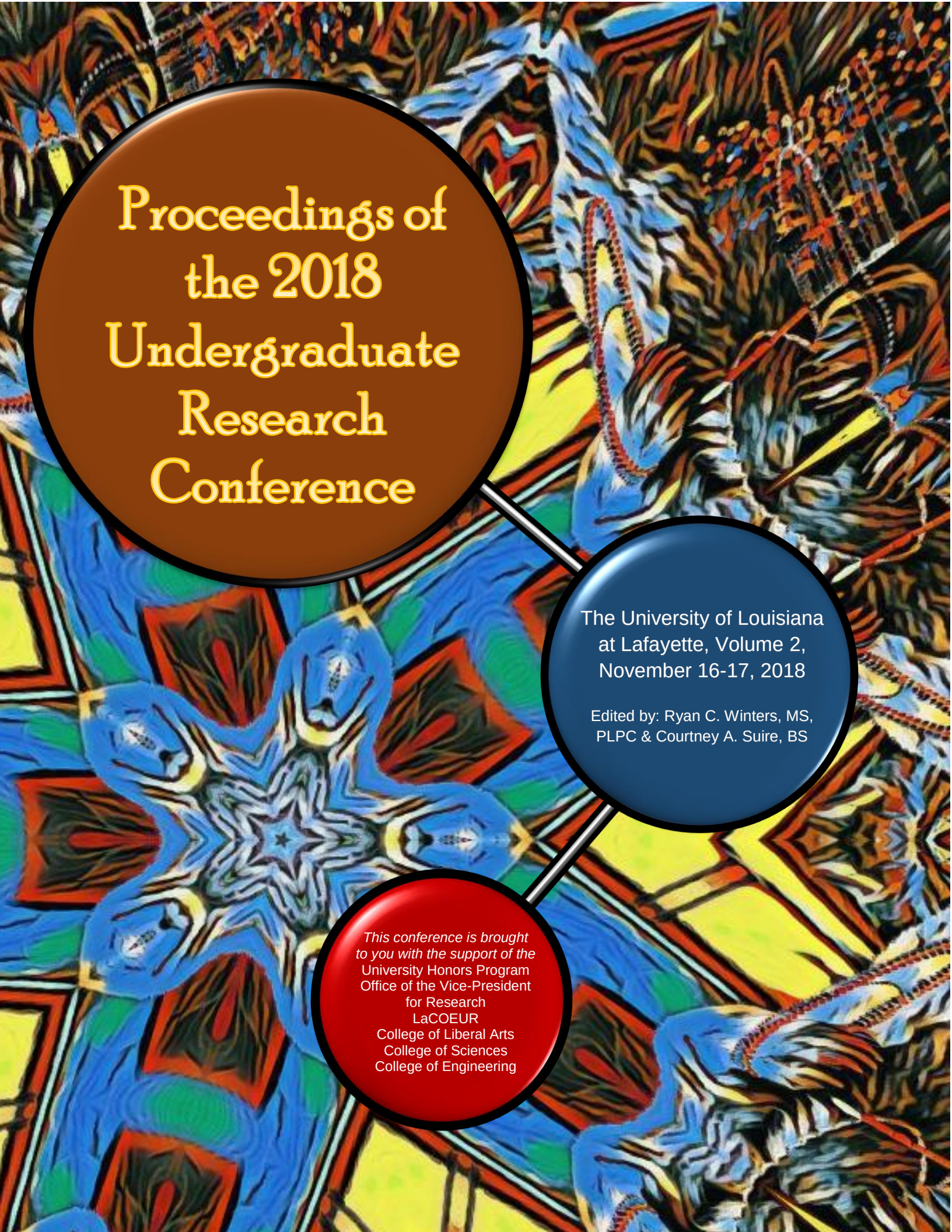

Proceedings of the 2018 Undergraduate Research Conference
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018
Edited by: Ryan C. Winters, MS, PLPC & Courtney A. Suire, BS
This conference is brought to you with the support of the
University Honors Program
Office of the Vice-President for Research
LaCOEUR
College of Liberal Arts
College of Sciences
College of Engineering

PROCEEDINGS OF THE 2018 UNDERGRADUATE RESEARCH CONFERENCE

PAPERS AND EXTENDED ABSTRACTS PRESENTED AT THE UNIVERSITY OF LOUISIANA AT LAFAYETTE

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

Soil-Geopolymer Mixtures Using Reclaimed Asphalt Pavement Materials for Pavement Base and Sub-base Layers

Makarios Abader[1], Mohammed J Khattak[2], Daniel Odion[3]

1. Undergraduate Research Assistant, University of Louisiana at Lafayette, Phone: (337) 504-9073 Email: mxa7804@louisiana.edu

2. Professor, Department of Civil Engineering, University of Louisiana at Lafayette, 254J- Madison Hall, Lafayette, LA 70504, Phone: (337) 482-5356, Fax: (337) 482-6688, Email: khattak@louisiana.edu

