
- b) Best case
- c) Average case

The following measures were utilized to perform the separation:

- Process time for each query on each method – averaged.
- Overall process time for each query type, on each method – averaged. Also separated into categories, for each type.
- Memory usage overall for all types, methods, etc.

4. FUTURE WORK

Future work for this project involves implementing multiple parallelization methods using 3 different approaches.

- Multithreading method: Multi-threading like approach allowing for concurrent processes to run on the structure. This allows queries that take less time to complete and start a new query without waiting on queries that could take longer.
- Substructures method: Splitting up the structure into sub-structures based upon data values and running queries on each in sequential order. This will also allow queries that take less time to complete and start a new query without waiting on queries that could take longer.
- Composite method(s): Various combinations of the above to be determined after testing is completed on the above methods. This will allow us to perfect the implementation and parallelization process.

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Investigating the Mechanical Properties of 3D Printed Nested Hierarchical Metamaterials

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ABSTRACT

Cellular materials are tessellated unit cells that are used to create load bearing components with high strength to weight ratios. This type of design is similar to many natural phenomena such as honeycombs, plants, and bones. The designs in question are of first order, meaning the cells are tessellated within themselves one time. The removal of materials creates a lighter structure with good strength properties which can be desirable for numerous engineering applications. In this work, the 2D lattice of rectangular topology was tested to observe its mechanical properties under both cured and uncured resin manufacturing. The two versions of the material showed impressive load bearing capabilities with cured holding more than 1.5 times the load of uncured. Uncured, however, experienced a recovery of around 80 percent while the cured shattered in a brittle manner.

1. INTRODUCTION AND BACKGROUND

Many studies have looked into honeycombs and their hierarchy variations showing tremendous strength and low weight under in and out of plane compression loading conditions[1][2]. Their has also been great interest in the effects of anisotropic or irregular cellular solids[1][3]. The structure studied in this experiment was a metamaterial with a rectangular unit cell. A key consideration in this structure was the use of a curing process. When heat is added to a system, the temperature rises and initiates a rapid movement of the particles, and consequently the space between each particle increases. When the heat is later removed, the particles move closer together. This process usually results in a stronger yet more brittle materials. This can be desirable, especially when creating structures that will be exposed to compressive loads. However, this means that cured materials will most likely fail without warning as in most brittle materials. This also results in little to no recovery once a compressive load is removed. Therefore a material that has been cured will have significantly different properties, specifically higher rigidity and brittleness, compared to the same material that has not been cured[4].

2. METHODS AND MATERIALS

The hierarchical metamaterials were designed in SolidWorks (Fig. 1) with a relative density of 0.6 and a cell size of 10 by 10 mm. A 50 x 50 mm square tessellation was done to create the structure and the boundaries were left open to allow the material to deform. The designed

metamaterials were fabricated utilizing an inverted stereolithography (SLA) 3D printer, Form 2 of Formlabs, using rigid resin. Both green (uncured) and cured with UV radiation technology samples were tested. The ultimate strength and Young's Modulus of cured resin are 40 MPa and 2.2 GPa, respectively and for cured one, $\sigma_u = 75\text{MPa}$ and $\sigma_y = 4.1\text{GPa}$ [5]. Both the fabricated samples underwent a uniaxial compression test with a 100 kN load cell and 0.7 mm/min of strain rate to determine their structural properties.

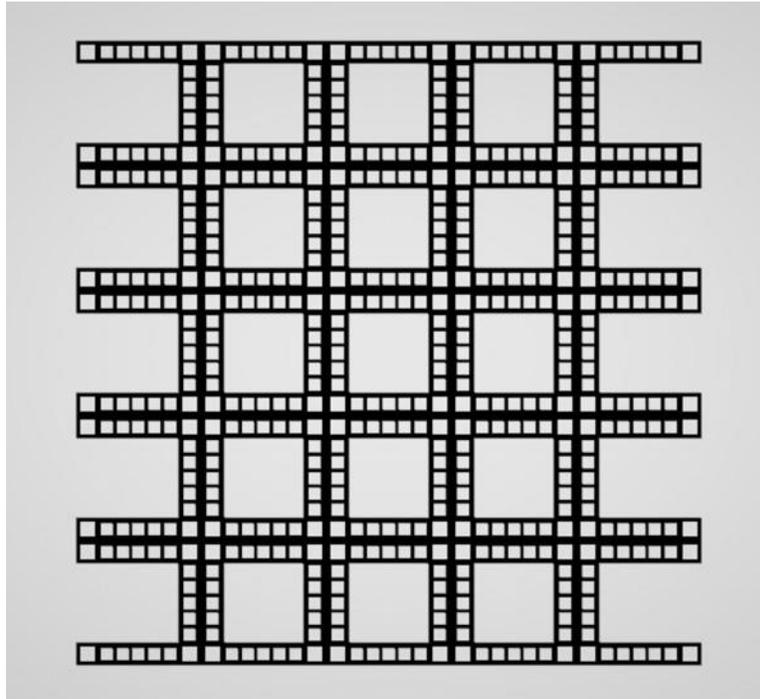


Figure 1: 5 by 5 square lattice of nested hierarchies

3. RESULTS

The specimens were compressed up to 70% to observe its behavior up until what would in practice be considered failure and beyond. The load vs. deformation plots for each of two samples are shown in Figures 2a and 2b. The uncured experienced its first failure at a load of approximately 1.15 kN while the cured failed at 1.95 kN. Figures 3a and 3b show the uncured and cured specimens respectively after the entire loading process. The cured sample crumpled completely while the uncured decompressed significantly and broke apart to a much lesser extent.

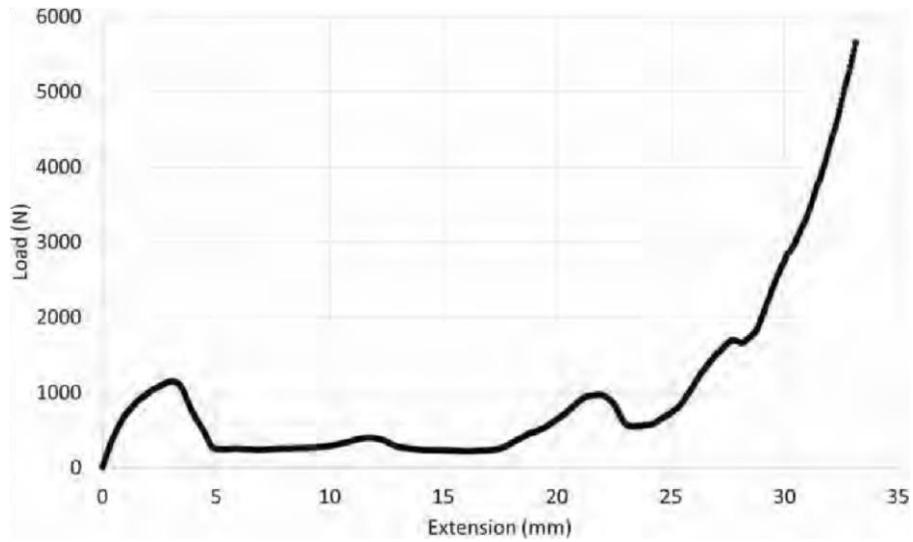


Fig. 2a: *Uncured Load Curve*

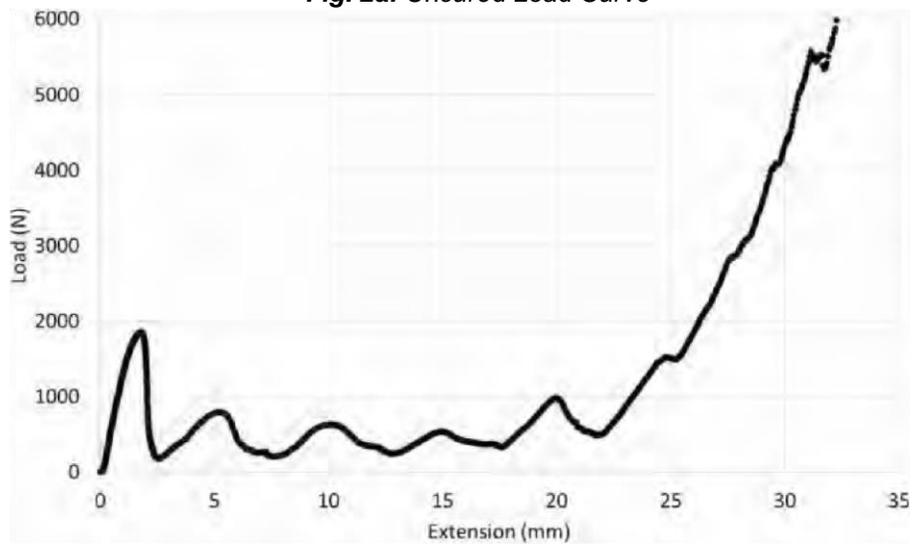


Fig. 2b: *Cured Load Curve*



Fig. 3a: *Uncured Post Compression*



Fig. 3b: *Cured Post Compression*

4. DISCUSSION

It can be seen in Figures 2a and 2b that the two variations of the cellular structure experienced similar loads and behaviors. The most unique behavior is the cyclical load bearing attribute. As each layer of the structure fails, the structure becomes weaker. Once that level has fully compressed, however, the structure regains some strength. It acts as if the failed layer has just been removed and behaves similar to how it would in its initial state. This process repeats for each layer, or in this case 5 times. This can be seen clearly in the cured specimen as there are 5 spikes in load. Once the fifth layer has collapsed the structure solidifies and begins to act as if it were a standard solid material test. This makes for a relatively gracefully failing structure. Both specimens reached their solidification point at just above 25 mm or 0.5 strain. As expected the cured specimen sustained more load than the uncured initially and after reaching its solidification point.

The major difference in the two specimens was the recovery process. Figures 3a and 3b provide a pretty stark contrast in post loading behavior. The uncured, which is more flexible, recovered to about 80 percent of its original size while the cured shattered in a brittle manner and experienced no recovery. This recovery of the uncured resin makes better use of the graceful failure mechanics innate to the structure.

5. CONCLUSION

It was observed that the nested hierarchical metamaterials created a cyclical load bearing phenomena. The cured resin had increased stiffness which increased its strength but as a result it failed in an extremely brittle manner. The uncured, in contrast, sustained a much lower load and also experienced a partial recovery of around 80 percent.

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Perspective Taking as a Moderator Between Self-Efficacy and Intrinsic Satisfaction in a Sample of Direct Support Professionals

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ABSTRACT

Direct support professionals (DSPs) play an essential role in ensuring the well-being and life sustaining measures of people living with developmental disabilities (DDs) and their families. The occupation is often challenging due to a bevy of workforce deficiencies and specific behaviors associated with DDs. Literature is limited in the relation between self-efficacy and general satisfaction in DSPs. The purpose of this study was to analyze the relation between self-efficacy and general satisfaction and how perspective taking functioned as a moderator between them. A sample of 133 DSPs (103 females, 30 males) were recruited from the Pinecrest Support and Services Center (PSSC) and responded to self-report measures that included the General Self-Efficacy Scale (GSE), the Intrinsic Satisfaction, Extrinsic Satisfaction, and General Satisfaction subscales of the Minnesota Satisfaction Questionnaire (MSQ), and the Interpersonal Reactivity Index that included Perspective-Taking, Fantasy, Empathic Concern, and Personal Distress. The results indicated a positive correlation between self-efficacy and intrinsic satisfaction that varied with perspective taking. The findings underscored a moderating role of perspective taking such that as perspective taking increased, the strength of the association between self-efficacy and intrinsic satisfaction increased. However, for individuals that indicated low perspective taking, self-efficacy did not indicate intrinsic satisfaction. The findings have implications for improving intrinsic satisfaction in DSPs by increasing self-efficacy and perspective taking in DSP job-training.

Keywords: Self-efficacy, intrinsic satisfaction, perspective taking

1. INTRODUCTION

Direct support professionals (DSPs) are professionals that assist in the day-to-day activities of those with developmental delays. The job tasks and long hours required of these professionals are physically, mentally, and emotionally taxing and tend to undermine job satisfaction in DSPs. The existing literature on the correlates for job satisfaction in DSPs is limited, but research has found that perspective taking increased job performance in a multitude of jobs, which further correlated with job satisfaction (Limbu & Jayachandran, 2012). This study aimed at examining two cognitive correlates, namely, self-efficacy and perspective taking, as they relate to job satisfaction in DSPs.

Self-efficacy develops through the experiences of task mastery and receiving positive feedback from others for the completion of task requirements (Bandura, 1994). An individual's general self-efficacy can be a predictor for success in both stress management and job performance (Abbasi, 2017; Molero et al., 2018). According to Manzano-Garcia and Ayala

(2017), high levels of self-efficacy in a work environment are associated with lower likelihood for emotional exhaustion. Self-efficacy supports an individual's vigor in and dedication to job duties. Consequently, self-efficacy may prove to be a supporting factor for job satisfaction in DSPs.

A general sense of job satisfaction is described as how satisfied an individual perceives the experiences while carrying out a job (Jafarjalal et al., 2017). There are two components of a general sense of job satisfaction. Extrinsic job satisfaction involves the product of a company's policies, supervisor relations, compensation, security, and hierarchical company models (Jafarjalal et al., 2017). Intrinsic job satisfaction is defined as an individual's sense of self-accomplishment on the job. A multitude of factors affect an individual's intrinsic job satisfaction, including personal responsibility, self-directedness, development of skills, and observed accomplishment (Jafarjalal et al., 2017). A potential correlate for intrinsic job satisfaction is the cognitive component of empathy.

Empathy, defined as one's reactions in response to the observed experiences of another, is a multi-dimensional construct that includes both cognitive and emotional elements (Davis 1983). Cognitive empathy involves perspective taking (i.e., adopting another's point of view), which helps individuals understand the internal states of others and relate their own experiences to those of others (Davis, 1983; Wilkinson, Whittington, Perry, & Eames, 2017).

The purpose of this study was to examine two cognitive processes, self-efficacy and cognitive empathy, as two correlates and how they jointly related to job satisfaction in DSPs. Existing literature does not examine perspective-taking as a moderator, and this study aimed to investigate the role of perspective taking in the relation between self-efficacy and job satisfaction.

2. METHOD

2.1. Participants and Procedure

A sample of 133 DSPs were recruited from the Pinecrest Supports and Services Center (PSSC). The PSSC is an intermediate care facility located in Pineville, Louisiana. The population served by PSSC includes approximately 600 individuals with developmental disabilities (DDs). The individuals who are served by the PSSC reside on grounds in a group home type of setting with residential staff in the home 24 hours a day. The PSSC employs around 500 DSPs who work 12-hour-shifts in two-day increments. The DSPs are the people that individuals with DDs have the most contact with, although for each individual there is an interdisciplinary team consisting of a psychologist, a psychiatrist, a physician, nurses, assistants to a psychologist, and qualified intellectual disabled professionals.

Inclusion criteria for participating in this study were: 1) being currently employed at the PSSC, 2) working at least 3 shifts per week, and 3) having been employed for at least two months at the PSSC. Exclusion criteria included 1) being out of client care, or 2) still being in the staff training process for newly hired DSPs. When a DSP is "out of client care", the DSP is being investigated due to complaints filed by an individual with DDs, a family member, or a coworker at the PSSC.

The ages for the DSPs in this study ranged from 20 to 65, with a mean of 35.03 years old ($SD = 11.68$). The sample was comprised of 78% females ($n = 103$) and 22% males ($n = 30$). On average, DSPs had been working at the PSSC for nearly 4 years ($M = 3.84$, $SD = 1.35$). Of the DSPs that participated in the study, 73% were African American ($n = 97$), 17% were European American/Caucasian ($n = 23$), and less than 1% of participants were Asian/Pacific Islander ($n = 1$), American Indian ($n = 4$), or other ($n = 7$).

2.2. Measures

General Self-Efficacy Scale. The General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) is a 10-item scale that measures a general sense of perceived self-efficacy. The scale aims to predict coping with daily hassles and adaptation after experiencing stressful life events. An exemplar item from the GSE is, “*I can always manage to solve difficult problems if I try hard enough.*” The Cronbach’s alpha for the GSE ranges from .76 to .90, for the present study the Cronbach’s alpha was 0.93.

Minnesota Satisfaction Questionnaire-Short Form. The Minnesota Satisfaction Questionnaire (MSQ) Short Form (Weiss, Dawis, England, & Lofquist, 1967) is a 20-item measure assessing an employee’s satisfaction with his or her job. Participants rate each item on a 5-point Likert scale ranging from 1 (*very dissatisfied*), 2 (*dissatisfied*), 3 (*neutral*), 4 (*satisfied*), and 5 (*very satisfied*). The MSQ Short Form includes three subscales: Intrinsic Satisfaction, Extrinsic Satisfaction, and General Satisfaction. Respondents rate each item based on their levels of satisfaction for that aspect of job. The reliability coefficients for Intrinsic Satisfaction ranged from .84 to .92, the Extrinsic Satisfaction scaled from .77 to .82, and the General Satisfaction from .87 to .92. For the present study, Cronbach’s alpha was .92 for intrinsic satisfaction, .89 for extrinsic satisfaction, and .95 for general satisfaction.

Interpersonal Reactivity Index. The Interpersonal Reactivity Index (Davis, 1980) is a self-report questionnaire that consists of four 7-item subscales, including Perspective-Taking, Fantasy, Empathic Concern, and Personal Distress. For the purpose of this study, only the PT subscale was used in the analyses. The Perspective-Taking (PT) scale measures the cognitive tendency for adopting the psychological perspective of others. Cronbach’s alpha’s for subscale PT was males, .71; females, .75. An exemplar item from the PT scale is, “*I try to look at everybody’s side of a disagreement before I make a decision.*”

3. RESULTS

3.1. Correlations

The results indicated that general self-efficacy ($M = 31.49$, $SD = 6.50$) and perspective taking ($M = 24.72$, $SD = 5.49$) were positively correlated with intrinsic satisfaction respectively, $r = .43$, $p < .0001$ and $r = 0.22$, $p = 0.049$. Also, general self-efficacy and perspective taking were positively correlated with each other ($r = 0.45$, $p = < 0.0001$).

3.2. Moderation Analysis

In a regression model with general self-efficacy (GSE SUM) as the main predictor, intrinsic satisfaction as the criterion variable, and IRI PT as the moderator, the main effect of general job satisfaction was significant, $b = .35$, $SE = .12$, $t = 3.08$, $p = .003$. Gender was controlled in the model. Further regression analysis adding the cross-product of GSE and IRI PT indicated a significant interaction effect on intrinsic satisfaction, $b = .21$, $SE = .09$, $t = 2.33$, $p = .024$, suggesting that perspective taking moderated the relation between self-efficacy and intrinsic satisfaction. Figure 1 summarizes this interaction, showing the prediction for intrinsic satisfaction from three levels of self-efficacy ($-1SD$, mean, $+1SD$) at three levels of perspective taking ($-1SD$, mean, $+1SD$). Subsequent simple slope tests indicated that the association of self-efficacy with intrinsic satisfaction varied by levels of perspective taking, such that higher levels of perspective taking were associated with stronger links between self-efficacy and intrinsic satisfaction. The findings suggested that a general proclivity for perspective taking when witnessing others in plight would reinforce the association between self-efficacy and intrinsic job satisfaction.