3. Graduate Research Assistant, Department of Civil Engineering, University of Louisiana at Lafayette, 127-Madison Hall, Lafayette, LA 70504. Phone: (337) 414-9911 Email: c00301417@louisiana.edu

ABSTRACT

The recycling of removed and/or reprocessed pavement materials containing asphalt and aggregates has become an applicable practice to investigate, particularly in its application in road construction. A study is conducted to test the feasibility of using reclaimed asphalt pavement aggregates (RAP) mixed with fly ash and an alkali activator as an alternative to soil cement in road base or sub-base applications. The resulting product referred to as soil-RAP geo-polymer is made by varied mix constituents of fly ash, RAP and a ratio of sodium silicate and sodium hydroxide. Moreover, the influence of mixture variables on the mechanical properties of soil-RAP geo-polymer is investigated through an experiment design under two fly ash types. Models to predict the unconfined compressive strength (UCS) based on mixture parameters are established with results showing the addition of RAP improving the mechanical properties of the soil-RAP geo-polymer mixture.

Key Words: Geo-Polymer, Fly Ash, Reclaimed Asphalt Pavement, Unconfined Compressive Strength

1. INTRODUCTION

Soil Stabilization has proven to be a very cost effective method in providing materials for the construction of low cost roads. There are many ways to implement the application of soil stabilization. Traditionally cement stabilization is the method, which has proven to be very effective especially in the case of sandy soil due to the ease of pulverization.

Cement stabilization refers to stabilizing soils with Portland cement. The primary reaction is with the water in the soil, which leads to the formation of a cementitious material. Cement stabilized road bases; provide substantial support to the overlaying pavement layer, which reduces stresses on subgrade soil. Therefore soil cement becomes useful in areas where aggregate quantities are low. Despite the positives, the high carbon footprint and cost of using cement for pavement base/sub-base stabilization has led to seeking alternative low-carbon stabilization technique like Soil RAP geo-polymer. Furthermore, cement stabilization causes shrinkage cracks in the base layer, which is an undesirable aspect of ride quality.

The recycling of asphalt pavement aggregates from reconstruction and resurfacing of old projects offers a means to reduce waste disposal loads sent to area landfills and to extend the life of natural resources.

Based on all this, it has become very necessary to utilize alternative cementing technologies along with reclaimed asphalt pavement (RAP) to produce more durable pavement sub-base and bases with consideration to economic restraints. One of these alternate binding materials is known as Geo-polymer binder/cement. These represent a class of materials comprising of mainly industrial by-products (such as coal fly ash, rice husk/sugarcane ashes and some clays) to significantly reduce its carbon footprint. This material has been investigated due to increased interest and it is now widely accepted that the utilization of Geo-polymer technology could substantially reduce CO_2 with minimum economic detriments *as* well as provide improvement in mechanical properties of soil stabilization processes.

2. RESULTS AND DISCUSSION

2.1 Effect of Fly Ash Content

Figure 1 below shows the variation of UCS and elastic modulus of specimens with fly ash content, where RAP and Silicate content are held constant at 15% (RAP) and 33% (Silicate). UCS and elastic modulus continuously increased with the increase in drum fly ash content, and the increase could be due to the availability of more geo-polymer binder in the mixture particularly at 25% fly ash. On the other hand, the specimens of the Salt River Lake actually decreased in UCS and elastic modulus after 15% fly ash content. Clearly, the drum fly ash yielded higher UCS and Elastic Modulus.

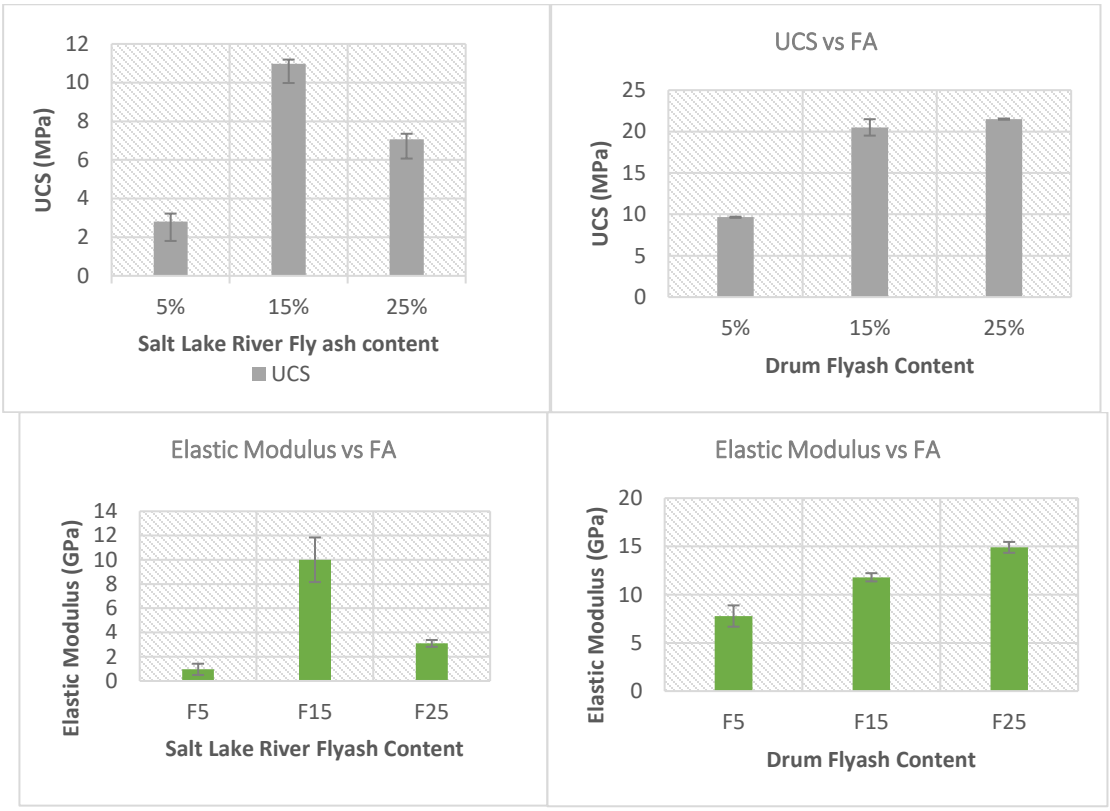


Figure 1. Effect of fly Ash content on Elastic Modulus and UCS at 15% RAP and 33% Silicate

2.2 Effect of RCA

Figure 2 below shows the variation of UCS and elastic modulus of specimens with RAP content, where fly ash and Silicate content are held constant at 15% (FA) and 33% (Silicate). According to figure 2 below, both the Drum and Salt Lake River fly ashes showed opposite trends in response to increase in RAP contents at 15% fly ash and 33% silicate. While the former decreased with RAP values, the latter increased. The Drum fly ash had the highest in UCS at 25% RCA as compared to Salt Lake River with 15% RCA. The elastic modulus of Salt Lake River Fly ash peaked at 15% and then went down where as that of Drum Fly-ash continually increased with increase in RAP content.

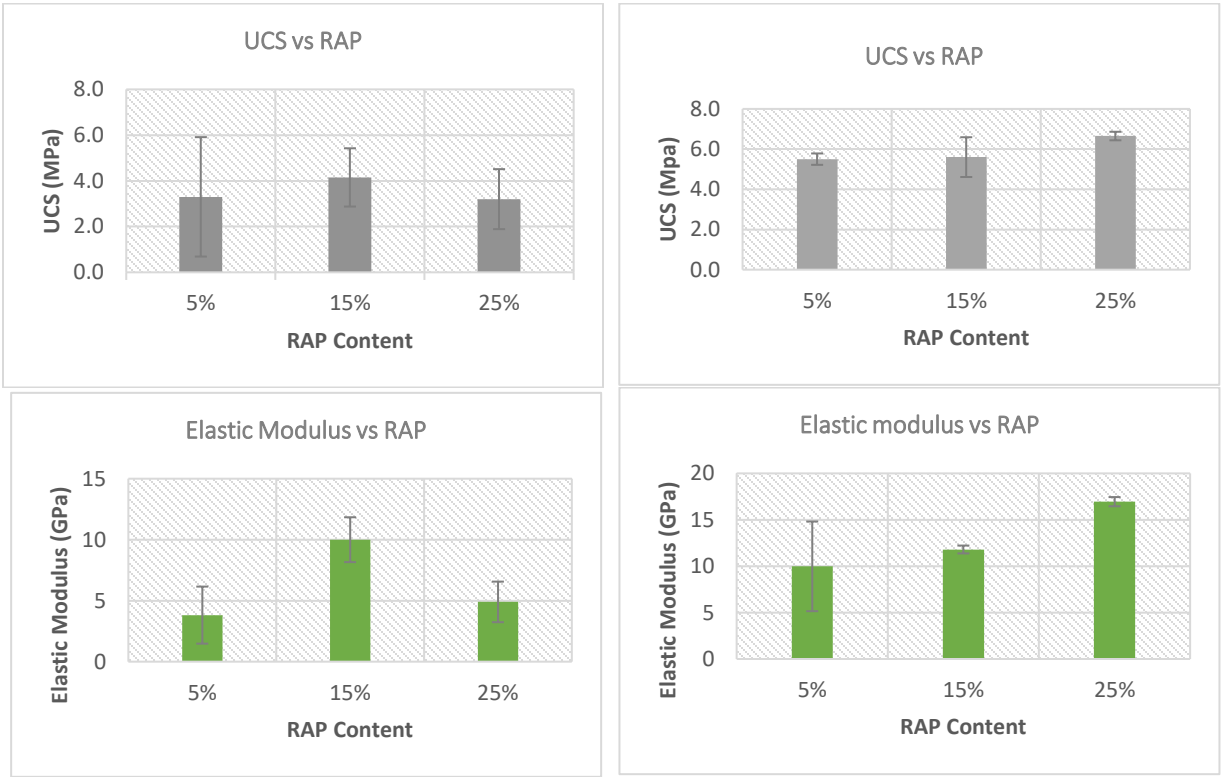


Figure 2. Effect of RAP content on Elastic Modulus and UCS at 15% Fly Ash and 33% Silicate