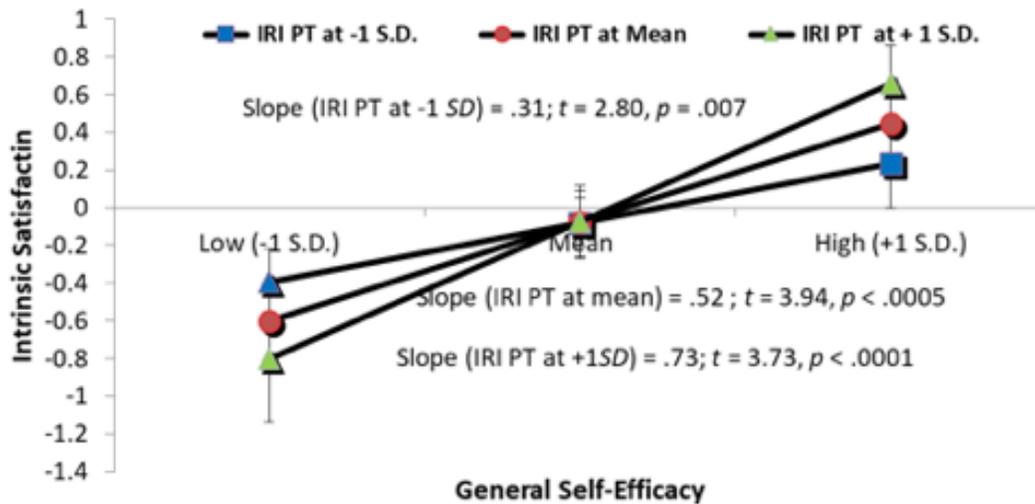


Figure 1. Interaction between general self-efficacy (GSE SUM) and perspective taking (measured by the Interpersonal Reactivity Index, IRI) predicting intrinsic satisfaction. All variables were standardized.

4. DISCUSSION

This study examined the relation between general self-efficacy and job satisfaction and how perspective taking moderated this relation. The results indicated that there was a positive correlation between general self-efficacy and intrinsic satisfaction, but the strength of this association varied by perspective taking. Specifically, as perspective taking increased, the strength of the association between general self-efficacy and intrinsic satisfaction increased. Although literature has yet to thoroughly establish the relation of perspective taking to self-efficacy, our data support the idea that perspective taking gives individuals the tools to be aware of other's experiences as well as individuals' own experiences. This perspective taking competence allows individuals to better gauge their own level of efficiency in reference to how satisfied they experience at their work. In this way, perspective taking intensifies the association between self-efficacy and intrinsic satisfaction. Therefore, it may be beneficial to place more emphasis on the importance of self-efficacy and perspective taking in DSP job-training in hopes of increasing levels of intrinsic job satisfaction among DSPs.

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Development of a 3D Bioprinter by Modifying an FDM 3D Printer

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ABSTRACT

Organ transplants give patients the ability to live longer, but they are scarce and often difficult to match physiologically. Organ transplants can have adverse side effects and are so expensive that some patients cannot afford to undergo one. More importantly, only a limited supply of suitable organs exists, leading to many patients put on waitlists. The growing demand for research of 3D bio-printed organs will allow doctors to make patient-specific artificial organs that can function as a living organ. 3D bioprinting of artificial organs can eliminate some of the difficulties associated with organ transplants. However, one of the major challenges of performing new research with biological materials is the expensive cost of 3D bioprinters. Therefore, developing a cost effective but functional bioprinter by modifying a fused deposition modeling (FDM) 3D printer is a crucial step of conducting progressing cutting-edge research. An FDM 3D printer typically uses a thermoplastic filament that is heated to its melting point and extruded in layers to create a 3D object. In this work, a Qidi X Pro 3D printer was used as the base to modify and create the 3D bioprinter. A large volume syringe pump extruder (LVE) for desktop 3D printers was used to adapt the Qidi X Pro into a bioprinter, such that the stepper motor from the Qidi X Pro is attached to the 3D printed LVE assembly, which enables the extrusion of bio-ink. The modification helps to convert it to a single-nozzle 3D bioprinter.

Keywords: 3D Bioprinter, FDM 3D printer, Bio-ink

1. INTRODUCTION

Bioprinters can be one of three different types: extrusion-based, inkjet-based, and laser-assisted. Extrusion-based systems utilize a pressure that is applied to a container of material to extrude a continuous stream of bio-ink through a nozzle to form a print. It is the most commonly used among the three types because of its versatility (Desimone et al., 2015). It is compatible with a variety of materials and properties, and it produces quality prints in a reasonable time frame. Inkjet-based systems utilize heat to push the ink through the nozzle to form a stream of small droplets that land on the print bed to create the desired print. This method is limited to materials with low viscosities because inkjet-based needles easily clog (Desimone et al., 2015). Unlike the first two systems, laser-assisted systems do not push the bio-ink through a nozzle. Instead, the material rests on a slide, and a high energy beam is directed towards it, which leads to the material concaving and forming a droplet (Desimone et al., 2015). Similar to the inkjet-based system, a stream of droplets is created to form a print in this type as well. Because the laser-assisted system is extremely complex to set up, it is rarely used for bioprinting. The only advantage of the laser-assisted system is the absence of the nozzle, which eliminates the possibility of a nozzle clogging and enables the use of a variety of bio-inks within a limited viscosity range (Desimone et al., 2015).

The extrusion-based system is the simplest type of 3D printer that can be modified into a 3D bioprinter because of its simplicity to set up and control. The Printbot Simple Metal

(Printrbot), a low-cost FDM 3D printer, was used to create a bioprinter (Pusch et al., 2018). The Printrbot was modified using the large volume syringe pump extruder (LVE), which is a simple assembly of 3D printed parts that adapts easily to a variety of 3D printers (Pusch et al., 2018). The LVE design was used to modify the Qidi X Pro to develop a bioprinter that has the possibility of dual biomaterial prints (Pusch et al., 2018).

2. MODIFICATION OF THE QIDI X PRO INTO A BIOPRINTER

The Qidi X Pro was used as the base 3D printer because it has a simple design, a dual extruder, and produces quality prints. These qualities make the Qidi X Pro a desirable base to modify into the 3D bioprinter as it enables the research of dual biomaterial prints. The LVE design provided STL files for a 3D printed assembly (Pusch et al., 2018). The assembly included a large gear and a small gear, a syringe plunger, a nut shuttle and a nut shuttle plate, a syringe guide, a syringe collar, and the LVE core. The 3D printed parts were assembled to create the LVE. The Qidi X Pro was disassembled to give access to its stepper motor and the modified Qidi X Pro can be seen in Figure 1. The filament feeder was removed from the stepper motor axle so that the stepper motor could be attached to the LVE. The stepper motor axle was inserted into the small gear's center so that the gear rotates in step with the stepper motor. The small gear's teeth were aligned with the large gear's teeth so that the gears meshed together. A steel axle inserted and secured into the large gear's center enabled the steel axle and large gear to rotate simultaneously. The nut shuttle and nut shuttle plate assembly were aligned with the steel axle and placed inside the LVE core. This assembly moves in the LVE core to move the syringe plunger in and out of the syringe. The 60 mL syringe is placed in the LVE core and contains the biomaterial, which is blocked off by the syringe plunger. This entire LVE assembly was secured to the Qidi X Pro using Velcro. A polyurethane tubing was connected to the syringe by connecting it to a 26-gauge needle to Luer lock adapter, which was connected to the needle assembly.

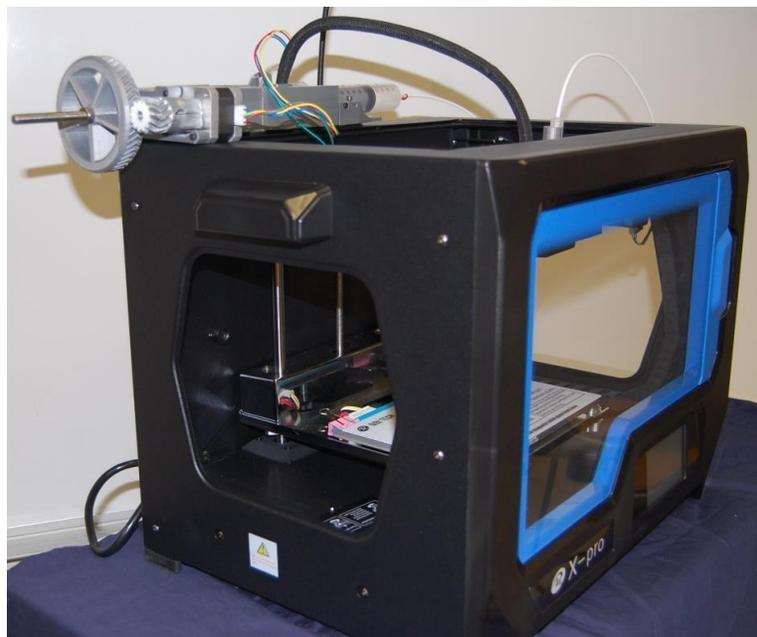


Figure 1. Front angled view of the modified Qidi X Pro

An 18-gauge needle jig and 250-micron needle jig STL files were provided to epoxy the 250micron needle into the 18-gauge needle (Pusch et al., 2018). The needle replaced the extruder nozzle on the Qidi X Pro as the biomaterial will exit onto the print bed from the 250micron needle. The extruder heater on the Qidi X Pro was set to zero so that the heat around the needle will not melt the epoxy off the needle assembly and enable the prints to occur at room temperature. The 18-gauge needle uses an adapter to attach a polyurethane tube so that the biomaterial from the syringe can be extruded from the needle.

These modifications also required adaptations to be made to the Qidi X Pro so that the 3D printer could still function normally. The stepper motor was removed from the Qidi X Pro extrusion mechanism and attached to the LVE assembly. However, the stepper motor activated the sensor to tell the printer that the extruders hit the boundary of the printer wall. With the stepper motor gone, there was nothing to activate the sensor, leading to the mechanism hitting the wall until the 3D printer was turned off. A vacancy was left when the stepper motor was attached to the LVE and moved to the external frame of the Qidi X Pro. The vacancy caused one of the leveling sensors to malfunction. To fix this issue, a box-like 3D printed part, designed on SolidWorks, was put in place of the stepper motor so that the leveling sensor was hit and also stabilized the assembly around the extruders. Also, to level the needle assembly with the left extruder of the Qidi X Pro, a cylinder-shaped 3D printed part, designed in SolidWorks, was used to level the 18gauge and 250-micron needle assembly. The cylinder-shaped part that levels the needle assembly was secured to the Qidi X Pro using epoxy. A zip secures the needle assembly to the cylinder-shaped piece and the Qidi X Pro. Figure 2 shows the major components of the bioprinter.

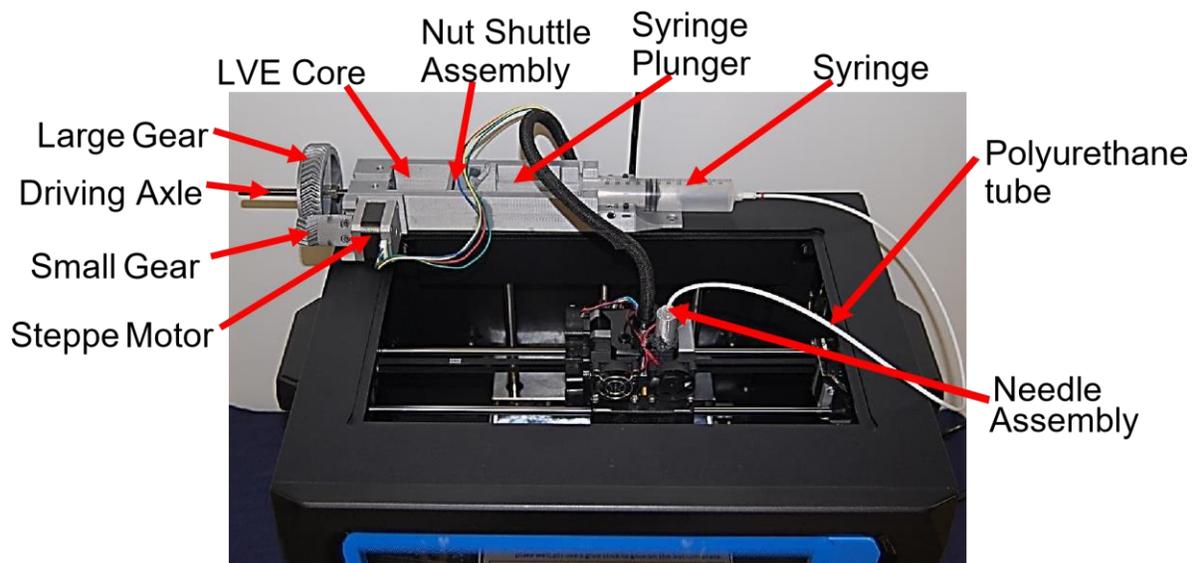


Figure 2. Major components of the bioprinter

3. CONCLUSION

The purpose of modifying a Qidi X Pro FDM 3D printer was to create a low-cost 3D bioprinter for future research in 3D printing of biomaterials. Further research includes testing the quality of the Qidi X Pro using gel-like fluids that contain no living cells but mimic the properties of bio-inks. If those tests show favorable results, actual bio-inks made with living cells will then be used and further research on the dual extruder bioprinter will be done.

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The Relationship between Hookup Participation, Drinking Behavior, and Psychological Well-Being

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ABSTRACT

Hooking up—casual sex encounters—have become increasingly popular in recent years (Bogle, 2008). There is evidence to suggest that substance use, namely alcohol, is positively associated with engagement in hookup behaviors (Lewis et al., 2012; Walsh et al., 2014). When examining psychological well-being (PWB) and hookup participation, there are mixed findings: some evidence suggests that there is no association between hooking up and PWB; other evidence suggests that there is a negative association between PWB and hooking up for women, but positively associated in men. Thus, the current study sought to examine how the context of alcohol consumption may affect PWB resulting from hookups and to examine how drinking behavior is associated with hookup behavior. Results indicated that the proportion of alcohol-involved hookups and nonalcohol-involved hookups were not significantly different. While there was a higher proportion of students who drink and hookup than students who drink and do not hookup, there were no significant differences in PWB regardless of hookup type or whether or not the participants consume alcohol. The current findings are consistent with research suggesting that alcohol use and hooking up are associated (Walsh et al., 2014), but contrary to research showing a positive association between negative affect resulting from alcohol-involved hookups.

Key Words: Hookups, Alcohol, Psychological Well-Being

1. INTRODUCTION

Hooking up has become a culturally normative practice for U.S. college age individuals. With up to 80% of college students participating in hookups (Garcia, Reiber, Massey, & Merriwether, 2012); some researchers purport that hooking up may be becoming the primary means of sexual intimacy among this demographic (Bogle, 2008)

While sexual intimacy is associated with positive psychological outcomes when viewed in the context of a committed relationship (Diamond & Huebner, 2012); casual sex, the sexual behavior implicit in hooking up, has often been viewed by health professionals as a problematic and risky behavior that may result in and be associated with inferior psychological well-being (PWB; Townsend & Wasserman, 2011). However, the association between hookup behavior and PWB has been unclear and at times contradictory.

Some studies have shown lower PWB associated with hookups for women (Townsend, 1995; Fiedler & Carey, 2010b), while other evidence suggest the opposite effect in women (Welsh, Grello, & Harper, 2006). In addition, when examining both men and women, hooking up has been positively associated with PWB (Mendle, Ferrero, Moore, & Harden, 2013). There also seems to be positive associations between hooking up and PWB in men (Clark, 2006), and in some cases no associations between these two variables in both sexes (Gentzler & Kerns, 2004).

The contradictory findings from previous research show that the association between hooking up and mental health remain unclear (Vranglova, 2015). In examining this dynamic, studies have shown that substance use is commonly associated with hookup behavior and may provide a potential explanation for negative psychological impact associated with hooking up (Walsh, Fielder, Carey, & Carey 2014). One example of substances associated with hookup behavior is alcohol consumption, which may serve as a facilitator for hookup behavior (Fielder & Carey, 2010). In addition, when examining reactions to hookups, Lewis et al. (2012) found that there was a significant positive association between alcohol consumption during a hookup and negative affect following the hookup experience in both men and women. One possible explanation for the contradictory findings regarding the association between hookups and PWB may be alcohol involvement in hookups.

More information is needed on how hookups impact psychological well-being. Given this need, the susceptibility of young adults to participate in risky behaviors, and the prevalence of hooking up on U.S. college campuses, the current study examined whether hooking up in the context of alcohol consumption leads to lower PWB compared to non-alcohol involved hookups. Four hypotheses were tested:

1. There will be more alcohol-involved hookups than nonalcohol-involved hookups.
2. The proportion of students who drink will be higher among students who hookup compared to students who do not hookup.
3. Within participants that hookup, those who participate in alcohol-involved hookups will experience lower PWB than those who participate in nonalcohol-involved hookups.
4. Within participants that hookup, those who consume alcohol will experience lower PWB than those who do not consume alcohol.

2. METHODS

Participants include 609 undergraduate students at a southern university. Data was collected from an online survey and participants were rewarded with course credit for completing the survey. A total of 149 students were removed from data analyses due to incorrectly answering attention check items (e.g., "If you are reading this select 'I choose not respond' as your answer"). Analyses were conducted on the remaining 456 participants which consisted of predominately Caucasian/White (74%) females (77%) with a mean age of 19.13 ($SD = 2.35$).

In addition to demographic information, participants answered questions regarding their hookup perceptions, frequency, and alcohol involvement in hookup experiences. The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) was used to separate participants into two categories: Drinkers and non-drinkers. The Depression, Anxiety, and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) was used to assess PWB and consists of three subscales: Depression, anxiety, and stress, that participants rate their agreeance with each item ranging from 1 *Did not apply to me at all* to 4 *Applied to me very much or most of the time*.

3. RESULTS

Of the total sample, 33% ($n = 146$) reported participating in at least one hookup; of those who hooked up, 57% ($n = 83$) reported that their most recent hookup experience involved alcohol. Participants had relatively low scores for depression ($M = 1.66$, $SD = 0.69$) and anxiety ($M = 1.67$, $SD = 0.60$) subscales of the DASS-21, and slightly higher scores for the stress subscale ($M = 1.96$, $SD = 0.67$).

To test hypothesis one, a chi-square analysis was used. The test indicated that the proportion of alcohol-involved hookups (57%) and nonalcohol-involved hookups (43%) were not significantly different, $\chi^2 (1) = 2.75$, $p = .097$.

To test hypothesis two, a chi-square analysis was used. The test indicated that the proportion of participants who hookup and consume alcohol (78.72%) was significantly higher than the proportion of participants who do not hookup and consume alcohol (46.37%), $\chi^2(1) = 42.63, p < .001$.

To test hypothesis three, three one-factor ANOVAs were conducted. Results indicated that scores for the depression, anxiety, and stress subscales of the DASS-21 did not differ by type of hookup experience (alcohol-involved or nonalcohol-involved).

To test hypothesis four, three one-factor ANOVAs were conducted. Results indicated that within participants who hookup, scores for the depression, anxiety, and stress subscales of the DASS-21 did not differ by whether or not the participants consumed alcohol.

4. DISCUSSION

The findings presented in the current study add to the conflicting literature that examines hookup behavior and psychological well-being. While 33% of the current sample reported engaging in hookups, other research suggests that the proportion of college students who hookup is higher (e.g., Garcia et al., 2012, Paul, McManus, & Hayes, 2000). Because some findings suggest engagement in hookup behavior negatively affects PWB (Townsend, 1995; Townsend & Wasserman, 2011) and other findings suggest that it is positively associated with PWB (Clark, 2006; Mendle et al., 2013), the current study sought to examine if the presence or absence of alcohol in hookup encounters might explain differences in PWB outcomes, there were no significant associations between alcohol involvement in hookups and PWB.

The current study found that the proportion of students who engage in hookups and consume alcohol was greater than proportion of students who do not engage in hookups and consume alcohol, which supports the notion that alcohol may serve as a facilitator for hookup encounters (e.g., Fielder & Carey, 2010). This finding is also consistent with the literature suggesting that substance use is commonly associated with hookup behavior (Walsh et al., 2014).

Lastly, this study did not find a significant difference in PWB following alcohol-involved hookups as compared to nonalcohol-involved hookups which is contrary to previous research suggesting that there is an association between alcohol-involved hookups and negative affect following the hookup experience (e.g., Lewis et al., 2012).

While the findings of this study contribute to the research examining hookup behavior and psychological well-being, it is not without limitation. The way that hookup participation was collected was categorical (i.e., participants indicated they hooked up 1-2 times per semester to 7+ times per semester), which limits the ability to examine how frequently college students actually hookup. In addition, when examining alcohol-involved hookup experience, the survey asked participants if their most recent hookup experience involved alcohol. Thus the ability to generalize whether or not their typical hookup experience involved alcohol is difficult.

Future research should aim to measure hookup frequency as a continuous variable and examine if the association between hookups, psychological well-being, and alcohol use have varying association depending on the frequency of engagement in hookup behavior. In addition, we did not examine how specific type of hookup (e.g., making-out, oral sex, or vaginal/anal intercourse) affected psychological well-being.

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Life Satisfaction of Churchgoers: The role of Sense of Community

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ABSTRACT

This research studied two relationships, one being the relationship between church membership and life satisfaction with sense of community mediating, and the other being religiosity and life satisfaction with sense of community mediating. Previous research has shown that religiosity is related to an increased sense of life satisfaction (Peacock & Poloma, 1998), but it is still not clear what aspects of religion give people this increase in satisfaction or happiness. While there may be many factors that could result in this belief, this study focuses on the role of sense of community among believers. Responses from Wave 6 of the World Values Survey United States Region (N = 2232) provided the data for this study. Participants were asked to identify how frequently they attended church, in the form of nonactive (0), and active (1). Subjects were also asked to rate how they perceived themselves within their community and their overall life satisfaction. Mediation analyses were then run to determine the relationship between the two sets of variables. Results indicated that individuals who attended church actively, as well as those who identified as religious were found to have greater life satisfaction, mediated by perceived sense of community.

Key Words: Church Membership, Religiosity, Community, Engagement, Life Satisfaction

1. INTRODUCTION

Previous research has shown that religiosity is related to an increased sense of life satisfaction (Peacock & Poloma, 1998), but it is still not clear what aspects of religion give people this increase in satisfaction or happiness. While there may be many factors that could result in this belief, this study focuses on the role of sense of community among believers. In other words, the aim of this research is to analyze the relationship between religiosity and life satisfaction and to analyze whether a perceived sense of community mediates the connection between membership of church/religiosity and life satisfaction.

1.1 Literature Review

Religiosity is defined as an orientation of one's knowledge, expectation, experiences, practices, and beliefs towards faith and transcendent encounter (Glock & Stark, 1965; Holdcroft, 2006). In this study, we consider indicators of religiosity, including church membership and perceived level of religiosity. Kim, Miles-Mason, Kim, and Esquivel (2013) surveyed 196 young Korean-Americans, seeking to explore many different aspects of religion and how they interplay with life. Out of eight dimensions tested using the Brief Multidimensional Measure of Religiousness/Spirituality, only three remained significant after controlling for demographic variables. It was found that the aspects of religiosity that were correlated with increased life satisfaction in young Korean Catholics were daily spiritual experiences, congregational support, and forgiveness (Kim et al., 2013). This suggests that these three factors are the most important in predicting life satisfaction among religious individuals. In a study with similar intentions on

finding the relations between religiosity and life satisfaction, Peacock and Poloma (1998) used the 1988 Gallup Survey to survey seven different age groups, in an attempt to map out a various spikes and valleys of religion throughout life. The study found that over the course of the lifetimes observed, the relationship between religiosity and age was not linear but rather shifted during different stages in life (Peacock and Poloma, 1998). It is theorized that priorities and attitudes shift throughout life regarding religion, thus causing a non-linear relationship. However, perceived closeness to God was a constant predictor of life satisfaction. This finding suggests that although a person's motivation for pursuing religion may change, the end result, perceiving oneself closer to God, may affect the life satisfaction of most religious individuals.

Research also identified a relationship between religiosity and sense of community. Specifically, Ellison and George (1994) sought to find how religious involvement was related to social support and connections with the community. Utilizing the Piedmont Health Survey, approximately 3,000 (N=2,956) responses were analyzed in the study. It was found that people who attend church consistently stated having larger social circles, were offered more support, thought more highly of their relationships, and an increased rate of contact with social groups than non-churchgoers (Ellison and George, 1994).

While research in the psychology of religion identified that religiosity is related to life satisfaction and sense of community, research in community psychology showed a strong link between life satisfaction and sense of community. For example, in a study focusing on overcoming the hardships of immigration, Hombrados-Mendieta, Gomez-Jacinto, Dominguez Fuentes, and Garcia-Leiva (2013) examined satisfaction with life between a group of immigrants, and a group of natives within Spain. The purpose of the study was to determine whether sense of community would have an effect on satisfaction with life when under life stressors such as immigration. Hombrados-Mendieta et al. (2013) used survey methodology and random route sampling, testing 700 immigrants and 946 natives. The results indicated that when sense of community was high, there was no difference in the levels of satisfaction with life between immigrants and natives. This finding suggests that sense of community can be used to buffer negative effects, to the point of even nullifying the negative effect's existence. In a related study, Ditchman, Keegan, Batchos, Haak, and Johnson (2017) sought out to see if sense of community affected the life satisfaction rating of individuals possessing brain damage. Utilizing survey data with a small population of individuals with brain damage (N=177), it was found that after controlling for other variables, sense of community consistently predicted perceived satisfaction of life. Both of these studies indicate that a strong sense of community consistently predicts life satisfaction, even in the face of adversity, such as brain damage or immigration.

1.2 Research Questions

Therefore, this study bridges the research in psychology of religion and community psychology and asks:

Research Question 1: Does sense of community mediate the relations between membership of church and life satisfaction.

Research Question 2: Does sense of community mediate the relations between religiosity and life satisfaction.

2. METHOD

2.1 Procedure and Sample

This study used the data from the World Value Survey Wave 6-United States. Data were available for the public at <http://www.worldvaluessurvey.org/wvs.jsp>. The final sample consisted of 2,332 individuals. Among them, about half of them were females (n = 1,148, 51.4%) and close to half were males (n = 1084, 48.6%). The average age of the participants was 48.91 years old (SD: 16.91; range: 18 – 93).

2.2 Measures

Two indicators of religiosity were included in this study. The first one was church membership. Participants were asked to indicate whether they were an active member, inactive member, or non-member. The item was recorded as an active member (1) and nonactive member (0). The second indicator was perceived religiosity. Participants were asked to report their level of religiosity from 1 (an atheist), 2 (not a religious person) to 3 (a religious person).

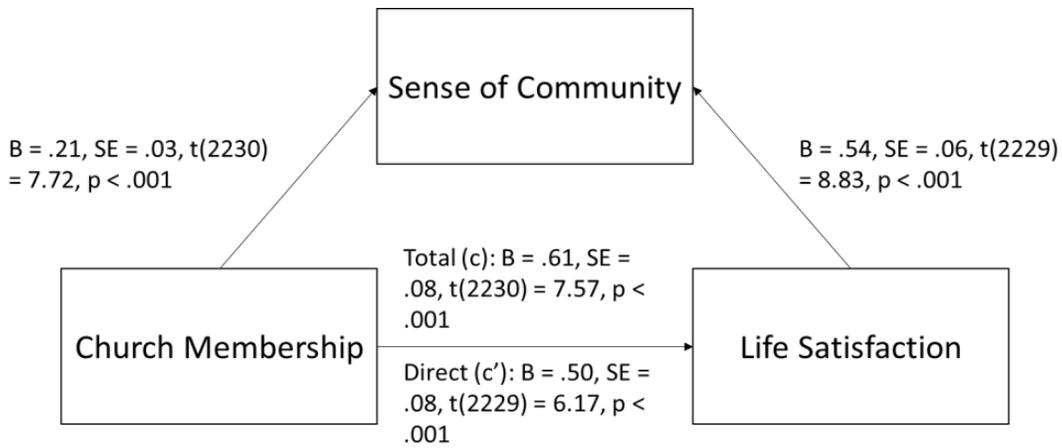
Sense of community was measured using one item, “People have different views about themselves and how they relate to the world. Using this card, would you tell me how strongly you agree or disagree with each of the following statements about how you see yourself?”, rated on a 4-point Likert scale. Higher scores reflected higher sense of community. Life satisfaction was measured using one item, “All things considered, how satisfied are you with your life as a whole these days? Please use this card to help with your answer,” rated on a 10-point Likert scale such as higher scores reflected higher satisfaction of life. All these measurements were then used to test the research questions. Bootstrapped (r=5000) mediation analyses were conducted using R3.6.0 (R Core Team, 2019) and the package psych (Revelle, 2018). In addition to the main measurements, participants were asked to report their demographics, including race, age, and gender.

3. RESULTS

3.1 Research Questions 1: Does sense of community mediate the relations between membership of church and life satisfaction?

As shown in Table 1, the results showed that individuals’ membership of church predicted life satisfaction, and such relations were mediated by sense of community. Individuals who were a member of church was found to have higher life satisfaction than individuals who were not a member of the church. Compared to individuals who were not a member of a church, individuals who were members of a church were found to have higher sense of community. Sense of community, in turn, was related to higher life satisfaction.

Figure 1. Bootstrapped (r=5000) mediation analysis results of Research Question 1 - Compared to individuals who were not a member of a church, individuals who were a member of a church were found to have a higher sense of community. Sense of community, in turns, was related to higher life satisfaction.

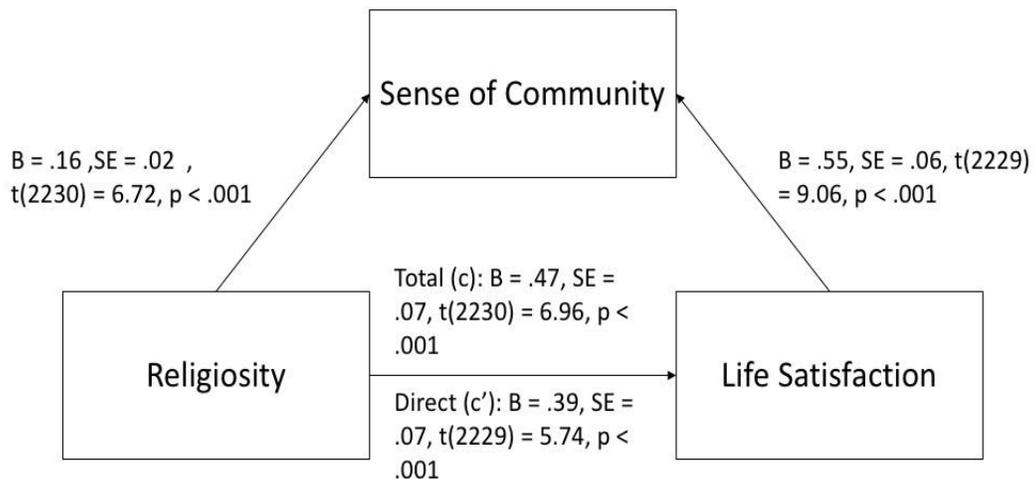


Note: Indirect effect was significant, $B = .11, SE = .02, 95\% CI [.08, .16]$.

3.2 Research Questions 2: Does sense of community mediate the relations between religiosity and life satisfaction?

As shown in Table 2, results indicated that life satisfaction was predicted by religiosity, which was mediated by sense of community. Specifically, higher perceived religiosity was related to higher life satisfaction and a greater sense of community. Sense of community, in turn, predicted higher life satisfaction.

Figure 2. Bootstrapped ($r=5000$) mediation analysis results of Research Question 2.



Note: Indirect effect was significant, $B = .09, SE = .02, 95\% CI [.05, .12]$.

4. DISCUSSION

The results of this study indicate that individuals who actively attend church, compared to those who inactively attend church, were found to have a greater sense of life satisfaction. Active members were also found to have a higher perceived sense of community, which in turn predicted life satisfaction. The same results were also found for individuals who identified as religious. Participants who describe themselves as “religious people” were found to have a higher sense of life satisfaction, mediated by sense of community. This would imply that both

attending church services, as well as simply identifying as religious result in the same effects. Because of this, it is possible that a multitude of factors can lead to increased life satisfaction. Future research can examine the differences between the effect of church membership and religiosity, with any attempt to discriminate between the two. Other studies can also examine other, more nuanced aspects of religion, such as moral beliefs and religious practices to see how they affect life satisfaction or sense of community.

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General Self-Efficacy (GSE) Interacts with Difficulty in Emotion Regulation (DERS) Predicting Depressive Symptoms (from DASS)

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ABSTRACT

Previous research has found that Direct Support Professionals (DSPs) have reported feelings of being overworked, lacking sufficient training, and experiencing burnout. The purpose of this study was to examine the moderating role of difficulty in emotion regulation between general self-efficacy (GSE) and depressive symptoms. A sample of 133 DSPs responded to a self-report measure that included demographic information, a general self-efficacy scale, a difficulty in emotion regulation scale (DERS), and a depression, anxiety, and stress scale. Results indicated that there was a negative correlation between GSE and depressive symptoms but that DERS strengthened the relation between the two variables. The moderating role of DERS showed that when difficulty in emotion regulation was high, the association between GSE and depressive symptoms was strong. However, for those individuals who reported low levels of difficulty in emotion regulation, their GSE scores did not significantly predict depressive symptoms. These findings suggest that targeting emotion regulation and self-efficacy may help improve the mental well-being of DSPs who encounter highly stressful situations on a daily basis.

Key Words: general self-efficacy, difficulty in emotion regulation, depressive symptoms, direct support professionals

1. INTRODUCTION

Direct support professionals (DSPs) help individuals, who have developmental disabilities, with daily activities and provide support for their safety. Many of the individuals that reside in long-term care facilities, where DSPs work, require around the clock care. DSPs play a vital role in helping to improve these individuals' quality of life. The daily duties of DSPs are so demanding that their mental and physical well-being is crucial in order to give quality care to residents with developmental disabilities. Many of these DSPs have self-reported stress, poor health, burnout, and intention to resign (Piko, 2006; Hatton et al., 1999; Willemse, Smit, de Lange, & Pot, 2011). In addition to this, low wages and understaffing of DSPs are common within many long-term care facilities (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; NCI, 2019). Many of the DSPs are provided with insufficient training and skills to give quality care which, in turn, affects job satisfaction and increases stress. Overall, this affects the individuals they care for negatively (Brandt, 2017).

Self-efficacy is the belief in oneself to effectively handle challenging situations (Abbasi, 2017). Findings derived from Bandura's (1994) research suggests that self-efficacy is developed

by receiving positive feedback for completing tasks and, consequently, influences emotions, thoughts, and behaviors. Individuals with high self-efficacy have a positive sense of self, achieve goals, are resilient to difficulties, and commit to tasks despite challenges (Bandura, 1994). On the other hand, low self-efficacy is associated with low self-confidence, low job performance, and failure to meet goals (Abbasi, 2017). Therefore, self-efficacy can predict stress management and mental well-being. (Abbasi, 2017; Molero, Perez-Fuentes, & Gazquez, 2018). Thus, a sense of self-efficacy can greatly affect the quality of care and the mental well-being of DSPs.

Emotion regulation refers to an individual's ability to recognize, understand and accept emotions, to control impulsive behaviors, and to use various appropriate coping mechanisms when experiencing negative emotions to reach a desired outcome (Gratz & Roemer, 2004). The ability to regulate emotions effectively is essential when faced with challenging situations and is associated with positive well-being (Nyklíček, Vingerhoets, & Zeelenberg, 2011; Yahyagil & Ikier, 2009). Those who are competent in regulating negative emotions overcome failure and/or rejection in the workplace and tend to have a positive mindset when faced with challenges (Brackett, Palomera, Mojsa-Kaja, Reyes, & Salovey, 2010; Judge & Bono, 2001; Yahyagil & Ikier, 2009). DSPs encounter many difficult tasks and situations daily, so being able to overcome negative emotions quickly is important for maintaining their own mental well-being (Judge & Bono, 2001).

This research aimed at measuring the psychological correlates of depressive symptoms in DSP's focusing on general self-efficacy and difficulty in emotion regulation. Moreover, this research examined if difficulty in emotion regulation moderated the relation between general self-efficacy and depressive symptoms.

2. METHOD

2.1. Participants and Procedure

All DSP's (30 males and 103 females) that met criteria were invited to participate in the study. The ages of the DSPs in this study ranged from 20 to 65, with the mean age being 35.03 years old. The sample contained 78% females ($n=103$) and 22% males ($n=30$). Of all the DSPs that participated in this study, 73% were African American ($n = 97$), 17% were European American/Caucasian ($n = 23$), and less than 1% of participants were Asian/Pacific Islander ($n = 1$), American Indian ($n = 4$), or other ($n = 7$). On average, DSPs had been working at PSSC for four years. The inclusion criteria included: 1) being currently employed at the PSSC, 2) working at least 3 shifts per week, and 3) having been employed for at least two months at the Pine Supports Services Center (PSSC). Exclusion criteria included: 1) being out of client care, or 2) still being in the staff training process for newly hired DSPs. DSPs filled out the questionnaire, via Survey Monkey. The order of the measures presented to participants was randomized to reduce the effect of order. After the DSPs completed the questionnaire, participants were debriefed, given a debriefing form and a list of counseling resources to utilize if they felt distressed after the study.

2.2. Measures

The Demographic Information Form. DSPs were asked questions about themselves including age, gender, ethnicity, income level, marital status, and educational attainment. Information regarding the DSP's work experiences were gathered including work position, title, length of employment, professional training received, number of hours worked, support from colleagues

or the agency, and whether the DSP works for multiple service providers, or as a self-employed sitter in the past month.

General Self-Efficacy Scale. The General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) is a self-report 10-item scale that measures a general sense of perceived self-efficacy. The scale aims to predict the ability to cope with daily hassles and adaptation after experiencing all kinds of stressful life events or circumstances. An exemplar item from the GSE includes, “*I can always manage to solve difficult problems if I try hard enough.*” The Cronbach’s alpha for the GSE ranges from .76 to .90.

Difficulties in Emotion Regulation Scale. The Difficulty in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004) is a 36-item self-report questionnaire that measures different aspects of emotion dysregulation. Respondents rate how often each item applies to themselves in a Likert scale format with responses ranging from 1-5, with 1 indicating *almost never (0-10%)*, 2 *sometimes (11-20%)*, 3 *about half the time (36-65%)*, 4 *most of the time (66-90%)*, and 5 *almost always (91-100%)*. An exemplar item from DERS is, “*When I’m upset, I have difficulty thinking about anything else.*”

The Depression Anxiety and Stress Scale. The Depression Anxiety and Stress Scale (DASS) (Lovibond & Lovibond, 1995) measures the severity and frequency of symptoms of depression, anxiety, and perceived stress during the previous week. The Depression subscale, Anxiety subscale, and Stress subscale each consists of 14 items. The Cronbach alpha for the Depression subscale is .91, for the Anxiety subscale is .81, and for the Stress subscale is .89. Participants rate each item on a 4-point Likert scale. An exemplar item from the Depression subscale is, “*I felt that life was meaningless,*” from the Anxiety subscale, “*I felt scared without any good reason,*” and from the Stress subscale, “*I found it hard to wind down.*”

3. RESULTS

Among the associations between the three variables of interest, including GSE ($M = 31.49$, $SD = 6.50$), DERS ($M = 64.61$, $SD = 18.71$), and depression, ($M = 5.67$, $SD = 7.51$), the relation between GSE and depression was significant, $r = -.38$, $p < .0005$. In a regression model with general self-efficacy (GSE SUM) as the main predictor, depressive symptoms as the criterion variable, and DERS as the moderator, the main effect of general self-efficacy was significant, $b = -.22$, $SE = .10$, $t = -2.26$, $p = .027$. Further regression analysis adding the cross-product of GSE and DERS indicated a significant interaction effect on depressive symptoms, $b = -.20$, $SE = .08$, $t = -2.34$, $p = .023$, suggesting that DERS moderated the relation between self-efficacy and depressive symptoms. Figure 1 summarizes this interaction, showing the prediction for depressive symptoms from three levels of self-efficacy ($-1SD$, mean, $+1SD$) at three levels of DERS ($-1SD$, mean, $+1SD$). Subsequent simple slope tests indicated that self-efficacy negatively predicted depressive symptoms when DERS was high, slope = $-.42$, $t = -3.89$, $p < .0005$, or at the mean, slope = $-.22$, $t = -2.26$, $p = .027$. When DERS was low (low difficulty), general self-efficacy and depressive symptoms were not related. The findings revealed a moderating role of difficulty in emotion regulation in the association of self-efficacy with depressive symptoms, such that difficulty in emotion regulation strengthened (or emotion regulation buffered) the association between self-efficacy and depressive symptoms.