2.3 Effect of Alkali Activator

Figure 3 below shows the variation of UCS and elastic modulus of specimens with Silicate content, where fly ash and RAP content are held constant at 15% (FA) and 15% (RAP). As shown in figure 3, the UCS decreased significantly with increase in silicate ratio for the Drum fly ash where the UCS remained fairly constant for the Salt Lake River fly ash. Interestingly, the highest elastic modulus for Drum fly ash was shown to be at no silicate. For Salt Lake River fly ash, there was an increase in the elastic modulus at 33% silicate followed by another decline.

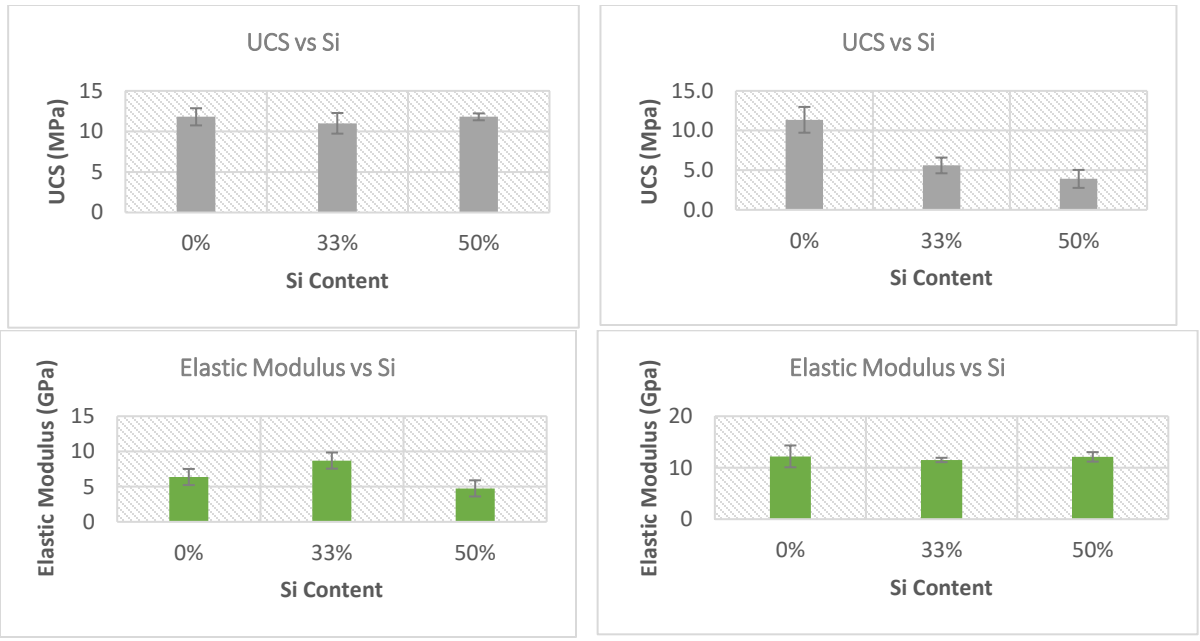


Figure 3. Effect of Silicate Ratio on Elastic Modulus and UCS at 15% Fly Ash and 15% RCA

REFERENCES

State of Louisiana Department of Transportation and Development. Louisiana standard specifications for roads and bridges. Part III, 305.04, 2006.

Gautreau, G., Z. Zhang, and Z. Wu. Accelerated loading evaluation of subbase layers in pavement performance. Louisiana Transportation Research Center, Final Report No. FHWA/LA.09/468, 2011.

Marceau, M., M. Nisbet, and M. VanGeem. Life Cycle Inventory of Portland Cement Concrete. PCA R&D Serial No. 3011, 2007. Portland Cement Association, Skokie, IL.

Davidovits, J. Geopolymer Chem. and Applications, 2nd ed., Inst. Geopoly., Saint-Quentin, France, 2008.

Hardjito, D., S. Wallah, D. M. J. Sumajouw, and B. V. Rangan. On the Development of Fly Ash-Based Geopolymer Concrete. *ACI Materials Journal*, 2004, vol. 101, no. 6, pp. 467-472

Rangan, B.V. Fly ash-Based Geopolymer Concrete, Research Report GC-4, Faculty of Engineering, Curtin University of Technology, Perth, Australia, 2008.

EFNARC. The European Guidelines for Self-Compacting Concrete Specification. May 2005.