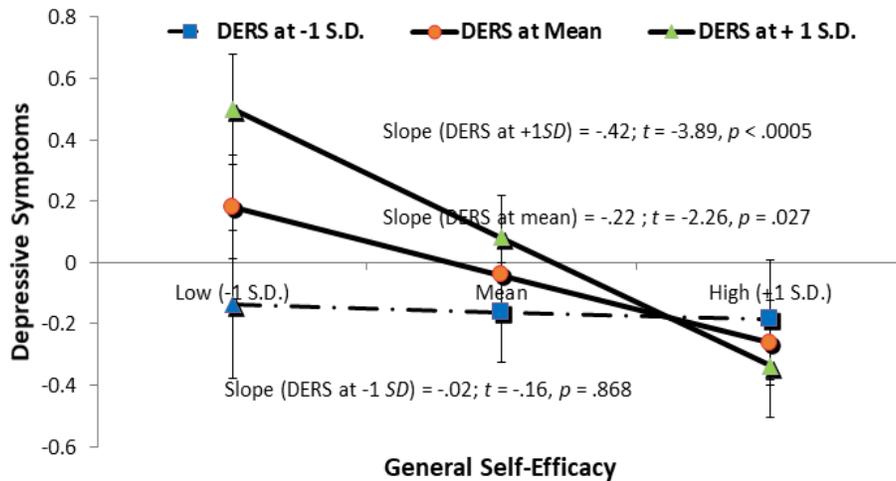


Figure 1. Interaction between General Self-Efficacy and difficulty in emotional regulation (DERS) predicting depressive symptoms. All variables were standardized.

4. DISCUSSION

This study examined the moderating role of difficulties in emotion regulation (DERS) between the relation of general self-efficacy (GSE) and depressive symptoms. The results indicated that there was a negative association between GSE and depressive symptoms, but the strength of the association varied by difficulty in emotion regulation. The findings reveal that DSP's levels of depressive symptoms are not related to their levels of general self-efficacy, when they have adequate emotion regulation skills. It is only when the individual does not have sufficient emotion regulation skills that the level of self-efficacy becomes an increasingly important predictor for depressive symptoms when difficulty in emotion regulation increases. We can infer from these results that emotion regulation skills seem to be vital when GSE is insufficient because an individual is still able to regulate their emotions even when they are not confident in their abilities. Therefore, to lower DSP's depressive symptoms, interventions need to target not only general self-efficacy, but also emotion regulation skills.

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Condom Availability, Attitudes, and Intentions

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ABSTRACT

Specifically, for sexually active college students, condom use is an important safe-sex behavior that significantly reduces risk of both pregnancy and STDs (CDC, 2019). The primary aim of this study was to see if providing free access to condoms in an unattended dispenser in a student residence hall could act as an intervention and improve attitudes, perceived norms, and intentions to use condoms. Based on previous literature, we predicted that the intervention group's condom use attitudes and behaviors would improve after having access to condoms compared to the control group. Attitudes, Perceived Norms, and Behavioral Intentions were each analyzed using a mixed-model ANOVA in which residence hall (intervention dorm and control dorm) was a between-subjects factor and time (time1 and time 2) was a within-subjects factor. Each examined the main effect of residence hall, main effect for time, and the residence hall by time interaction effect; however none of these effects were statistically significant (all $ps > .05$). Fewer than half of the time 1 participants ($N=283$) completed the time 2 survey, resulting in low statistical power. Also, the condom dispenser was in only one location and was unknowingly removed two weeks prior to the designated end time of the study. These limitations should be considered for future research on condom availability, attitudes, and intentions.

Key Words: Condom-Use Intentions; Condom-Use Attitudes; Theory of Planned Behavior; College Sample

1. INTRODUCTION

Safe-sex behaviors are important for the health of sexually active college students. Condom use is an important safe-sex behavior that both significantly reduces risk of pregnancy and of sexually transmitted diseases (STDs) (CDC, 2019). Condom use can be particularly important for sexually active students at University of Louisiana at Lafayette who are at a high risk for STDs. In the 2018 National CDC STD rankings, Louisiana ranked third in the nation for congenital syphilis, fourth for chlamydia, fifth for gonorrhea, and seventh for primary and secondary syphilis case rates (CDC, 2019).

To begin to understand the reasons behind condom use behaviors by college students so that they can potentially be increased, we looked to previous literature. The Theory of Planned Behavior (TPB) has been used to successfully explain and change condom use behaviors (Montanaro & Bryan, 2014). The theory states that attitudes, social norms, and the perceived amount of control people have over their behaviors can account for their condom use behaviors (Montanaro & Bryan, 2014).

Some barriers to condom procurement include embarrassment, cost, and it not being the norm to talk about or have condoms in educational settings (Kirby & Brown, 1996). These social stigmas about condom use can account for why students would avoid prophylactic procurement. According to a study by Wells and Alano (2013), the important safe-sex behavior of condom use

has been shown to increase in university students when unattended condom dispensers were installed.

The University of Louisiana at Lafayette does not give easy, free access to condoms. To receive a free condom, they must make an appointment at Student Health Clinic and undergo an assessment and counseling session. This can seem like an unnecessarily long and intimidating process for students that seek to gain free access to protection.

The primary aim of this study was to see if providing free access to condoms in an unattended dispenser in a student residence hall at University of Louisiana at Lafayette could act as an intervention and improve attitudes, perceived norms, and intentions to use condoms. Based on previous literature, we predicted that the intervention group's condom use attitudes and behaviors would improve after having access to condoms compared to the control group.

2. METHODS

2.1 Participants

Participants were recruited from two campus residence halls; 105 participants (46 from the target dorm; 59 from the control dorm) answered both pre- and post-intervention surveys, including questions about demographics, sexual behaviors, condom use behaviors, and condom use attitudes. The participants' average age was 19.8 years and 77% identified as female, 21% identified as male, and 2% identified as something else.

2.2 Procedure

An email was sent to the residents of both the target and control campus residence halls to invite them to participate in the initial, or pre-intervention survey. 283 participants responded to the initial survey and were used for analysis. A condom dispenser was placed in the laundry room of the target dorm following time 1 survey administration. The condom dispenser was filled weekly for 6 weeks. After the condom dispenser was taken down, all participants who completed time 1 survey were invited to complete the post-intervention survey.

2.3 Measures

The measure of attitudes about condom use included three components designed under TPB: attitudes toward obtaining and using condoms (4 items, e.g., "I feel positive toward obtaining and using condoms during sexual activity"), perceived social norms regarding condom use (4 items, e.g., "No one would judge me if they saw me take condoms"), and behavioral intentions to use condoms (4 items, e.g., "I intend to obtain condoms when I need them. Dependent variables were scored by aggregating the four items for each of attitudes, perceived social norms, and behavioral intentions.

3. RESULTS

Attitudes, Perceived Norms, and Behavioral Intentions were each analyzed using a mixedmodel ANOVA in which residence hall (intervention dorm and control dorm) was a betweensubjects factor and time (time1 and time 2) was a within-subjects factor. Each examined the main effect of residence hall, main effect for time, and the residence hall by time interaction effect.

- The ANOVA for attitudes towards condom use yielded a non-significant main effect for both residence hall, $F(1,102) = 2.571, p = .122$ and time, $F(1,102) = 1.374, p = .244$. The model also yielded a non-significant interaction effect for residence hall by time, $F(1,102) = .042, p = .838$.

- The ANOVA for perceived social norms regarding condom use yielded a non-significant main effect for both residence hall, $F(1,100) = 0.505$, $p = .479$ and for time, $F(1,100) = 2.659$, $p = .106$. The model also yielded a non-significant interaction effect for residence hall by time, $F(1,100) = 0.351$, $p = .555$.
- The ANOVA for behavioral intentions towards condom use yielded a non-significant main effect for both residence hall, $F(1,101) = 2.906$, $p = .091$ and for time, $F(1,101) = 3.275$, $p = .073$. The model also yielded a non-significant interaction effect or residence hall by time, $F(1,101) = .061$, $p = .805$.

4. DISCUSSION

The analysis revealed that the condom dispenser did nothing to improve the attitudes, perceived social norms, and behavioral intentions toward condom use that was originally expected. These findings illustrate the importance of conducting further research as well as the implementation of resources such as the dispenser into schools in the future.

Multiple limitations should be taken into account regarding this study. Fewer than half of the time 1 participants ($N=283$) completed the time 2 survey, resulting in low statistical power. Of the residents who completed the time 2 survey, 70% of the people in the target dorm reported never using the condom dispenser (despite being aware of its existence). The fact that the dispenser regularly had to be refilled means that someone was using the dispenser. These residents would presumably have not been able to as easily access condoms and would have been less likely to participate in safe-sex behaviors if the condom dispenser was not there.

The results showed that attitudes towards condoms did not change between time 1 and time 2; however, it is possible that participants who did use the condoms did not return for time 2 and give feedback. In addition, it should also be noted that the condom dispenser was in only one location. Therefore, if the students did not regularly go to that location, then they would not have come into contact with the dispenser. Finally, the condom dispenser was unknowingly removed two weeks prior to the designated end time of the study.

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The Impact of Different Definitions of Sexual Harassment on College Campuses on Perceptions of Students

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ABSTRACT

Despite Title IX's effort to outlaw sexual misconduct, sexual harassment continues to be prevalent on college campuses. In 2018, Secretary of Education, proposed a narrower definition of sexual harassment in academic settings than the previous, broader Obama-era one. This study aimed to investigate the effect of exposure to a narrower vs. a broader definition of sexual harassment on college students' perceptions of academic sexual harassment. Participants were 244 undergraduates at the University of Louisiana at Lafayette. They were given a sexual harassment scenario, either the narrow or broad definition of sexual harassment, and follow up questions regarding their perceptions. Results were analyzed using five 2 (condition: narrow definition vs. broader definition) x 2 (participant gender: male or female) ANOVAs to test for main effects of the IVs and their interactions. We found that gender indicated feelings of sympathy and blame towards the victim and whether the victim should feel passive, benign, or blame herself. Our hypothesis that the definition would influence the participants' perceptions about the scenario was not supported.

1. INTRODUCTION

Defining and preventing sexual harassment in educational settings continues to be a controversial subject. Under Title IX part of the Education Amendments of 1972 to the 1964 Civil Rights Act, sexual harassment is illegal, specifically in federally funded education programs and activities. However, sexual misconduct continues to be a prevalent issue on college campuses. Nearly two-thirds of college students experience sexual harassment (NSVRC, 2018). Women graduate students are harassed by faculty about three times as much as women undergraduates while female undergraduates encounter greater peer sexual harassment from other college students (Nancy & William, 2018). One in ten female graduate students at major research universities report being sexually harassed by a faculty member. More than half (53%) of cases involved professors allegedly engaged in serial sexual harassment (Nancy, & William, 2018). Controversy lies in what defines it, how it is investigated, and what consequences should be administered to offenders.

When the definition is controversial, it makes the reporting process difficult for victims. The most common reason for not reporting incidents of sexual assault or sexual misconduct was that it was not considered serious enough (more than 50%) (Cantor et al., 2017). In November 2018, the Department of Education under Education Secretary Betsy DeVos proposed rule changes regarding how college campuses should deal with sexual misconduct accusations. The rule proposed a narrower margin for allegations to be considered sexual harassment. Essentially, the proposal works to give more favor to the accusers and will place

limits on what can be referred to as sexual harassment while the Obama-era definition was more encompassing (Meckler, 2018). University of Louisiana at Lafayette has operated under the narrow definition since 2015.

Previous research has been conducted to further investigate sexual harassment in university settings. Peng and Huang (2017) showed that female victims were not capable of addressing their harassment by name, with confusion and discomfort. A study by Javorka (2014) investigated the effect of victim reporting on perceptions of sexual assault. There was no significant effect of reporting condition on perceptions of sexual assault. However, males tended to blame and not believe the victim more than females.

This study's aimed to investigate the effect of exposure to a narrower vs. a broader definition of sexual harassment on college students' perceptions of academic sexual harassment. These perceptions are important because they can influence victims' reporting decisions. We think, the narrower the definition, the less likely a student may be in reporting a potential sexual misconduct situation. As a consequence of the absence of reports, the perpetrator may be more likely to commit the same act, in belief that it was not considered sexual harassment.

2. METHODS

2.1 Participants

Participants in this study consisted of University of Louisiana at Lafayette undergraduate students from the Psychology Department who were 18 years of age or older. Participants were recruited through the SONA system and were requested to complete an online survey. 244 participants began the study. However, data were not analyzed for two people who did not complete all measures and for 10 people who saw both versions of the sexual harassment story due to a programming error. Therefore, analyses were based on an n of 232. The majority of the participants identified as White (77%), heterosexual (91%), females (75%). Most participants were freshmen (70%) with the average age of 18.

2.2 Measures

A questionnaire assessed participant's demographic characteristics such as age, gender, race, political affiliation and sexual orientation. The following questions assessed participant's experience with sexual assault by asking if they had ever encountered it first-hand or if they knew anyone who had. Lastly, a personal definition of sexual harassment in university settings was requested.

Participants then read a vignette, written for the purpose of this study. The vignette was about Alexa, a chemical engineering student at the University, and Sam, her organic chemistry tutor. Due to sexual comments made by Sam during tutoring sessions, Alexa feels uncomfortable continuing the sessions. Participants were told that Alexa is unsure what to do so she looks into her University's Title XI resources. Then, participants were randomly assigned to either the broad or narrow definition of sexual harassment used by the University's Title XI Office.

Following the vignette and the given definition, participants were asked to rate their agreement (using a 1-5 scale) with twelve statements regarding their perceptions of Alexa. The statements assessed the amount of blame and sympathy the reader felt towards the subject. The internal reliability of the sympathy ($\alpha=.79$) and blame ($\alpha=.83$) subscales were good. Participants were then asked to complete a modified version of the Stranger Harassment Index Survey, where they rated their agreement (on a 1-5 scale) to statements about how Alexa

should have felt or what she should have done (Fairchild & Rudman, 2008). The constructs measured in this index and their internal reliability are as follows: passive ($\alpha=.9$), self-blame ($\alpha=.81$), benign ($\alpha=.87$), and active, which did not have good reliability. Lastly, participants reported how they thought Alexa should handle the situation, with options such as “stop going to tutoring,” “confront Sam,” “get over it,” “go to local police,” and more.

3. RESULTS

Results were analyzed using five 2 (condition: narrow definition vs. broader definition) x 2 (participant gender: male or female) ANOVAs to test for main effects of the IVs and their interactions. The dependent variables were sympathy, blame, passive, self-blame, benign. There was no significant main effect of condition nor was there a significant interaction effect of condition by gender. There was a main affect of gender on each DV:

- Sympathy was higher for women ($M = 5.73$) than for men ($M = 4.98$); $F(1,221) = 25.17$, $p < .0001$
- Blame was higher for men ($M = 2.87$) than for women ($M = 2.00$); $F(1,221) = 41.57$, $p < .0001$
- More men felt Alexa should behave in a passive manner ($M = 1.84$) than women ($M = 1.43$); $F(1,221) = 19.83$, $p < .0001$
- More men felt Alexa should self-blame ($M = 1.68$) than women ($M = 1.19$); $F(1,221) = 39.23$, $p < .0001$
- More men felt Alexa should behave in a benign manner ($M = 2.39$) than for men ($M = 1.69$); $F(1,221) = 45.87$, $p < .0001$

Results for the recommendations of participants about how Alexa should handle the situation show that there were two most recommended and three least recommended actions.

166 participants recommended that she should “confront Sam” and 111 said she should “tell a therapist.” Only two participants recommended that she “drop the class” or “sue him” and only one said she should “tweet about it.”

4. DISCUSSION

Our hypothesis that the definition would influence the participants’ perceptions about the scenario was not supported. However, gender influenced whether they felt sympathy or blame for Alexa and whether they thought Alexa should behave in a passive manner or blame herself. Consistent with prior research, males tended to blame the victim more, while females tended to sympathize with the victim more (Javorka, 2014).

This study did contain multiple limitations. There is little prior research on how semantics of defining sexual harassment in universities settings can affect perceptions and reporting behaviors. Our study may have been limited in that we gave the participants the definition after the scenario. Presumably, participants were primed by the scenario and not the definition, which could be why we lacked significant results. Future studies could provide the definition prior to the scenario. Encouraging results of this study suggest that more participants felt sympathy than blame for the victim despite given a narrow or broad definition.

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The Response of Labor Unions to Universal Basic Income

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ABSTRACT

Basic Income is a concept that has been receiving more and more attention over the past years as an alternative to the current employment-based welfare systems and as a possible solution for a world where automation reduces the number of available jobs. Support comes from various groups on the left, which embrace the idea of an unconditional basic subsistence guarantee that gives everyone the freedom to choose their own way of life, and from libertarian-leaning groups that advocate for a much simpler, streamlined welfare system. Labor unions are often overlooked in this debate, yet they hold a somewhat surprising, but insightful position. Most labor unions reject basic income on the grounds that it will not deliver the expected positive effects, such as increased wages, decreased unemployment and more personal freedom, while bearing the risk of being used to dismantle the welfare state and lower government support. Furthermore, UBI contradicts the traditional values of unions and is seen as a threat to their power. This paper will take a closer look at these concerns that labor unions bring forward to analyze where they come from, whether they are economically justified, and how these criticisms could possibly be addressed when designing basic income policies.

Key words: basic income, labor unions, social welfare

1. INTRODUCTION

Receiving a fixed payment from the government, unconditionally, simply by virtue of being a citizen - the concept of universal basic income (UBI) has an innate appeal, but also raises many questions, from feasibility to the meaning of work. The concept is continually gaining support, especially from those on the left of the political spectrum, as displayed by the candidacy of Andrew Yang for the Democratic presidential nomination based on a UBI platform. One group that can traditionally be counted as part of the left-leaning spectrum, however, staunchly opposes UBI: labor unions. Their somewhat unusual position within the Left, but also their important role in forming labor and more generally economic policy, as well as organizing popular support for or opposition against UBI, makes them an interesting object of analysis. This paper will utilize statements of labor unions mainly in the United States, Canada, and Germany, as well as scholarly sources, to identify and analyze the arguments of unions within political-institutional, economic, and philosophical frameworks. The results show that the majority of labor unions do not support UBI on the grounds that it will not deliver the expected positive effects, such as better working conditions and more personal freedom, while bearing the risk of being used to dismantle the welfare state and lower government support. Furthermore, UBI appears to contradict the unions' traditional view on work as a right and honor, and unions see it as a threat to their power as an organization.

2. OVERVIEW OF POSITIONS

To be able to understand the viewpoint of labor unions, it is imperative to study their contributions to the UBI debate in their respective environments. In the United States, unions

seem to be largely uninterested. While there was a general openness to the negative income tax (NIT) experiments in the 1970s, they did not engage in the debate support the policy in any way. Today, this attitude has not changed much. No American union has an official statement or policy paper on basic income, and only three out of the ten largest unions have any kind of information mentioning basic income on their website.

One notable exception to this atmosphere of neglect of UBI is Andrew Stern, the ex-president of the Service Employees International Union (SEIU). In his book *Raising the Floor*, he promotes basic income as “a bold, alternative solution” (Stern and Kravitz 2016) to the problems that today’s economy faces, which will be exacerbated by trends towards a gig-economy and an ever increasing use of technology. Stern appeals specifically to unions by presenting UBI as the “ultimate permanent strike fund” and a tool to “increase workers’ bargaining power” (Stern and Kravitz 2016), but unions showed little receptiveness to his message. Overall, the available responses show that American unions could possibly become supporters of a basic income campaign, but currently have no interest in the policy. The statements of Richard Trumka, head of the AFL-CIO, in interviews with the news site *Splinter* and with the *Seattle Times*, sum up the position of American unions: basic income is an “idea [he] like[s] to play with” and the idea has been examined in AFL-CIO committees, but he remains sceptical, claiming that the union representatives “haven’t seen a solution that works” (Nolan 2017; Romano 2018).