Davidovits, J., and L. Sawyer. Early high-strength mineral polymer. Pyrament Inc. US Patent 509985A, 4/9/1985.

Hambling, D. Cool Under Pressure: Geopolymers Offer Diverse Structural Benefits." Defense Technology International, September/October, 2009. Defense Tech. International, Washington, DC.

Han, C., A Pyzik, and J. Liu. Modified Geopolymer compositions, processes and uses. Dow Global Technologies LLC, EP 2438027 A2, Apr 11, 2012.

Annual Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt Usage: 2009–2012, 3rd Annual Asphalt Pavement Industry Survey (AAPI) IS-138 Produced December 2013

www.epa.gov/coalash/coal-ash-reuse
Deal, T.A. What it costs to recycle concrete: C&D Debris Recycling, Sept/Oct, 1997, p. 10–13.
Arora, S., A. H. Aydilek. Class F Fly-Ash-Amended Soils as Highway Base Materials. *Journal of Materials in Civil Engineering,* 2005, 17(6) DOI: 10.1061/(ASCE)0899-1561(2005)17:6(640)
S. H. S.-L. S. Patimapon Sukmak. Strength development in clay–fly ash geopolymer. Construction and Building Materials, vol. 40, no. 566–574, p. 11, 2013.
I. Phummiphan, S. Horpibulsuk, R. Rachan and A. Arulrajah. High calcium fly ash geopolymer stabilized lateritic soil and granulated blast furnace slag blends as a pavement materials. Hazardous Materials, Vols. 257-267, p. 11, 2018.
N. Cristelo, S. G., T. Miranda, D. Oliveira and R. Silva. Soil Stabilization using alkaline Activation of Fly ash for self-compacting rammed Earth Construction. p. 46, 2012.
M. M. Zumrawi and M. H. Mohammed. Effect of Fly Ash on the characteristics of expansive soils in Sudan. p. 7, 2016.
P. S. Parti and S. k. Das, "Suitability of alkali activated fly ash binder as a stabilizing agent for expansive soils," 2014.
S. Rios and A. V. D. Fonseca. Alkali activated soil-ash mixtures. Geo-technical Engineering for Infrastructure and Development, 2015.
S. Rios, N. Cristelo, A. V. d. Fonseca and C. Ferreira. Structural Performance of Alkali activated Soil ash Versus Soil Cement. American Society of Civil Engineers, 2011.
N. Cruz, S. Rios, A. V. D. Fonseca and C. Rodrigues. Mechanical and Durability Properties of a soil stabilized with alkali-activated cement, European journal of Environmental and Civil Engineering, p. 37, 2017.
N. Cristelo, S. Glendinning and A. T. Pinto. Deep Soft soil improvement by alkaline activation. Institute of Civil Engineers, 2011.
A. Vargas, A. C. Vilela, J. P. Castro-Gomes and R. Mejia. Strength development of alkali activated fly ash produced with combined NAOH and CA(OH)2 activators. Cement and concrete composites, vol. 53, no. 341-349, p. 10, 2014.

Community Engagement of African American Students

Donaka Autry[1] and Manyu Li[1]
1 Department of Psychology, University of Louisiana at Lafayette, dxa1838@louisiana.edu
2 Department of Psychology, University of Louisiana at Lafayette, manyu.li@louisiana.edu

ABSTRACT

This research studied the relations between students' community engagement and racial identities and their need to help those who share their culture. Four-hundred-and-twenty-six students, 110 African Americans and 316 Caucasians, participated in this study. The Li and Frieze (2016) community engagement scale was used to study general community engagement intention (i.e. both engagement in American and heritage culture), community engagement intention in heritage culture, and community engagement intention in American culture. The need to help families/friends/strangers from heritage culture was measured using six items to measure participants' perceived demand and desire to help families, friends and strangers from their heritage cultures. Results showed that the two racial groups (African Americans vs. Caucasians) were only different on their community engagement intention in cultural heritage groups. The two groups were not different in general community engagement. The results also indicated a positive correlation between African Americans' general community engagement intention and their perceived need to help their culture.

Key Words: African American, University Student, Community Engagement.

1. INTRODUCTION

Students in universities learn not only from classes, but also activities they participate outside classes. Students have time to explore not only their career, but also their responsibilities as a citizen and a member of their community (Giles and Eyler, 1994). This study aimed at understanding community engagement of university students from different racial groups, and how their racial identity related to their community engagement.

There are a lot of benefits to students of getting involved in the. Research in the past showed that community services improved students' well-being, involvement in school and thus their academic motivation (Hyyppä, M. T., & Mäki, 2003; Li, Frieze, Nokes-Malach, & Cheong, 2013). Community engagement can also empower individuals (e.g. Speer, P. W., Jackson, C. B., & Peterson, 2001) and improve one's own health (Hyyppa and Maki, 2003). By getting university students involved in communities, students can develop a life-long interests in helping the communities and people around them.

The purpose of this study is to understand how cultural heritage, particularly, racial identity influences students' engagement in the community. Research in the past suggested that minorities tended to participate more in the community than the majority because they often feel that their heritage community needs them (Katz, 2014). Therefore, in this study, we ask two research questions:

1. *Does African American students and Caucasian students differ in their interests in community engagement?*

2. *If so, does African American students' community engagement relates to their perceived need to help people from their heritage?*

2. METHOD

2.1 Procedure

Participants aged 18 years or above will also be recruited through the Psychology Department SONA System. The students will learn of the study via the Psychology Department SONA System. Participation in the study is completely 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 very minimal. However, participants will also be informed that they may cease their participation at any moment they feel uncomfortable continuing the experiment. Participants were all debriefed after the survey.

2.2 Sample

Five-hundred-and-twenty-two participants were recruited. However, racial groups other than African Americans and Caucasians were too small to conduct any meaningful comparison. Therefore, only African Americans and Caucasians participants were retained. The final sample consisted of 426 participants. Among them, 110 were African Americans and 316 were Caucasians. There were 307 females and 105 males. Average age was 19.29 (Range = 18 – 42).

2.3 Measures

Community engagement intention was measured using Li and Frieze (2016) community engagement scale. The scale consisted of seven items measuring participants' community engagement in their heritage community, and seven items measuring participants' community engagement in the American culture. Participants rated their agreement on the items based on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Sample items were "In general, I am interested in doing things to help people from my heritage culture/Americans" and "community change in my heritage culture/America does not come from volunteers but from full time paid community leaders and staff." Scores were computed for general community engagement intention (i.e. both engagement in American and heritage culture), community engagement intention in heritage culture, and community engagement intention in American culture.

The need to help families/friends/strangers from heritage culture was measured using six items self-constructed to measure participants' perceived demand and desire to help families, friends and strangers from their heritage cultures. Perceived demand was measured by how much participants agree to the statement "my [heritage] families/friends/people who share my cultural heritage… need my help". Perceived desire to help was measured using three items "It is my responsibility to help … my [heritage] families/friends/people who share my cultural heritage." Items were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Scores were averaged to form a mean score.

In addition to the main measurements, participants were asked to report their demographics, including race, age and gender.

3. RESULTS

3.1 Research Questions

3.1.1: Race and community engagement

A linear regression analysis was conducted to see if race (African Americans vs. Caucasian Americans) predicted general community engagement, controlling for age and gender. As shown in Table 1, African American students had higher general community engagement intention than Caucasian students (B = .52, S.E. = .11, $p < .001$). Also, female were had higher general community engagement intention than female (B = .39, S.E. = .11, $p < .001$). R-square was .09. However, when we looked at specific community engagement for America (i.e. excluding community engagement in cultural heritage communities), the two racial groups showed no differences (B = .12, S.E. = .07, $p = .061$). Therefore, the two racial groups were only different on their community engagement intention in cultural heritage group.

Table 1. Linear Regression results predicting students' general community engagement.

	B	S.E.	p
Race: African American	.52	.11	<.001***
Age	-.01	.02	.621
Gender: Female	.39	.11	<.001***

3.2.2 Research Question 2: Perceived need to help heritage culture and community engagement

A linear regression was conducted to see perceived need to help heritage culture predicted African American's general community engagement and engagement to heritage culture, controlling for age and gender. As shown in Table 2, the higher perceived need to help heritage cultures, the higher African American's general community engagement intention. R-square was .19. Therefore, it appears that one of the motivating factors of African American community engagement is the need to help people from their own heritage cultures.

Table 2. Linear Regression results predicting African American students' general community engagement.

	B	S.E.	p
Perceived need to help heritage culture	-.12	.04	.001**
Age	.01	.02	.522
Gender: Female	.44	.15	.004**

4. DISCUSSION

Results displayed a difference in African American and Caucasian general community engagement intention within their cultural groups. However, the differences were later found to only appear in community engagement in cultural heritage groups. The experiment also suggested that one of the motivating factors of African American community engagement is the need to help people from their own heritage cultures. These results may be explained by the historic struggle of African Americans as well as their use of community to progress in society. This research can be expanded by studying the driving forces behind African Americans' need to help their culture. Researchers could also look at other minority groups to discover a pattern across different minority cultures. As earlier mentioned, research in the past showed that community services improved students' well-being, involvement in school and thus their academic motivation (Hyyppä, M. T., & Mäki, 2003; Li, Frieze, Nokes-Malach, & Cheong, 2013). Studies can be done to examine how academic motivation and community involvement correlate among different races.

REFERENCES

Hyyppä, M. T., & Mäki, J. (2003). Social participation and health in a community rich in stock of social capital. *Health Education Research*, *18*(6), 770–779.

Katz, V. S. (2014). *Kids in the middle: How children of immigrants negotiate community interactions for their families*. New Brunswick, New Jersey, and London: Rutgers University Press.