In Canada, the basic income debate, both within and outside of the labor unions, is already a little more mature. Data from Mincome, the Canadian NIT experiment in the mid-1970s, has been made available to researchers, who have published various studies based on the experiment (Calnitsky and Latner 2017; Forget 2011; Widerquist 2005; among others). Labor unions were not an active part of the experiment, but they expressed their support for the Senate committee on poverty that ultimately led to the implementation of Mincome. However, Canadian unions still treat basic income with “considerable caution” (Haddow 1994). They find the idea appealing in theory, but “too much a risky social policy reform,” and therefore “reject it for pragmatic reasons” (Vanderborcht 2006). The Ontario Public Service Employees Union (OPSU), for example, perceived the Ontario Basic Income Pilot, which ran from April 2018 until its premature end in March 2019, as a “thoughtful proposal,” but found that “scepticism is warranted” and did not expect the basic income to have all the positive effects that proponents promised (OPSU 2017).

Whereas basic income has received little attention in North America, the debate is far more advanced in Europe. In Germany, UBI has been debated within all major parties, as well as among activists and businesspeople. The position of German labor unions is overwhelmingly clear: they oppose basic income. The public and service employees union *Ver.di*, and the metal and industrial workers’ union *IG Metall* both published detailed position papers on the issue. The unions see the appeal of the concept, calling it “attractive” and “fascinating”, but warn of its unintended consequences (Ver.di 2017; IG Metall 2018). They point out that due to the massive costs and the current political situation, only a very limited UBI with a low payout would be realistic. According to the unions, this model would entail a massive reduction of the surrounding welfare state and deregulation of the labor market. UBI would essentially become a “trojan horse of neoliberalism” that, despite the appeal of helping the poor and unemployed, would ultimately lead to a deterioration of the position of lower and middle income groups (Lajoie 2007; Schäfer 2007; Ver.di 2017).

3. POWER CONSIDERATIONS

Introducing a basic income into the job market greatly changes the dynamics of the bargaining process. Birnbaum and De Wispelaere (2016) show that employees are faced with different exit

options - incomplete, strong, and radical - which become increasingly attractive with the existence of UBI as a guaranteed income floor. Being able to threaten the employer with exit strengthens the employee's bargaining position, which reduces the need for reliance on a union, and threatens the union's basis of existence. This logic, however, only applies to generous basic incomes, and is much stronger for skilled than for unskilled workers, leading unions to conclude that UBI is "not a resource of power" for individuals (Birnbaum and the Wispelaere 2016; IG Metall 2018). On a broader level, unions perceive UBI as a threat to their ability to push for a strong welfare state. Employers and political actors could use the existence of a guaranteed income floor through UBI as an excuse to dismantle other parts of the welfare state, and ultimately, the "position of dominion of capital would even be strengthened" (Ver.di 2017).

4. ECONOMIC CONSIDERATIONS

From an economic perspective, labor unions point to a multitude of problems. First, financial issues have to be considered. While the exact costs are much debated and depends largely on the specific proposal, basic income is undoubtedly a voluminous program regardless of its exact form. Consequently, labor unions all over the world doubt the feasibility of basic income. In Great Britain, unions perceive it as "very costly" and "more remote [...] than ever" (Jordan and Ziegler 2001), in Germany unions criticize "insufficient financing" (Ver.di 2017) and judge the idea as "not realistic" (IG Metall 2018). If any proposal had the chance of being implemented, it would be the cheaper, neoliberal models that bring unwanted side effects, German unions argue (Ver.di 2017; IG Metall 2018). Additionally, the majority of the financial burden would have to be borne by the middle class, while the benefits would go to the unemployed. Consequently, "BI has not much to offer to the vast majority of union members" (Vanderborgh 2006).

Considerable doubt about the positive effects of UBI is also present with respect to labor market effects. While UBI does move the labor market closer to the ideal by allowing for easier entrance into and exit of the labor market, these effects are likely to be small. They are most relevant with respect to the unemployment trap, which denotes the effect of receiving government benefits when unemployed, but losing almost all of these benefits when picking up a job, leading to an effective tax rate of nearly 100 percent and very low incentives to find a job. This trap would largely be eliminated, but a significant reduction of unemployment would only be achieved with accompanying deregulation, especially with respect to minimum wage standards. Such deregulation, however, would weaken the position of employees, and unions staunchly oppose it. With respect to wages, different outcomes are possible. The increased individual bargaining power through the power to say "no" to unsatisfactory employment conditions exerts an upward pressure on wages. On the other hand, a threat of downward pressure that is recognized by unions is the argument that an employee's basic costs of living are already covered by the basic income, and the employer only has to pay a "combination wage" on top of that, instead of a full and fair compensation (Lajoie 2007).

5. PHILOSOPHICAL CONSIDERATIONS

While power and economic considerations explain a large part of the negative response of unions, their often fervent refusal to support UBI points to deeper underlying issues. The statements issued by labor unions show that they have three philosophical objection. First of all, UBI is an inherently individualistic concept, while unions are a communal organization. UBI is not only paid out on an individual instead of a household basis, it could also promote more flexible work and family arrangements, leading to an atomization of society and a weakened "foundation for solidaric and collective action" (IG Metall 2018).

The second issue is the value of work, which is central to the identity of unions. From a union perspective, work is at the core of one's life and provides not only the means for one's living, but also, "social integration, recognition, [and] self-affirmation" (Ver.di 2017). UBI, on the other hand, makes work almost unnecessary and allows us to move other things to the center of our lives. Lastly, UBI contradicts the view on distributive justice of labor unions. UBI is a need-based concept, granting everyone a guaranteed income regardless of merit or effort. Labor unions do generally support raised minimum standards of living, but they emphasize the role of merit and personal contribution to the system. UBI is therefore seen not as an end of exploitation, but merely a substitution: instead of rich firm-owners exploiting employees, "the idle [now] exploit the industrious" (Reeve 2003).

6. CONCLUSION

Labor unions, while displaying considerable diversity in their stances, generally reject UBI due to a set of core arguments. From an institutional standpoint, unions see their role in their bargaining process, their power, and therefore their very existence threatened. Economically, they doubt the feasibility of the policy, and point out that issues such as low wages and unemployment may worsen instead of improve. Lastly, core differences in the understanding of the structure of society, value of work, and concepts of distributive justice separate unions from supporting UBI. These separations are considerable, but they do not have to be permanent. Many overlaps can be found between the goals of unions and UBI, and policies that address the concerns voiced by unions could find support, or at least no open resistance, in the future.

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Expansion of Presence of *Diploechiniscus horningi* in Eastern United States

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ABSTRACT

Tardigrades (Phylum Tardigrada), also known as water bears are microscopic panarthropods. They are found in marine, freshwater, and terrestrial habitats. The number of terrestrial and freshwater species exceeds 900. Approximately, there are 30 families, 142 genera, 1298 species and 34 additional subspecies. The genus *Diploechiniscus* now has both *Diploechiniscus oihonnae* and *Diploechiniscus horningi* from western USA and Canada. It is not easy to distinguish unknown specimen from closely related tardigrade species because they have very limited morphological differences. Samples from both Virginia and Georgia were compared to each *Diploechiniscus* species to determine their identity. Differences included the presence of filaments instead of spines in *D. horningi*. *D. oihonnae* normally have spines which is used to distinguish them from *D. horningi*. Morphological, morphometric, and molecular data were analyzed, leading to the conclusion that unknown specimens from Georgia and Virginia were *D. horningi* species. This expands the Eastern United States. DNA was obtained for *Diploechiniscus horningi*. Unfortunately, there are as of yet no DNA data from *Diploechiniscus horningi* from western North America.

1. INTRODUCTION

Tardigrade species live in both marine and terrestrial environments, often residing on mosses and lichens. Water bears have been recorded all across America, with a vast range of species and diversity (Meyer and Hinton 2007). Tardigrades have few morphological characteristics which can often make them difficult to identify. The common morphology of a water bear consists of a rounded body, often with spines and filaments along the dorsal and lateral body portions. Tardigrades have four legs with claws, giving them their bear-like appearance and movements.

In 1971, Schuster and Grigarick wrote the original description of then *Echiniscus horningi*, which has since been changed to *Diploechiniscus horningi* (Gasiorek et al. 2019). The original specimens were found in Oregon and along the north coast of California. The original description included eye spots, polygonal dorsal plate arrangement, cirrus at the anterior, spines present at all cirrus locations with barbed spines D and E (Schuster and Grigarick 1971).

Additionally, *Diploechiniscus oihonnae* was redescribed by Vicente et. al in 2013 using samples from Portugal from both Serra da Estrela's Natural Park and Castro Laboreiro in Peneda-Gerês National Park. *Diploechiniscus oihonnae* was the only species in the genus at the time (Vicente et al. 2013). The holotype description included black eyes, a double dorsal sculpture, and the presence of a long buccal tube.

Since then, the *Diploechiniscus* genus has grown and now includes both *D. horningi* and *D. oihonnae* from their characteristic black eyes, "double sculpting" dorsal plates, and short dorsolateral spines (Meyer and Hinton 2012). The unknown specimens collected from Virginia

and Georgia were compared to both known *Diploechiniscus* species to determine the correct species classification.

Comparisons between *D. oihonnae* and *D. horningi* used of qualitative, morphological, and molecular data. The qualitative data revealed that all three specimens are similar, as tardigrades do not have many characteristics to distinguish. But presence of filaments instead of spines gave reason to believe that the unknown specimens from Georgia and Virginia were *D. horningi*.

2. QUALITATIVE DATA

The qualities of the unknown species are common to tardigrade descriptions in the *Diploechiniscus* genus. The specimens have black eyes, double sculpted dorsal plates, and dorsolateral spines that are shorter than the filaments nearest. These features can be seen in Fig. 1.



Fig. 1 Phase microscopy of Virginia sample showing distinct features of the *Diploechiniscus* genus. Dorsal plates in polyhedral arrangement can be seen, along with long filaments and spines located on the outer portions of the dorsal and lateral body sections. Four legs with claws can be clearly seen, another distinct tardigrade feature.

The distinguishing characteristic of spines, specifically on cirrus A, C, and E, revealed that the specimens collected from Georgia and Virginia were most likely *D. horningi* and not *D. oihonnae*, where long and wispy filaments are present in these locations. Table 1 compares qualitative characteristics compared between the unknown specimens and the original description given by Schuster and Grigarick in 1971.

Character	Unknown Samples	Schuster and Grigarick (1971)
Eye Spots	*	*
Dorsal Plate Arrangement	*	*
Cuticle Polygon Plates	*	*
Pores on Plates	*	*
Spines on A, B, C, D, E	*	*
Barbed Spine D, E	*	*

Papillae on Leg IV	*	*
Dente Collar	*	*
Claws with Spurs	*	*

Table 1. Data comparison table between unknown tardigrade species collected from Georgia and Virginia and the original *D. horningi* description given by Schuster and Grigarick in 1971. It can be clearly seen that qualitatively speaking, the samples share common characteristics. An asterisk indicates that the trait is present.

3. MORPOLOGICAL DATA

Using phase contrast microscopy, various characteristics of the Georgia samples were measured and recorded to compare to measurements from *Diploechiniscus* of *oihonnae*. These data can be seen below in tables 1 and 2, which compare mean measurements of all data. We are comparing Georgia specimen to *D. oihonnae*.

Table 1. Morphological Data Comparison of Georgia samples and Vicente et al. Description of *D. oihonnae* (2013)

Character	Georgia (μm)	Vicente et al. (μm)
Body Length	217.4	231.4
Scapular Plate	18.7	53.4
Cirrus Internus	6.4	19.8
Cephalic Papilla	2.3	8.3
Cirrus Externus	13.0	21.9
Cirrus A	37.5	71.8
Cirrus B	42.1	44.4
Cirrus C	34.7	80.9
Cirrus D	36.7	80.9
Cirrus E	19.3	/
Spine on Leg IV	3.0	4.6
Teeth	7.2	/

Table 1 gives mean lengths of measurements obtained from Georgia samples and compares to the mean lengths of Vicente et al. samples (2013).

Table 2. Morphological Data Comparison of Georgia samples and Meyer and Hinton samples (2012)

Character	Georgia (μm)	Meyer and Hinton (μm)
Body Length	217.4	239.7

Scapular Plate*	18.7	(not recorded)
Cirrus Internus	6.4	29.2
Cephalic Papillae	2.3	8.7
Cirrus Externus	13.0	34.8
Cirrus A*	37.5	108
Lateral Spine B	42.1	49.8
Lateral Spine C*	34.7	122.9
Lateral Spine D	36.7	68.7
Lateral Spine E*	19.3	123.3
Spine on Leg IV	3.0	4.9

Table 2 shows the similarities between the Georgia samples measured and the samples measured from Meyer and Hinton in 2013. Major differences in sample measuring techniques could explain drastic differences (*) between the samples or natural variation in the character.

4. MOLECULAR DATA

Molecular data in the Vicente et al. (2013) paper included analysis of the *cox1* gene for the *D. oihonnae* species. For the Georgia specimens, a data analysis of the *cox1* gene was run by Dr. Jackson to compare the genes from the samples. The data obtained gives a 10.9%-11.5% difference between the specimens, which is on the borderline for being different species.

Fig. 2 Molecular Comparisons Between Vicente et al. (2013) and Georgia samples of the *cox1* gene

12M_LCO					
13M_LCO	0.000				
14M_LCO	0.027	0.027			
15M_LCO	0.007	0.007	0.023		
16M_LCO	0.000	0.000	0.027	0.007	
Variance:	0.112	0.112	0.109	0.115	0.112

Fig. 2 shows variance between known *cox1* gene in Vicente et al. (2013) and unknown Georgia samples. Overall, this comparison gives between a 10.9 and 11.5 percent variance between the samples, which is on the border of differing species.

5. DISCUSSION

By gathering the qualitative, morphological, and molecular data; it can be presumed that the Georgia and Virginia specimens are of *D. horningi*. The qualitative and morphological data suggest that the spines in the locations of cirrus A, C, and E distinguish the specimens from the *D. oihonnae* description. The molecular data gave a difference of 10.9-11.5% between the specimens from the known *D. oihonnae* and unknown samples. This, along with the other observations, allows us to conclude that the unknown specimens from Georgia and Virginia are *D. horningi*. This means that the species has expanded range from northern California and Oregon to both Georgia and Virginia, and possibly other areas as well. Due to the tardigrade species having a diverse habitat range, it is possible that *D. horningi* has expanded over the western United States, although more samples would need to be identified and collected in order to establish their overall range of North America. We can conclude that specimens from Georgia and Virginia are morphologically distinct from *D. oihonnae*. Georgia and Virginia

specimens are morphologically consistent with west coast *D. horningi*, but without west coast DNA we cannot be certain they're the same species.

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Performance Comparison of RRT and FRRT Algorithms

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ABSTRACT

This paper provides an analysis of simulations of a flexible system whose path was planned using the Rapidly-Exploring Random Tree (RRT) and Flexible Rapidly-Exploring Random Tree (FRRT) algorithms. RRT is a path planning algorithm developed for high-degree-of-freedom dynamic robots with nonholonomic constraints. However, it has some limitations, namely, generating optimal solutions for robots with kinodynamic constraints and failing to be an asymptotically optimal planner. Other versions of RRT, like RRT*, are asymptotically optimal but use the two-point boundary value problem to generate the planner's tree. However, solving the two-point boundary value problem is computationally expensive. Therefore, a new algorithm, FRRT, is proposed that generates optimal solutions without using the two-point boundary value problem. Although more research is required to prove FRRT's optimality, the analysis presented in this paper shows promising results.

Keywords: Path Planner, Path Planning, Sampling Based Algorithms, Rapidly-Exploring Random Trees

1. INTRODUCTION

Path planning algorithms provide autonomous mobile robots the ability to find an optimal path through the minimization of a user-defined cost function. Cost functions typically depend on system dynamics, distance traveled, and/or fuel use. Figure 1 shows the response of a flexible system in a workspace to a trajectory generated by the Flexible Rapidly-Exploring Random Tree (FRRT) path planner. In this case, the desired path was generated by minimizing distance traveled and vibration. The reported data in this paper were obtained from the results of simulations similar to this one. The next section will provide background information about the Rapidly-Exploring Random Tree (RRT) algorithm. Section 3 will present the analysis and results of the research. A discussion on the analysis and results will follow in Section 4, and Section 5 will conclude this report.

2. BACKGROUND

2.1. Rapidly-Exloring Random Tree (RRT)

RRT is an algorithm developed for robotic path planning for high-degree-of-freedom dynamic robots with nonholonomic constraints (LaValle, 2006). It generates a collection of trajectories, called a tree, branching from the start node in the workspace. The RRT algorithm starts by randomly sampling a node in the workspace, then determines which existing node on the tree is closest to the new sample. RRT then extends a trajectory from the existing node towards the new sample. This process is repeated until the desired number of nodes have been generated.

One issue with the RRT algorithm is that it is not asymptotically optimal; as the number of nodes approach infinity, the algorithm is not guaranteed to converge to an optimal solution. Algorithms that are asymptotically optimal, like RRT* (RRT star), require solving the two-point boundary value problem in order to generate the tree (Eaglin & Vaughan, 2019). A problem arises when dealing with kinodynamic systems, because solving the two-point boundary value problem is computationally expensive.

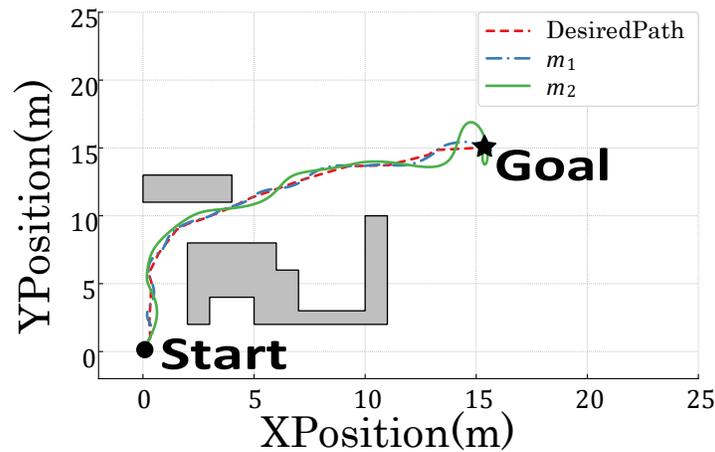


Figure 1: FRRT Simulation Example Response

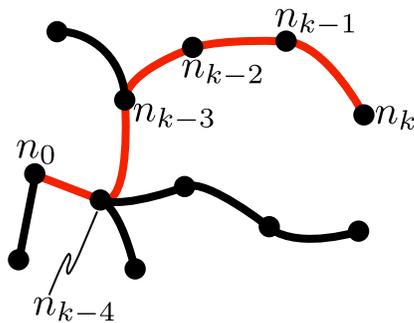


Figure 2: Cost of Trajectories on Tree

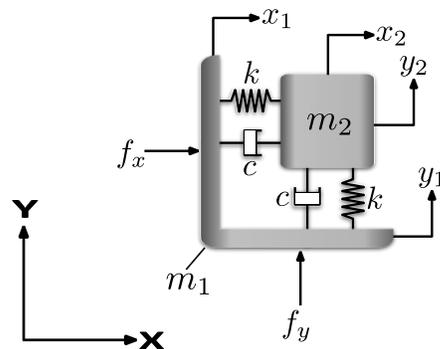


Figure 3: Mass-Spring-Damper

2.2. Flexible Rapidly-Exploring Random Tree (FRRT)

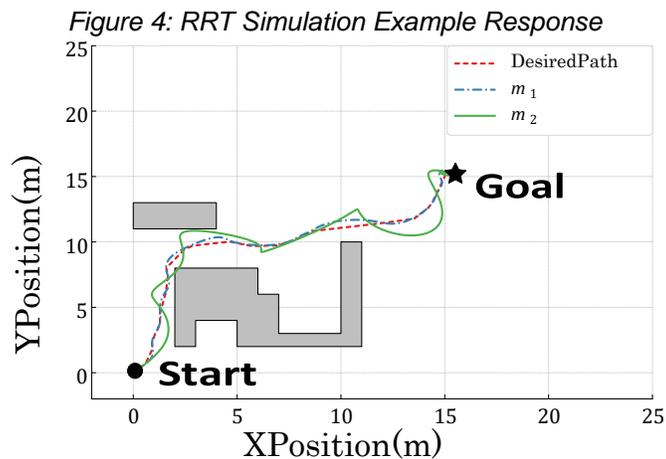
The FRRT algorithm was created to generate the tree for kinodynamic systems without needing to solve the two-point boundary value problem at every node (Eaglin & Vaughan, 2019). The two-point boundary value problem is still needed, but only to connect the tree to the goal. FRRT extends the RRT algorithm to plan paths for vibrating systems. Where RRT generates a trajectory to the closest node on the tree, FRRT generates several candidate trajectories towards the sampled node. The trajectory which minimizes total cost is added permanently to the tree. Figure 2 shows a small example of a tree. The red trajectories represent the path from n_0 to n_k . The cost at n_k is the sum of the incremental costs for each trajectory along the entire path.

2.3. Model for Simulations

A two-mass-spring-damper system like the one in 3 is commonly used as a benchmark for analysis of vibration controller performance. In this model, two perpendicular control force inputs act on mass m_1 , which is connected via springs and dampers to the second mass, m_2 . The resulting system has two rigid-body modes and two flexible modes. For the simulations presented in this paper, m_1 and m_2 are 5 kg and 1 kg respectively. The variable forces in the X and Y directions are f_x and f_y . The spring constant, k , is 1 N/m. The damping coefficient, c , is 0 Ns/m. The X and Y positions of m_1 are x_1 and y_1 , respectively. The X and Y positions of m_2 are x_2 and y_2 , respectively. For this set of parameters the natural frequencies of the two flexible modes are identical and equal to 1.1 rad/s.

3. ANALYSIS AND RESULTS

The following plots in this section represent a collection of data from 88 simulations each for FRRT and RRT. An example of a simulation using FRRT is shown in Figure 1, and one of RRT is shown in Figure 4. In both simulations the total cost was defined as the sum of deflection and path length.



3.1. Comparing Lowest Cost Solutions

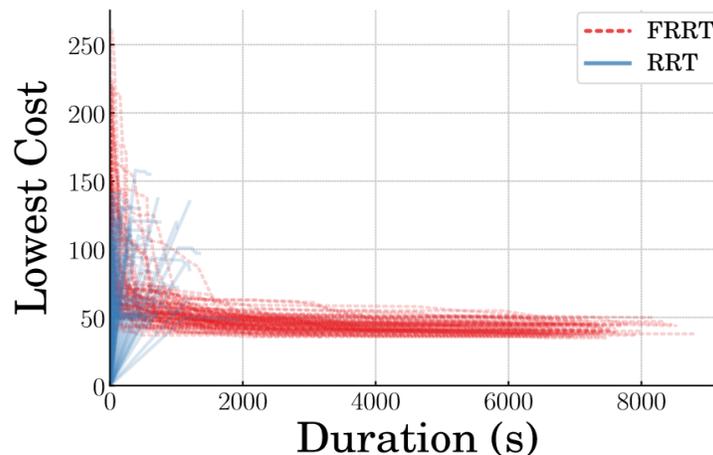


Figure 5: Lowest Cost as a Function of Solution Time

Each red or blue line in Figure 5 represents a single simulation done in the workspace shown in Figures 1 and 4. Figure 5 shows the lowest cost solution as a function of duration, which is the time it takes to solve a workspace for a given tree size. FRRT runs for a longer period of time, but the lower average variance of lowest cost suggests that FRRT minimizes the cost function more consistently. FRRT and RRT have an average lowest cost variance of approximately 88 and 256, respectively.

3.2. Time Complexity

Figure 6 compares the solution time of FRRT against that of RRT. For a given tree size, the solution time of FRRT is greater than RRT. Figure 6 shows greater increases in solution time as the number of nodes increase. Further research is being done to decrease the algorithms solution time. An extension of this research is a pruning method, where the highest cost nodes get deleted from the workspace to prevent continued computation when checking nearby nodes. At this time, the highest cost nodes are being checked more than once while never being added to the tree. This results in unnecessary calculations adding additional unwanted time to the duration of the FRRT algorithm.

3.3. Consistency of Solutions

Figure 7 shows the number of feasible solutions found by the path planners as a function of tree size. Each node on the tree within a user defined radius from the goal can be used to generate a feasible solution from the start to the goal. Only one feasible solution can be generated from an individual node. The ability of the algorithms to generate a consistent number of feasible solutions at a given tree size can be analyzed by comparing the average variance of those solutions. The average variances of FRRT and RRT are approximately 144 and 3002, respectively. The lower variance of the FRRT algorithm suggests that it has the ability to find a more consistent number of solutions. This implies that there is a greater probability for a solution to be found during a single simulation using FRRT. The mean number of feasible solutions for FRRT and RRT were analyzed. FRRT and RRT were found to have a mean number of solutions of approximately 213 and 173, respectively. This shows that FRRT typically generates a larger number of feasible solutions than RRT.

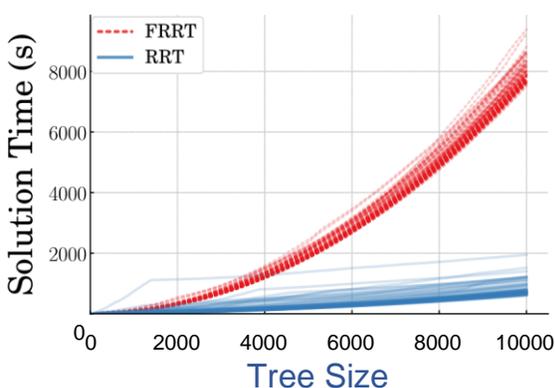


Figure 6: Solution Time as a Function of Tree Size

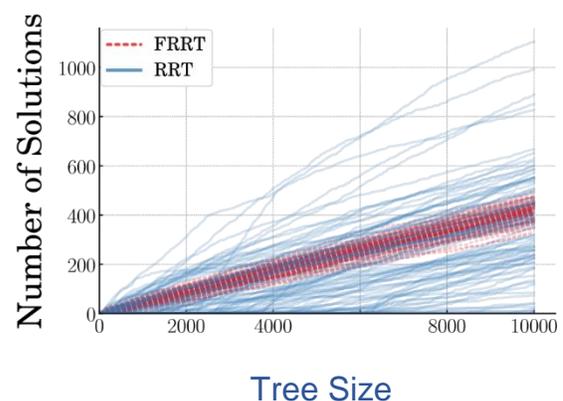


Figure 7: Number of Feasible Solutions for a Given Tree Size

3. CONCLUSIONS

This work compared the performance of the FRRT and RRT path planning algorithms. FRRT was created in an attempt to generate the tree for kinodynamic systems without using the two-point boundary value problem at every node. It was shown through simulations that FRRT shows more consistency than RRT when finding solutions and minimizing the cost function. It accomplishes this without the use of the two-point boundary value problem at every node. Instead, FRRT generates trajectories that minimize total cost by comparing several neighboring sample nodes and their possible trajectories during the process of building the tree. A disadvantage of FRRT is the amount of time it takes to generate a tree with a desired size. These results provide a basis for further improvements to be made on the FRRT algorithm.

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Sense of Belonging and Perceived Social Support: The Role of Ethnic Minorities' Perceived Appearance

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ABSTRACT

This study aims at studying the role of skin color and hairstyle in college students' sense of belonging and perceived social support. Previous studies showed that the skin tone and hairstyle of people belonging to ethnic minority groups may be related to prejudice and that prejudice is often found to be related to one's perceived sense of belonging and social relations. Therefore, we are interested in studying whether there is a relations between perceived appearance (hairstyle and skin tone) and students' perceived sense of belonging and social relations. About 128 college students will be recruited to participate in the survey. Students will be asked to report different aspects of their academic and social life, such as perceived support and prejudice, frequencies to go to tutoring, utilization of professors' office hours, and their involvement in student organizations. Students will also report their hairstyles and skin tone, and whether they perceive their styles and skin tone as attractive and common. Expected results/hypotheses: It is expected that people who are racial/ethnic minorities and with darker skin tone may perceive more barriers to social relations (i.e. lower perceived social support). It is also expected that people who perceive their hairstyle as unattractive or uncommon may feel less belonging to the school and may feel less social support.

Key Words: African American, University Student, Hair Style, Skin Tone

1. INTRODUCTION

Appearance is related to first impression (Wolffhechel et al., 2014), which further relates to social relationships (Bhargave & Montgomery, 2013). In some cultures, hairstyle has been used as a marker of various cultural indications. For both African men and women, hair is intricately connected to cultural identity, spirituality, character make up, and notions of beauty (Johnson & Bankhead, 2014). For example, in Africa, hairstyle was used to denote age, religion, social rank, and marital status as well as other status symbols (Johnson & Bankhead, 2014). In addition to hairstyle, research found that skin tone plays a crucial role in identity formation in all individuals (Tate, 2007). This study aimed at understanding the role of skin tone and hairstyle in African American college students' social relations and sense of belonging.

1.1 Literature Review

Women do not wear their natural hair as a result of many stereotypes and issue with social acceptability, therefore majority of Black African will feel disconnected with their natural African hair and prefer European/Asian hair styles are more beautiful and attractive (Oyedemi, 2016). Oyedemi (2016) examined 159 Black African female students at a predominantly Black university in South Africa. The researchers used questionnaires and 20 images of different common Black hairstyles to analyze the participants' perception on Black hairstyles.

Specifically, they used a variety of styles such as “African Natural Hair”, “Braided Natural African Hair” and “European/Asian Hairstyles”. In addition to the questionnaires, five participants were randomly selected to have conversational face-to-face interviews with the researchers. Majority of the participants in this study believed that full shoulder-length European or Asian hair texture was the preferred hairstyle that would make them feel beautiful or attractive. Only 16.3% of participants believed that their African natural hair would make them beautiful and attractive. In fact, most of the participants (71.4%) believed that braided natural African hair was the ugliest style of hair. The perception of hairstyle could be further complicated by other aspects of one’s appearance. For example, Tate (2007) found that hairstyle mediated the effect of skin tone. In other words, if one has dark skin but looser curls or longer hair, the perceived positive attributes of appearance act to lessen the “burden” of dark skin tone (Tate, 2007).

The perception of appearance may play a role in one’s social perception. Specifically, research in the past suggested that black women and men tended to feel more comfortable around those with similar skin tone and hair style as theirs (Johnson & Bankhead, 2014). Therefore, in this study, we extended previous research to the United States context to further examine how perception of appearance (e.g., hairstyles and skin tone) may play a role in African Americans’ perceived social support and sense of belonging.

1.2 Research Questions

The purpose of this study is to understand the roles of hairstyle and skin tone in college students’ social relations. Therefore, in this study, we ask the following research questions:

1. Does hairstyle (natural/non-natural; straight/non-straight) relate to African American students’ perceived social support/sense of belonging?
2. Does African American students’ perception of how common their hairstyle is relate to their perceived level of social support/sense of belonging?
 - a. Hypothesis: Students perceiving their hairstyle as less common would feel less social support/sense of belonging.
3. Does skin tone relate to African American students’ social support/sense of belonging?
 - a. Hypothesis: Students of a darker skin complexion would feel less social support at school/sense of belonging.

2. METHOD

2.1 Procedure

Participants aged 18 years or above will be recruited through the Psychology Department SONA System. Participation in the study is voluntary, although students may fulfill partial research requirement or receive bonus credits by participating in the experiment. In the announcement, participants will be informed that the survey would take approximately 20 minutes and that the risk to feel distress is minimal. However, participants will also be informed that they may cease their participation at any moment they feel uncomfortable continuing the experiment. Participants will be debriefed after the survey.

Power analysis using G*Power 3.1.9.2 reveals that the total minimum sample size for testing differences between two groups using F-tests (i.e. Research Question 1) 128 ($\alpha = .05$, power = .80, effect size $f = .25$, number of groups = 2; two-tailed). For testing linear regressions with one predictor, the minimum sample size required is 34 ($\alpha = .05$, power = .80, effect size $f = .25$, two-tailed). Therefore, a minimum sample size of 128 will be used to test the research questions in this study.

2.2 Measures

Hairstyle is measured using one-item “What is your current hairstyle?” Students can choose from “short/long natural coil”, “twisted, braided or locks with/without hair attachment”, “short/long natural straight hair” and “chemically-treated relaxed/curled”. Participants will also be given a choice to self-describe. In the analysis, hairstyle will be recoded as “natural vs. non-natural”, “straight vs. curled”, and “decorated vs. not decorated”. Students will also be asked how common they perceive their hairstyle to be at the university (i.e. UL Lafayette). Students will rate their perception based on a 10-point Likert scale from 1 (very uncommon) to 10 (very common). For skin tone, participants will be asked to rate their skin tone, “what shade would you consider your skin?” based on a 5-point scale from 1 (fair – lightest) to 5 (deep – darkest).

Perceived social support is measured in several ways. Social relations are measured by six items adopted from Cemalcilar’s (2009) peer relationships subscale of the Scale for Measuring Schools’ Social Climate. The items were modified to refer in particular to social relations in the university, namely, ‘at UL. For example, ‘I feel close to my classmates’ was modified as ‘I feel close to my classmates at UL, and ‘we usually have a good time with my friends’ was modified as ‘we usually have a good time with my friends at UL’. Two items measuring participants’ relations with friends were added, including ‘I feel close to my friends at UL’ and ‘I can share my problems with my friends at UL’. The items are rated on a 5-point Likert scale from 1 (Strongly disagree) to 5 (Strongly agree). Perceived teacher support is measured by the Teacher Social Support and Academic Support subscales of the Classroom Life Measure (Johnson et al., 1985). The measurement assesses perceived social support and concern from teachers. Students rated item such as “My teacher at UL really cares about me” and “My teachers like to help me learn” from 1 = never to 5 = always. Finally, sense of belonging is measured using Li and Frieze (2016) Psychological Place Attachment Scale (PPAS) rated on a 5-point Likert scale.

3. EXPECTED RESULTS/ANALYTIC PROCEDURE

3.1 Research Question 1

A one-way ANOVA will be conducted to examine whether students who report natural vs. non-natural hairstyle will have different level of perceived social support and sense of belonging. An alpha-level of .05 will be utilized. Similarly, students reporting a straight vs. non-straight hairstyle will also be compared using a one-way ANOVA.

3.2 Research Question 2 and 3

A linear regression analysis will be conducted to examine whether students’ perception of how common their hairstyle is relates to perceived level of social support and sense of belonging (Research Question 2). It is expected that such relations is positive, that is, students who perceived their hairstyle to be more common will feel higher level of social support/sense of belonging. A alpha-level of .05 will be used. R-square will be reported.

Similarly, for research question 3, a linear regression analysis will be conducted to examine whether skin tone (light – dark) relates to students’ social support. It is hypothesized that students of a darker skin complexion would feel less social support at school.

4. DISCUSSION

The findings of this study will help us explore whether perceived appearance in African American students may play a role in their social world. If the results show relations between

perceived appearance and social life, future studies may further look at the mediators (e.g., perceived prejudice) or moderators (e.g., self-esteem, racial identity). Future students may also look at other potential outcomes of having a less confident perceived appearance (e.g., academic success).

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MODELING OF RC COLUMN UNDER CYCLIC LOADING

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ABSTRACT

This study aims to conduct non-linear cyclic analyses of RC column connections strengthened with FRP composites. From previous events, it has been discovered that damage in RC buildings and bridges can take place due to construction and design issues. One of the major causes of damage is non-ductile design of RC column connections. The joint experiences lack of ductility, the main source of underperforming under the effect of earthquake. The lack of strength and ductility in connection may lead to sever damage. Opensees software will be used and results will be verified against an experimental study available in the literature. The configuration of the FRP strengthening system (i.e. transverse, longitudinal, and combined) will be studied to propose the best system optimizing the strength and ductility of the connections. Initially, numerical column models with and without FRP jackets subjected to cyclic loading will be modelled and analyzed using Opensees. The accuracy of modeling will be verified by comparing the results against their experimental counterparts. The verified model will be used to examine different FRP configurations enhancing both strength and ductility to desirable level. This research is important because it will present ways to improve ductility and strength of RC column connections.

Keywords: FRP, RC, strengthening, Opensees, Column.

1. INTRODUCTION

There are a number of studies that addressed FRP-confined concrete column which is subjected to cyclic loading. The model by Lam and Teng (2009) was used to overcome the deficiency in the previous models which helps to study the seismic performance of the FRP jacketed columns. The model by Lam and Teng (2009) was used to describe the effects of cyclic compression on the columns. The behavior of the columns was developed and improved from their previous model (Lam and Teng 2003). This studies the compressive strength and the ultimate axial compressive strain of the FRP columns in a detailed manner. Likewise, for the study of the tensile behavior of the columns. Yassin (1994) model was used neglecting the effect of compressive deterioration on the tensile modulus of concrete but it had to be modified such that it studies the behavior only when the load is applied from the origin. To illustrate the hysteric behavior of steel reinforcement, the new stress-strain model "ReinforcingSteel (RS)" in OpenSees was used in this study. Two columns with similar characteristics were tested by double bending by the application of a constant axial compression load of 654 kN using prestressing bars and cyclic lateral loads. Failure of both columns was by jacket rupture within the plastic hinge regions, followed by the crushing of concrete. For the numerical stimulation, the "Non-linear beam Column" that considers the spread of elasticity was used here and conducted with displacement control. The predicted maximum displacements from cyclic analysis were significantly larger than those from pushover analysis. This may be attributed to the isotropic hardening of the longitudinal steel bars under cyclic loads. The predicted ductility

was less than the observed due to the assumption made as the hoop rupture strain of FRP jacket is same as the material ultimate tensile strain of the FRP. This paper (Lam and Teng, 2009) explains the modified model for the FRP column based on Lam and Teng (2003) model with mainly four modifications, which are the determination of FRP rupture strain, ultimate condition, envelope shape, and hysteretic rules. Using Opensees, numerical analysis and comparison with the old model the results were thus verified. There was a difference between the FRP confined concrete and the steel confined concrete; FRP confinement provided better performance than the others. The design oriented models are considered to be more effective and practical for engineering designs, proving to have better prediction of the ultimate strength and strain. The model by Lam and Teng (2003) was used for this study. The fiber element model was set up on the basis of a beam-system structural mechanics and uniaxial constitutive model of materials. The nonlinear structural analysis was based on the fiber element method that can be completely conducted in Opensees software using a nonlinear beam column model and plastic hinge model. There is still no FRP confined concrete constitutive model embedded in the Opensees platform so the modified model is used here. FRP strain reduction factor is essential in the model. It was not accurate enough in Lam and Teng(2003) model, therefore it is suggested that it should be determined by the unconfined concrete strength and elastic modulus of FRP fibers EFRP for each practical case. The database for FRP-confined normal strength concrete was adjusted; with the increase of unconfined concrete strength, it was found that the normalized ultimate coefficients of stress and strain should be modified instead of being specified as 1 and 1.75, respectively. The expression of ultimate stress was required to be further modified to fit both normal-strength concrete and high-strength concrete. The relationship between the intercept stress and compressive strength of unconfined concrete was recommended to be further specified rather than assumed to be the same for simplicity. A hysteretic model, which combined the envelope curve above with the unloading and reloading rule derived empirically, was proposed by Lam and Teng (2009). A series of numerical implementations had been conducted and also various modeling assumptions were made in Opensees. For the monotonic axial loading tests, the primary factors of considerations were the compressive strength of concrete and the confinement effect of the FRP jacket. These FRP confined members were subjected to a cyclic lateral load, and they were fully strengthened by an FRP tube. The experimental results indicated that the mechanical performance of FRP confined members were improved due to the confinement effect. The FRP jackets were partially wrapped around the columns concentrating on the vulnerable pier bottom. The load deformation curves show a strong correlation for the most part of the cyclic loading process, except for some specific loops. Hence, the model performed better than the Lam and Teng (2003) model. To investigate the seismic performance of the FRP wrapped columns (Wang et al., 2010), six columns confined with Carbon Fiber Reinforced Polymer (CFRP) and two control columns were tested in this paper which were subjected to high axial load and cyclic lateral force, different from other research that generally focus on columns with low axial stress. The contribution of hoop was essential and the test concluded remarkable improvement in ductility and the energy dissipation of the CFRP confined columns. A nonlinear analytical procedure was developed in Opensees, using the fiber model to study the performance of columns and the obtained curves. The ductility of the RC columns was found to be less without the proper lateral confinement of the columns. Hence, the Fiber Reinforced Polymer (FRP) overlay technique was introduced and proven to be an effective retrofitting technique which enhanced the shear resistance and ductility of the columns. The experiment was conducted by using a test frame specially designed to allow the top stub of columns to move only along horizontal direction and no rotation occurred. Axial load was

applied by hydraulic jack and rollers were placed under the jack to eliminate the frictional restraints. Displacement control mode was used in the lateral displacement cycles until lateral load decreased to 80% of the maximum lateral loading capacity. Compared to the retrofitted columns, the test specimen performed poorly whereas the retrofitted ones showed improved ductility, strength and energy dissipation. Also, with the increase of axial load, the peak lateral load of retrofitted columns was improved, but the ultimate displacement was reduced.