Li, M., Frieze, I. H., Nokes-Malach, T. J., & Cheong, J. (2013). Do friends always help your studies? Mediating processes between social relations and academic motivation. *Social Psychology of Education*, *16*(1), 129–149. https://doi.org/10.1007/s11218-012-9203-5

Speer, P. W., Jackson, C. B., & Peterson, N. A. (2001). The relationship between social cohesion and empowerment: Support and new implications for theory. *Health Education & Behavior*, *28*(6), 716–732.

The Effects of Artificial Limbs on Sprint Times in Professional Athletes

Shanna A. Barrow[1], Jeremy J. Foreman[2]
[1]School of Kinesiology, University of Louisiana at Lafayette
[2]School of Kinesiology and Center for Sports Success, University of Louisiana at Lafayette

ABSTRACT

The participation of disabled athletes in sports has steadily increased due to the technological advancements of assistive devices. The Paralympics have allowed these athletes the opportunity to compete, but amputated sprinters that wish to compete against their able-bodied competitors have brought controversy to the world of sports. The purpose of this study is to determine the effects of artificial limbs on sprint times in professional athletes. Paralympic and Olympic data from 1988 to 2016 is examined. Able-bodied competitors perform better than amputated athletes in all sprint events. It appears that prosthetic legs do not provide an advantage, but further metabolic and biomechanical analysis would be beneficial.

1. INTRODUCTION

The participation of disabled athletes in sports has steadily increased due to the technological advancements of assistive devices. The Paralympic Games first took place in Rome in 1960 and have since evolved to become the second largest sporting event in the world, allowing disabled athletes the opportunity to fairly compete ("Paralympics," n.d.). Limb deficiency is one of the eligible impairment types for Paralympic athletes. These amputated competitors are further classified to provide an equal opportunity of success in their events. Some athletes, however, would like to compete against able-bodied competitors, but the issue of fairness causes controversy. Many involved in the sports world believe that there would be an unfair advantage for runners with artificial limbs. The purpose of this study is to determine the effects of artificial limbs on sprint times in professional athletes.

2. LITERATURE REVIEW

Modern technological advances allow more disabled athletes than ever before to participate in sports. There is debate as to whether or not these technologies provide an unfair advantage, and there have been many issues of controversy (Dyer, 2015). Many assistive devices have been banned from competition due to the benefits they provide to the athlete. Speedo's LZR Racer swimsuits were prohibited after they were found to provide a significant improvement in performance (Stefani, 2012). Despite the speculated advantages, data surrounding the possible athletic benefits provided by prosthetic limbs is limited and inconclusive.

Perhaps the most prevalent topic of controversy involving prostheses in sports is that of Oscar Pistorius. Pistorius is a bilateral transtibial amputee holding Paralympic records for the 100-, 200-, and 400-meter races (Wolbring, 2008). The reduced mass of his carbon fiber distal segment allows a more rapid repositioning of the lower limb, resulting in increased speed (Weyand et al., 2009). Pistorius was not allowed to compete in the Olympics alongside able-bodied competitors. The International Paralympic Committee (IPC), however, believes that the possible advantages should not be viewed from strictly biomechanical positions ("IPC Position Statement," 2008).

The IPC determines the classification requirements for all Paralympic athletes. Despite the efforts the control "for the impact of impairment on the outcome of competition," many athletes feel unfairly misclassified (Tweedy, Beckman, & Connick, 2014). It has proven difficult to classify disabled athletes, and comparing them to their able-bodied counterparts is even more challenging. The debate in question is whether the use of leg prostheses provides an advantage for sprint runners. Some research indicates that current prostheses are not as energy efficient as the human foot, and amputees are thus unable to match the amount of energy generated by an intact limb (Nolan, 2008). Other studies found that amputees do not differ physiologically, but that their prosthetic legs provide a possible mechanical advantage (Weyand et al., 2009). The current research on sprinters with lower-limb amputations is limited in the number of subjects studied and could be improved by examining a larger sample size.

3. METHODS

To determine the effects of prosthetic limbs on sprint times for professional athletes, data is gathered for every Paralympic/Olympic year from 1988 to 2016. This data is collected from the Paralympic and Olympic archives and includes the times for the 100-, 200-, and 400-meter races. The sample includes three classifications of athletes for each event: above-knee amputees (T42 classification), below-knee amputees (T44 classification), and able-bodied competitors. The dependent variable is the amount of time the participants took to complete the event measured in seconds. The independent variables are group classifications (e.g., T42 and T44), year of the event (e.g., 1988=0, 1992=1, …, 2016=7), and the heat in the year (e.g., first heat, final heat). Ordinary least squares (OLS) regression analysis is used to determine the effect of prostheses on sprint times.