2. GEOMETRY AND LOADING

A column from Teng et al. (2010) was used in this study and modelled in Opensees. The column is 610 mm in diameter, 2440 mm high, and reinforced with 20 steel bars that are 19.1 mm in diameters and steel hoops of 6.4 mm in diameters spaced at 127 mm on center. A constant compression loa of 654 kN was applied in addition to lateral cyclic loading. The column was modelled first without any FRP strengthening in order to validate the model. Later, FRP wrap along the length of the column and at connection with footing will be applied with various configurations in order to determine which configuration is the most appropriate to use.

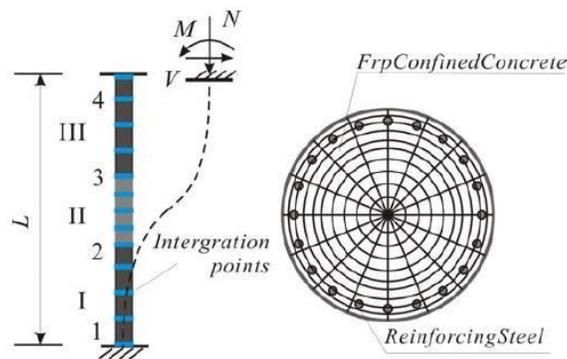


Figure 1. Modeled Column (Teng et al., 2010)

3. ASSUMPTIONS

The RC column is modelled in Opensees. The following modelling assumptions are adopted:

- (1) The model is two dimensional and each node has three degrees of freedom;
- (2) UniaxialMaterial Concrete02 was used. This omits the effect of compressive deterioration on the tensile modulus of concrete;
- (3) UniaxialMaterial Steel02 was used. It was used to model the reinforcing steel; and
- (4) NonlinearBeamColumn element is used since it is a force-based nonlinear beam-column element and it considers uniformly distributed plasticity.

4. OPENSEES MODEL

The following figure presents part of Opensees modelling for RC column under study.

```

File Edit Format View Help
# NbCol # number of column longitudinal-reinforcement bars, has been defined with the geometry
# AbCol # bar area of column longitudinal reinforcement, has been defined with the geometry

puts "All element-cross-section variables have been defined"
puts "Begin section definition"

# Define the fiber section
# -----
section fiberSec $SecTag {
  set rc [expr $ro-$coverSec];                # Core radius
  patch circ $IDconcCover $nfCoverT $nfCoverR 0 0 $rc $ro 0 360;    # Define the cover patch
  patch circ $IDconcCore $nfCoreT $nfCoreR 0 0 $ri $rc 0 360;      # Define the core patch
  if {$NumBarsCol <= 0} {
    return
  }
  set theta [expr 360.0/$NumBarsCol];        # Determine angle increment between bars
  layer circ $IDreinf $NumBarsCol $barAreaSec 0 0 $rc $theta 360;  # Define the reinforcing layer
}

puts "All patches/layers have been defined"
puts "End of element-cross-section definition"

# Define Geometric Transformation
# performs a linear geometric transformation of beam stiffness and resisting force
# -----
set ColTransfTag 1;
geomTransf Linear $ColTransfTag;           # associate a tag to transformation

puts "End Element definition"
puts "Begin Element Connectivity"

# Element Connectivity-----
# Gauss-Lobatto integration points
set numIntgrPts 5;
element nonlinearBeamColumn 1 1 2 $numIntgrPts $SecTag $ColTransfTag;

```

Figure 2. Opensees Model

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Nutrition and Wellness Intervention: The Young Chefs Club

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ABSTRACT

It is generally agreed that the nation is facing a childhood obesity crisis. Establishing a healthy lifestyle (diet and exercise) early in a child's development could be an important strategy in preventing this serious health issue. For three consecutive years, 2017-2019, Southern University and A&M College Dietetic Interns lead The Young Chefs Club Intervention. The objectives were for the participants to improve in their consumption of healthy foods and learn basic cooking skills. The intervention consisted of twelve weeks of interactive nutrition lessons and cooking activities. A total of 30 middle-school students attending The Big Buddy Afterschool program, a nonprofit organization in Baton Rouge, Louisiana were participants. Changes in nutrition knowledge and eating behaviors were assessed using a pre-and post-survey. The survey instrument consisted of eight items designed to measure the confidence related to preparing and consuming fruits and vegetables. Response options ranged from 1 ("Very Unsure I Can") to 6 ("Very Sure I Can"). A post-only questionnaire (Cooking Skills) was used to assess participants' food preparation skills.

Findings for years 2017 and 2018 are presented. Prior to the intervention, 95.2% (n=20) of those participants indicated some degree of "unsureness" in their confidence in preparing and consuming fruits and vegetables. Post intervention, 66.7 % (n=14) of the participants indicated some level of "unsureness." Participants in all three years (2017-19) specified a range of experience in performing basic cooking skills. Confidence in using sharp knives safely, a stove top burner and measuring cups and spoons were 37.1% (n=11), 31.6 % (n=10) and 33.6% (n=10) respectively. Results suggest that including cooking activities in teaching nutrition can be effective in improving knowledge and healthy eating behaviors of youth. A six-month post-intervention assessment is recommended for future research.

College Students Eating Behaviors and Attitudes

Aaliyah Augustus

ABSTRACT

During college, student's eating habits and attitudes about food and nutrition are often unhealthy. The goal of this pilot study was to examine select eating habits and attitudes of college students. A convenience sample of 88 students, enrolled in nutrition courses at Southern University and A&M College, were recruited for participation. Using an online survey, we collected data regarding student dietary behaviors, attitudes towards health and disease, and demographic characteristics. The majority of the participants were female (96%), between the ages of 19 and 21 (58%), and were college sophomores (42%). Over seventy-five percent indicated that they were either very concerned (44.3%) or neither concerned nor disconcerned (43.2%) about their diet. Most students indicated that they consumed processed meats at least 2 to 4 times per week (37.5%), consumed fruits 1 to 3 times per month (35.6%), and vegetables 1 to 3 times per week (43.9%). Lastly, nearly half of the students indicated that they consumed convenience foods at least once per week (23.9%) or 2 to 4 times per week (23.9%). Our findings indicate that there is an opportunity to improve the eating habits and attitudes of college students. This in turn may promote better eating habits and positive attitudes about nutrition and health and potentially lower risk for chronic disease later in life.

Biosurveillance of Ticks and Associated Pathogens in Belize

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ABSTRACT

Belize is a tropical country hosting a rich biodiversity and diverse landscapes, ranging from lowlands and swamps in the north to rainforests and mountainous regions in the south. It is also training grounds for U.S. soldiers. Ticks can carry and transmit dangerous pathogens that put both local residents and soldiers at-risk. Herein we compare 564 ticks collected in two villages (Red Bank & San Roman) in the SE district of Stann Creek in 2018 with those collected in 2014 & 2015 from Cayo (SW), Orange Walk (NW), and Corozal (N) Districts (n = 154) (Polsomboom et al. 2017).

Stann Creek ticks were primarily collected off local dogs, with a few samples collected from horses and by dragging. DNA was extracted from 564 ticks and DNA barcodes successfully obtained from 417 confirming the presence of 10 taxa: *Amblyomma auricularium*, *A. coelebs*, *A. imitator*, *A. maculatum*, *A. nr oblongoguttatum*, *A. ovale*, *A. sp. nr ovale*, *A. tapirellum*, *Dermacentor nitens*, *Rhipicephalus sanguineus*. All 10 taxa were collected on dogs, *A. tapirellum* and *D. nitens* on horses, and *A. ovale* and *D. nitens* found by environmental

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dragging. Differences were detected in tick species recovered across the four districts sampled to date (Corozal (N), Orange Walk (NW), Cayo (SW) and Stann Creek (SE)). All 564 ticks were also screened for *Rickettsia spp.*, *Babesia spp.*, *Borrelia microti*, *Borrelia spp.*, and *Ehrlichia spp.* using a series of available species- and genus-diagnostic primers. All positive amplicons were sequenced and resultant sequences blasted in GenBank. Seven ticks were found to be infected: six by *Rickettsia parkeri* (*A. ovale* (n=5), 1 unidentified) and one by *Ehrlichia canis* (specimen unidentified). All infected ticks were restricted to San Roman village. It is important to understand the connections between vectors and the pathogens they may carry to work towards preventative measures and improving healthcare.

Is Crab Shell a Repository for the Divalent Heavy Metal Cadmium?

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ABSTRACT

The post-ecdysial mineralization in crustaceans involves deposition of carbonate salts, such as calcium carbonate, to the organic matrix in the new exoskeleton. Cadmium is a toxic, non-essential metal frequently found in tissues of aquatic crustaceans. In spite of the similarity between cadmium and calcium ions, no study has been carried out to investigate whether the exoskeleton is a repository of cadmium. This project seeks to determine whether cadmium is incorporated into the new shell during the post-ecdysial mineralization using the blue crab, *Callinectes sapidus* as the model crustacean. It is hypothesized that the injected cadmium would be deposited into the shell by calcium transporters in the epidermis during the mineralization process because of the resemblance between cadmium and calcium ions. Post-ecdysial blue crabs will be injected with cadmium chloride, and cadmium content and calcium in the exoskeleton and cadmium content in the hepatopancreas, blood, gills and muscles will be analyzed. Since the presence of cadmium may also impact the formation of the shell in multiple ways, such as alterations in composition of exoskeletal inorganics and changes in the integrity of the organic matrix, the mechanical strength of the crab exoskeleton will also be analyzed. If the hypothesis is proven true, the finding will not only constitute a seminal contribution to aquatic toxicology but also signify that cadmium in crustacean exoskeleton can be used as a biomarker for aquatic cadmium pollution.

Keywords: ecdysis, cadmium, *Callinectes*, blue crab

Effects of Curing Regimes on Fly Ash-Based Soil Geopolymer Mixtures

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ABSTRACT

The strength of cement stabilizes soil and reduces when subjected to a higher temperature. This isn't particularly good for highly tropical regions. More importantly, fly ash known as a cement substitute combined with alkaline solution, otherwise called geopolymer, has been known to produce strong binding property and solid resistant to high temperature. Therefore, the purpose of this research was to investigate the relationship between heat curing temperature and delay time as the influencing parameters of compressive strengths of geopolymer mixtures. Geopolymer samples were prepared under different targeted heating temperatures which were room temperature and heat curing ranges of 45°C, 60 °C, and 75°C for a curing period of 72 hours in the oven. More so, the specimens were compacted after delay time of mixing ranging from 1 to 3 hours. The mechanical properties of geopolymers were determined with the compressive test and the comparison was made through graphical illustration with soil cement and geopolymer control specimens cured in ambient temperature for 28 days. The results showed that the compressive strength of soil geopolymers under heat curing condition developed quickly when there is an increase in temperature and the optimum temperature was found to be 75°C at 72-hour oven curing. Also, the delay time results showed that a delay between mixing and compaction will affect the outcome of the strengths of geopolymers and the effect increases with time. It can be concluded that the temperature curing and delay time play an important role in accelerating and achieving the compressive strengths respectively as comparing to curing in ambient condition.

Keywords: Cement, soil, fly ash, geopolymer, alkaline, unconfined compressive strength, ambient, temperature, delay time, oven curing.

A Comparison of Levels of Burnout in Occupational Therapists in Louisiana

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ABSTRACT

Background: Burnout is often described as feelings of exhaustion and dissatisfaction towards one's work experience. The abbreviated Maslach Burnout Inventory (aMBI) separates burnout into three components: emotional exhaustion (EE), depersonalization (DP), and personal

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accomplishment (PA). Each of these three components is individually measured to determine how influential each aspect is. Purpose: This study was meant to examine levels of burnout, to identify the most prominent component of burnout, and to determine correlations between burnout and various demographic characteristics of Louisiana occupational therapists (OTs). Methods: Thirty-six occupational therapists completed a survey consisting of the aMBI and questions regarding demographic information. Results: Occupational therapists reported low Depersonalization scores and high Personal Accomplishment scores, which are indicative of low burnout levels. However, occupational therapists also reported moderate levels of Emotional Exhaustion, indicating that this is the most prominent aspect of burnout. Further analysis showed that burnout was associated with younger occupational therapists, as well as those who are unmarried. Burnout was also associated with those occupational therapists who worked with adolescents and young adults, as well as the elderly. Conclusions: This study was pursued to provide more information about burnout so that occupational therapists can become more aware of symptoms, allowing them to take the necessary steps to cope with this phenomenon. To further combat burnout, various coping mechanisms can be implemented in occupational therapy workplaces.

Keywords: burnout, occupational therapy, abbreviated Maslach Burnout Inventory

Use of Medical Marijuana for Neurologic Disorders in the Pediatric Patient

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University of Louisiana at Lafayette -- College of Nursing and Allied Health Professions

ABSTRACT

Cannabidiol (CBD), a non-intoxicating cannabinoid found in marijuana, possesses neuroprotective, anti-inflammatory, and antioxidant properties. With the recent increase in legalization and utilization of medical marijuana in healthcare in the United States, much is unknown about treatment and effects on the pediatric patient. The Epilepsy Foundation would like to aid providers and parents, in collaboration with researchers and other professionals in the pediatric healthcare field, to further identify treatment options and candidates for treatment. However, research about the safety and efficacy of marijuana's effects in treating neurologic disorders in the pediatric population is lacking. The purpose of this literature review aims to disseminate and study current research and raise awareness about the risks versus benefits of utilizing medical marijuana in treating neurologic disorders, specifically epilepsy, in the pediatric patient. Nurses can play a vital role as patient advocates and teachers in educating parents weighing the risk and benefits of the use of cannabidiol in epilepsy treatment. Nurses and healthcare providers should be well versed in the risks versus benefits of utilizing medical marijuana in the pediatric patient, as well as, have knowledge of correct dosing, therapeutic levels, side effects, safety and efficacy with the use of medical marijuana in the pediatric patient. (CBD), a non-intoxicating cannabinoid found in marijuana, possesses neuroprotective, anti-inflammatory, and antioxidant properties. With the recent increase in legalization and utilization of medical marijuana in healthcare in the United States, much is unknown about treatment and effects on the pediatric patient. The Epilepsy Foundation would like to aid providers and parents, in collaboration with researchers and other professionals in the pediatric healthcare

field, to further identify treatment options and candidates for treatment. However, research about the safety and efficacy of marijuana's effects in treating neurologic disorders in the pediatric population is lacking. The purpose of this literature review aims to disseminate and study current research and raise awareness about the risks versus benefits of utilizing medical marijuana in treating neurologic disorders, specifically epilepsy, in the pediatric patient. Nurses can play a vital role as patient advocates and teachers in educating parents weighing the risk and benefits of the use of cannabidiol in epilepsy treatment. Nurses and healthcare providers should be well versed in the risks versus benefits of utilizing medical marijuana in the pediatric patient, as well as, have knowledge of correct dosing, therapeutic levels, side effects, safety and efficacy with the use of medical marijuana in the pediatric patient.

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Computing with Minimum Fundamental Logic Operations

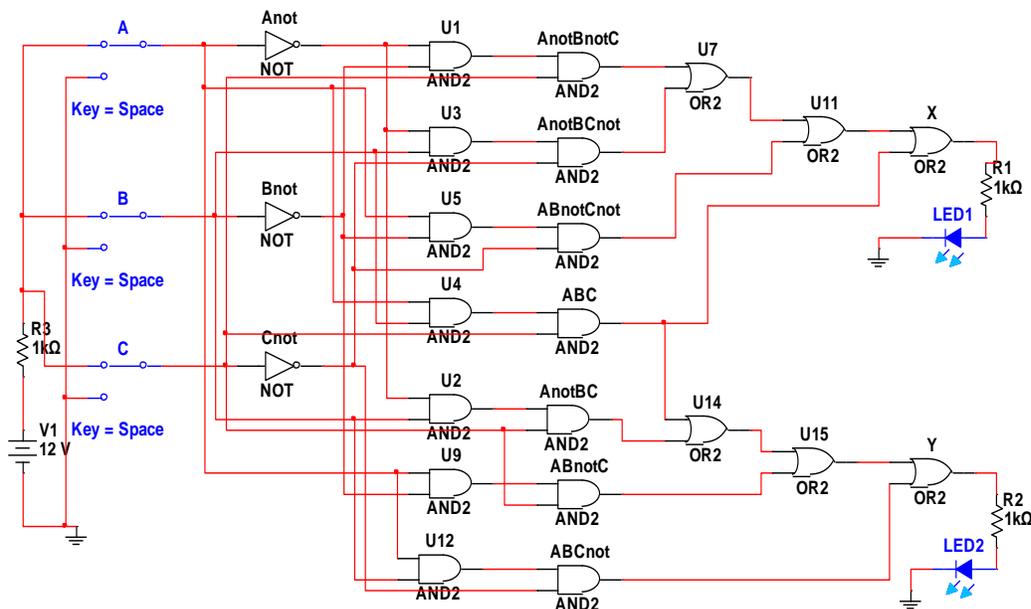
Kenneth Darcy, Caleb Vining, Holden Rivers, Daniela Forero Salcedo, Nicholas Moldovsky

ABSTRACT

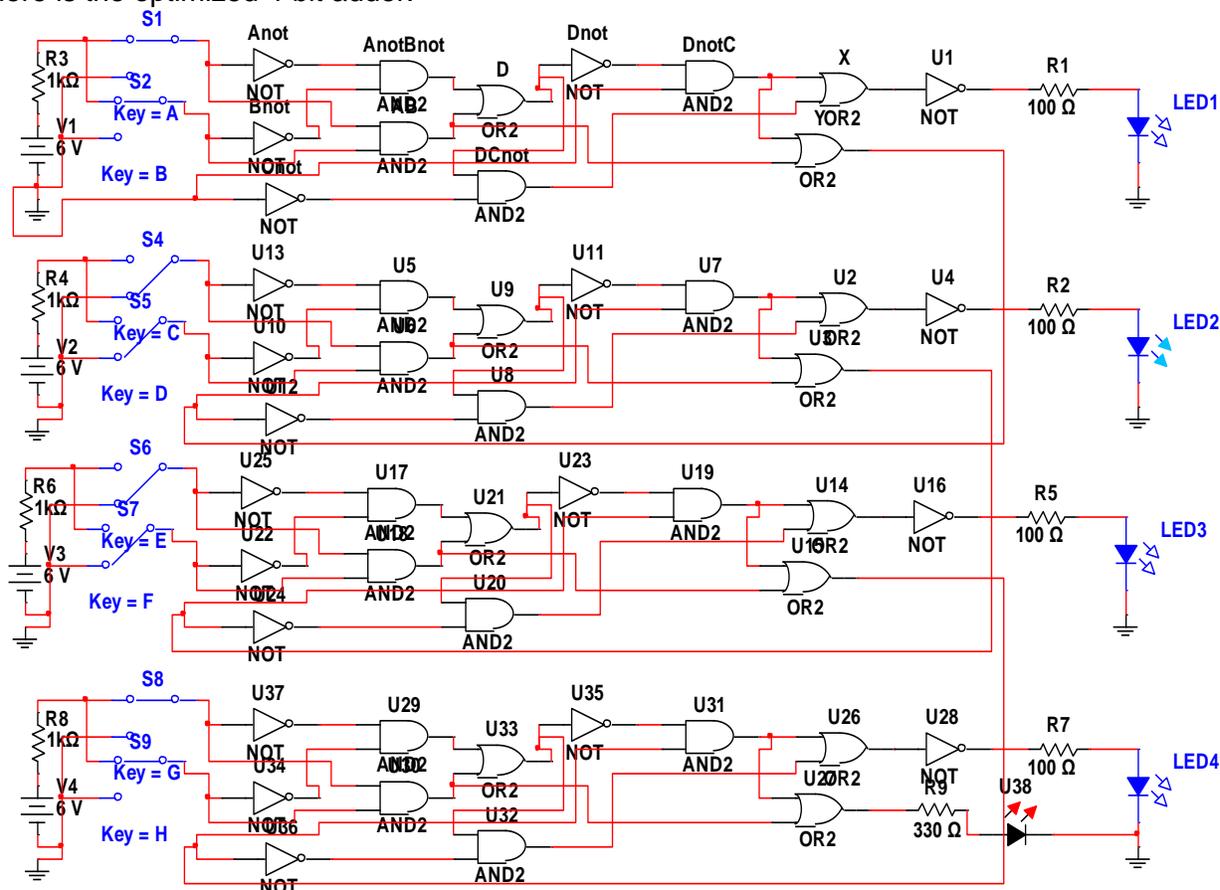
In this research, a fully working Encoder, Adder, and Decoder were designed and built utilizing basic logic gates. With a focus on optimization, the team derives a new method of implementing a Full Adder that makes use of fewer operations in comparison to the standard implementation. By combining the Encoder, Full Adder, and Decoder components, one can demonstrate the mechanism of computing that many electronic devices use today. This paper is significant in that it explains the entire process from conception to implementation.

The explanation of this process is significant in that there are few guides to constructing these components that go this in-depth. The main purpose of this paper is to act as a guide to the reader so that they could go through the entire process and understand it with certainty. This would act as a stepping stone for most others to be able to understand fundamental digital electronics with an emphasis on the importance of minimizing operations.

Here is the original, unoptimized 1-bit adder.



Here is the optimized 4-bit adder.



Identifying Spiders Through PCR Analysis Using the Mitochondrial Cytochrome C Oxidase I (COI) Gene and the 16S Ribosomal RNA Gene

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ABSTRACT

DNA barcoding is a taxonomic method used to identify and distinguish animal species by the sequence of a 650 base pair segment of the cytochrome c oxidase (COI) gene and sometimes the 16S rRNA gene. Both genes are found in mitochondrial DNA, and the sequence obtained is most useful at the subspecies level. DNA barcoding is important and useful when identifying spider species because spiders can be small and thus difficult to categorize, and the primary technique for spider identification is through morphological distinction of the genitalia of sexually mature spiders thus making the identification problematic for juveniles. We studied 50 juvenile and sexually mature spiders in the family Lycosidae to generate identifying barcodes for these spiders. We used five different primer sets in three different combinations to amplify the COI gene and the 16S rRNA gene. The primer sets were 16Sa & 16Sb, LCO 1490 & HCO 700ME, and LCO 1490 & HCO 2198. These combinations were selected because of their ability to successfully amplify spider DNA according to published literature. Barcodes that successfully distinguish Lycosidae species will be presented.

College Female Students' Perceived Body Shapes and Their Clothing Fit Issues

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ABSTRACT

It is difficult to find a perfect fitted clothing in the current retail stores because the current apparel companies only produce standardized clothing; this standardized clothing is known as ready-to-wear (RTW). Standardization causes problems in consumers who have different body shapes and personal preferences of clothing fit. The challenge for the apparel industry is to produce clothing that satisfies all body types. Clothing fit is the most important issues while consumers are wearing and purchasing clothing. Despite the importance of clothing fit there is little research about ready to wear clothing fit issues. In this study, we explore RTW clothing fit satisfaction and how it corresponds to consumers' perceived body shapes by searching the locations (waist, hips, bust girth, and back width) in RTW clothing which cause clothing fit issues for each body shape. The study used a convenience sample of African American female college students. 150 female participants were recruited for data analysis. This study demonstrates that

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African-American female college consumers perceive their body shapes quite differently from their actual body shapes, leading to specific preference for their clothing dependent on body shape groups. The study found that more than 36% (n=55) participants believed their body shapes to be an hourglass shape; the hourglass shape participants were more satisfied with clothing fit in the dress and blouse categories than the other body shapes (rectangular pear and inverted triangular shapes) participants. The inverted triangular group responded that they felt tight-fitting around the bust, whereas the rectangular group complained the back width was too tight. This study demonstrates that each group has certain locations in RTW clothing that are uncomfortable or unfitting.

Aerobic Overtraining Protocol Mitigates Glucose Intolerance and Does Not Impair Running Performance In C57bl Mice

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BACKGROUND

It is unclear what role glucose uptake may play in contributing to glycogen depletion in overtraining. Therefore, the purpose of the study was to determine if a treadmill overtraining protocol would affect glucose tolerance, as a measure of glucose uptake.

METHODS

18 male mice were divided into a control group (CON), exercise group (EXE), and an overtraining group (OTS). A glucose tolerance test (GTT) was performed at 0, 20, 40, 60, and 120 min pre- and post-intervention. An incremental load test (ILT) was performed pre- and post-intervention. EXE and OTS completed a 4-week conditioning protocol 5 days/week. For the next 4 weeks, EXE continued the conditioning protocol while OTS performed the overtraining protocol.

RESULTS

There was a significant group ($F= 31.62$; $p < 0.01$), time ($F= 91.24$; $p < 0.01$), and interaction effect ($F= 9.03$; $p < 0.01$) for performance, as measured by EV. However, EV did not differ between the EXE (24.4 ± 1.7 m/min) and OTS (25.0 ± 0.2 m/min) groups post-intervention ($p = 0.91$). There was significant group ($F= 14.46$; $p < 0.01$) and interaction effects ($F= 17.37$; $p < 0.01$), but not time ($F= 0.84$; $p < 0.37$) for GTT area under the curve (AUC). The AUC post-intervention for CON, EXE, and OTS were 42413.3 ± 1799.9 AU, 31948.3 ± 2019.6 AU, and 25563.3 ± 816.7 AU, respectively. Body weight significantly increased in all groups (CON = 5.77 ± 0.98 g; EXE = 4.48 ± 0.62 g; OTS = 1.88 ± 0.36 g), though the increase was significantly greater in the CON ($p < 0.01$) and EXE ($p = 0.04$) groups compared to the OTS group.

CONCLUSIONS

GTT and EV were significantly improved in EXE and OTS groups compared to CON. The overtraining protocol did not worsen exercise performance or GTT.

Three Voices of the American Dream: King, Harjo, & Lee

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ABSTRACT

Martin Luther King Jr., Joy Harjo, and Li-young Lee's works tackle issues of community, spiritual guidance, and legacy or what we pass down to our children. All these writers' works are based on what their version of the American Dream is. King, Harjo, and Lee's American Dreams are all influenced by where they came from and their cultural backgrounds. All three of these writers are minorities and came from varying backgrounds—African American, Native American, and Chinese Immigrant. King wanted to make a future where "Separate but equal" and Jim Crow laws don't exist. Harjo wanted to find her place in the world due to her feeling misplaced due to her mixed racial heritage—Muscogee, Cherokee, French, and Irish. Lee wanted to live a better life by immigrating to America in the 1960s while at the same time honoring the spiritual guidance of his Indonesian Chinese father—a struggle that would go on to define the American immigrant experience of the late 20th century. The American Dreams of these authors all hinge upon a sense of community, the methods they use to obtain their dreams is done through spiritual guidance, and after they obtain their dreams, they leave behind their legacy. All these writers envisioned an America that was interconnected with their past, but not enough that it made it harder to move on to a brighter future—a future without racial discrimination and one with people who have a deep spiritual connection with their forbearers.

Keywords: American Dream, Martin Luther King, Joy Harjo, Li-young Lee

Red Edge Spectroscopic Study of Bovine Serum Albumin Before and After UV Photolysis with Two Fluorescence Dye Probes

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ABSTRACT

This research involves investigating the protein structural changes of the two tryptophan residues of bovine serum albumin (BSA) before and after UV photolysis using two fluorescence dye probes. Photolysis of BSA was performed at 3 wavelengths: 220, 254, and 300 nm. The two dye fluorescent dye probes used, 1-anilinonaphthalene-8-sulphonic acid (ANS) and 2-p-toluidinylnaphthalene-6-sulphonate (TNS), were investigated before and after UV photolysis utilizing red edge spectroscopy. In order to minimize any photo-bleaching of the probes, ANS and TNS were added after the photolysis of BSA. Tryptophan degradation occurs very rapidly

with exposure to UV light and a substantial decrease in fluorescence intensity for ANS was observed, indicating destruction of some ANS binding sites on BSA. The decrease in intensity was 68, 64, and 85% for 220, 254, and 300 nm wavelengths respectively. Minimal red shifts are observed for the ANS-BSA. For the TNS-BSA system, the red shift patterns are very similar to ANS, but with a slight blue shift for all wavelengths of 2 to 5 nm after photolysis. The reduction in the TNS fluorescence intensity was minimal after photolysis compared to ANS. The decrease in intensity was 38, 40, and 27% for 220, 254, and 300 nm wavelengths respectively. This suggests that TNS binds to different locations due to its structure compared to ANS. From this work, TNS appears to be a more localized effect than ANS and occupy the Trp 134 residue located in a fatty acid binding pocket due to TNS having a more linear structure than ANS.

Keywords: red edge spectroscopy, UV photolysis, TNS, ANS

Ultrasonic Degradation of Metribuzin

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ABSTRACT

Metribuzin is a widely used herbicide that is commonly used in agriculture to control broadleaf and grassy weed species. Like other triazine herbicides, there is concern about its persistence in the environment and its potential to contaminate surface and ground waters. The sonolytic removal of this herbicide from wastewater was investigated in this study. Metribuzin in aqueous media was subjected to ultrasound using different sources; a low power cleaning bath and a 20 kHz probe type horn. Enhanced rates of metribuzin degradation occur with both systems. Degradation rates significantly increased using the 20 kHz probe type horn. With metribuzin decreasing by 94.7% in 4 hours with a 50% amplitude. The same results could be completed in half the time using a 100% intensity on the sonochemical probe. High-Performance Liquid Chromatography (HPLC) and Gas Chromatography Mass Spectrometry (GCMS) were used to analyze the sonicated solution for metribuzin levels and degradation products. The decrease in metribuzin concentration resulted in the formation of the metabolites deaminated (DA) diketometribuzin (DK) and deaminated diketo-metribuzin (DADK). Other peaks formed in the HPLC results are being investigated to identify other potential metabolites. The rate constant found for the degradation appears to fit a first order reaction model. Spike recoveries for the HPLC method ranged from 98% - 112%. The optimum experimental conditions, as well as rate constants of the degradation will be presented.

Keywords: Metribuzin, triazine herbicide, ultrasonic degradation

Presence of Multi-Drug Resistant Pathogens and Antibiotic Resistance Genes in Waterways and Seafood Populations of Rural Southeast Louisiana, USA

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ABSTRACT

The spread of antibiotic resistance is a growing global concern in recent years. Improper usage and disposal of antibiotics by consumers, hospitals, and industries has furthered the emergence of antibiotic resistance in the waterways of Southeast Louisiana, namely Bayou Lafourche and Bayou Terrebonne, a main source of drinking water impacting over 70,000 individuals that live along its banks. Additionally, there are existing reports of exposure to antibiotic-resistant bacteria through direct contact with seafood. In Louisiana, one out of every seventy jobs are related to the seafood industry, and this region exports roughly 1 billion pounds of seafood each year at a value of 2.4 billion USD. Although the implications of an increasing presence of antibiotic resistance in the rural environment is alarming, there are very few studies dealing with this phenomenon in other similar locations. In this study, water samples were collected as well as samples from various species of freshwater fish and shellfish—common seafood caught in the area—and the occurrence of antibiotic-resistant bacteria was monitored. This survey of antibiotic-resistant bacteria and genes was accomplished using Kirby-Bauer Assay as well as PCR techniques for gene display. The results of this study show the presence of multi-drug resistant bacteria exhibiting resistance to all antibiotics tested. Furthermore, various bacteria containing the *sul1* and *sul2* genes, genes for sulfonamide drug resistance, were isolated. Further work will continue to search for additional antibiotic resistance genes.

Keywords: antibiotic resistance, *sul1*, *sul2*, Bayou Lafourche

A Progression of Modern Jazz Through the Analysis of the Saxophone in Select Jazz Standards

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ABSTRACT

Almost immediately after Arnold Schoenberg broke away from the constraints of tonality in Europe, modern jazz pioneers in America were breaking away from the limitations of conventional theory and form. Jazz defied convention in its own right in the grand scheme of Western music, but the early 1940s began the era of truly modern jazz. Sanford M. Helm, the author of “Jazz: Music In Miniature” gives insight into the parallels occurring in jazz music and

serious music. He suggests that within a fifty-year period, jazz music developed in the same way that serious music developed within 200 years. An analysis of modern jazz through the progression of the saxophone in its music gives a perspective of one of the newest of jazz instruments in one of the newest of musical genres. After extensively researching the history of jazz music, I picked jazz standards in each style of modern jazz, focusing on those important to saxophone as well as making sure to use saxophone giants on each of the four primary saxophones (soprano, alto, tenor, and baritone). The project highlights findings in the different styles of modern jazz through the vantage point of jazz standards written or played by saxophonists. This includes historical connections within the genre, the impacts that each style had on the one that superseded it, the contributions the saxophone figureheads made to the genre, the analysis of the forms and melodic lines of the selected pieces, and the implications that the findings made for future expansion of the modern jazz genre.

Keywords: saxophone, modern jazz, music history

Effect of Silver Oxide Nanoparticle on the Sediment Bacteria of Gulf of Mexico in Removing Carbon and Nitrogen

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ABSTRACT

Nanoparticle use in engineering, medicine, cosmetics, personal care products, and manufacturing is becoming more common. Nanoparticles are incredibly useful because of their ability to change the properties of the compound they are made of, but unfortunately have been reported to be toxic to microbes including bacteria. Because nanoparticles are becoming commonplace, it is likely that they are being disposed of improperly and will inevitably end up in the coastal waters of South Louisiana because of drainage of Mississippi watershed into this coastal ecosystem. Nanoparticles in coastal waters should have an impact on the bacteria that play a key role in biogeochemical cycles such as carbon, nitrogen, and phosphorus cycles, but to our knowledge no study on this subject has been reported. In this study, sediment samples were collected from Grand Isle and Cocodrie of coastal Louisiana and were enriched for common heterotrophic bacteria that carry out carbon and nitrogen cycles in coastal waters. These enriched bacteria were exposed to various concentrations of silver oxide nanoparticle. The results showed that the nanoparticle at concentrations 10 mg/L or above were lethal to the bacteria and the bacterial growth was inhibited resulting in no loss of carbon and nitrogen from the media. The lethal concentration 50 (LC50) of silver oxide for the coastal bacteria will be studied and the effect that silver oxide nanoparticles have on the carbon and nitrogen cycle in the natural water systems will be reported in this paper.

Key Words: nanoparticle, silver oxide

Internet Shopping Intention Among College Students

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ABSTRACT

The internet is one of the most popular market formats to college students. Tremendous growth of internet shoppers in the recent years urges to research on a subject of the internet shopping intention related to the clothing involvement and product attributes. The purposes of this study were to explore the two factors in product attributes, style and brand attributes, impacting on the online purchasing intention among the college students. Convenience sampling method was used to recruit the responses of 240 completed surveys. The data were analyzed to explain the unique internet shopping intention among college students using structure equation modeling (SEM). The path coefficient in SEM was made to test the hypotheses. This study revealed that the clothing involvement was one of strong determinant factors in style and brand attributes, ultimately affecting the internet shopping intention. That is, both factors of style and brand attributes greatly impact on the internet shopping intention. Especially, many college students show strong clothing concerns, associated with the factor of brand attributes before purchase decision. When college students were looking for their clothing through the internet, they first recognized the famous brand names or the well-known brand products. Interestingly, however, when they made a decision through online purchase, the style attributes more strongly impacted on the online shopping intention rather than the brand attributes.

Hydroxyproline Analysis in Freshwater Fish Skin of the Bayou Region

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ABSTRACT

Collagen is a major fibrous protein found in the extracellular matrix of cells and in connective tissue. Collagen molecules consist of a triple helix structure made up of the three amino acids: glycine, proline, and hydroxyproline. Hydroxyproline is abundant in collagen. The triple helix connects to form a complex collagen network that provides strength and structure. Collagen networks are abundant in connective tissues whose primary function is to aid in new skin cell growth. Analyzing the hydroxyproline content of an area of connective tissue can help quantify how much collagen is present. In the present work, we investigated hydroxyproline content in three different sectional areas of skin belonging to *Lepomis auritus* (Redbreast Sunfish), *Lepomis macrochirus* (Bluegill), *Aplodinotus grunniens* (Freshwater Drum), and *Pylodictis*

olivaris (Flathead Catfish), all of which are freshwater species in the Bayou region. The hydroxyproline content of each area is used to quantify the amount of collagen aiming to find areas with the highest collagen content. Fish skin was homogenized and lysates were subjected to acid hydrolysis. The hydroxyproline content was then analyzed colorimetrically and compared to a standard curve. Present data indicates the abdomen of the *Pyloodictis olivaris* contains the highest hydroxyproline content suggesting this area will have high levels of collagen. This is the first such report on skin biochemistry for these species.

Keywords: hydroxyproline, fish skin

Utilizing Mardi Gras Museum Collections in Understanding the Elements and Principles of Design

Ra'Lisa Smith and Samii Kennedy Benson, PhD.

ABSTRACT

Mardi Gras holds significant importance for the city of New Orleans, Louisiana. Its customs include the use of signature colors (purple, green and gold), parading organizations (krewes, tribes and troupes), cotillion balls and masquerading among other traditions, events, festivities (Gotham, 2012). Popular in New Orleans since as early as the 1830s, masquerading is one of the more prominent customs which involves the wearing of elaborate masks, wigs and costumes by participants (Cohen, 1951).

The most extravagantly designed costumes are worn by members of the parading organizations to the themed parades and/or balls that are held throughout the carnival season. Thousands of dollars and countless hours go into the creation of Mardi Gras costumes. Due to their intricacy, the costumes can take up to a year to create and to fit the organizations ever-changing themes, new costumes must be produced each year.

In the same fashion as contemporary artists and designers, Mardi Gras costumers utilize various art and design techniques in their work. In addition to their aesthetic beauty, Mardi Gras costumes can serve as useful educational resources for novice fashion students in understanding the elements and principles of design. The purpose of this research was to engage students in understanding the elements and principles of design through the exploration of Mardi Gras museum collections. More specifically, this research asked: a) How did the museum collections help in understanding the elements and principles of design?

Students toured the Mardi Gras costume collections housed at two museums located in New Orleans, The Mardi Gras Museum of Costumes and Culture and The Presbytere Museum. During each visit, students were asked to record their observations in the form of notes, photographs, sketches and artifacts. The student's reflections revealed a greater understanding of the elements and principles of design through this enhanced learning experience.

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