4. RESULTS

Regression results indicate several statistically significant findings for 100-, 200-, and 400-meter races. For 100-meter races, an able-bodied runner can expect to run 100m in 11.5 seconds in the first heat in 1988. An additional 0.3 seconds should be taken off the expected time per Olympics that has passed (i.e., for every 4 years that passed). Regarding T42 and T44 classifications, runners with a T44 classification take about 2.2 seconds longer to complete the 100-meter race and runners with a T42 classification take about 3.9 seconds longer. Heats were not statistically significant in predicting 100-meter race times.

Table 1. Regression results for 100-meter race times.

Variable	Coefficient	Standard Error	P-value
Year	-0.307	0.036	<0.001
Heat	-0.095	0.071	0.184
T44	2.166	0.250	<0.001
T42	3.933	0.258	<0.001
Constant	11.547	0.320	<0.001

Based on the regression results, an able-bodied runner can expect to run 200-meter in 23.6 seconds in the first heat in 1988. For every Olympics that passes, race times should reduce by about 0.7 seconds and an additional 0.3 seconds should be taken off expected times for each

subsequent heat a runner completes. Regarding T42 and T44 classifications, runners with a T44 classification are expected to be about 4.4 seconds slower than able-bodied runners and runners with a T42 classification take about 8.9 seconds longer to complete the 200-meter race, relative to able-bodied runners.

Table 2. Regression results for 200-meter race times.

Variable	Coefficient	Standard Error	P-value
Year	-0.680	0.069	<0.001
Heat	-0.336	0.163	0.040
T44	4.392	0.439	<0.001
T42	8.850	0.496	<0.001
Constant	23.606	0.649	<0.001

For 400-meter races, an able-bodied runner can expect to complete the race in 47.9 seconds in the first heat in 1988 with an additional 0.7 seconds taken off per Olympics that has passed. Runners with a T44 classification take about 9.6 seconds longer to complete the 400-meter race compared to able-bodied runners. The heat is not statistically significant in the 400-meter race.

Table 3. Regression results for 400-meter race times.

Variable	Coefficient	Standard Error	P-value
Year	-0.746	0.117	<0.001
Heat	-0.101	0.239	0.672
T44	9.635	0.599	<0.001
Constant	47.870	0.941	<0.001

5. CONCLUSION

For every event analyzed, the able-bodied athletes had the shortest sprint times. Thus, prosthetic limbs do not provide a competitive advantage for sprinting. More precisely, above-knee amputees are at more of a disadvantage than below-knee amputees. This research only analyzed sprint times. Metabolic and biomechanical aspects could be further examined to determine whether prosthetic limbs provide an advantage in these areas. The results of this study could be useful to the IPC, athletes, and sports managers and could aid in the process of determining classifications for amputated athletes. Given the statistical evidence provided in this study, athletes who want to compete against able-bodied runners should be allowed since they are at a disadvantage as amputees with artificial limbs.

REFERENCES

Dyer, B. (2015). The controversy of sports technology: A systematic review. *SpringerPlus*, *4*(1), 1-12.

IPC position statement on IAAF's commissioned research on Oscar Pistorius. (2008, January 14). Retrieved from https://www.paralympic.org/press-release/ipc-position-statement-iaafs-commissioned-research-oscar-pistorius

Nolan, L. (2008). Carbon fibre prostheses and running in amputees: a review. *Foot and Ankle Surgery, 14*(3), 125–129.

Paralympics - History of the Movement. (n.d.). Retrieved October 6, 2018, from https://www.paralympic.org/the-ipc/history-of-the-movement

Stefani, R. (2012). Olympic swimming gold: The suit or the swimmer in the suit? *Significance, 9*(2), 13-17.

Tweedy, S., Beckman, E.M., & Connick, M.J. (2014). Paralympic classification: conceptual basis, current methods, and research update. *PM&R, 6*(8S), S11-S17.

Weyand, P. G., Bundle, M. W., McGowan, C. P., Grabowski, A., Brown, M. B., Kram, R., & Herr, H. (2009). The fastest runner on artificial legs: Different limbs, similar function? *Journal of Applied Physiology, 107*(3), 903–911.

Wolbring, G. (2008). Oscar Pistorius and the future nature of Olympic, Paralympic and other sports. *SCRIPT-ed, 5*(1), 139-160.

Using RNA Interference to Determine the Role of Epidermal Carbonic Anhydrase in Post-Ecdysial Mineralization of Crustacean Exoskeleton

Madalyn Beyer[1] and Enmin Zou[2]
1 Nicholls State University, mbeyer1@its.nicholls.edu
2 Nicholls State University, em.zou@its.nicholls.edu

ABSTRACT

The use of crab shells as a model for innovative manufacturing shows great promise due to its remarkable properties. Many researchers have explored the use of chitin, which acts as "steel rods" for the crab shell, as a template for functional materials. This study, however, seeks to investigate the "cement" that is laid in between the chitin rods: calcium carbonate. Understanding its deposition following crab molting will help lay the foundation for development of underwater materials due to the crab shell's strong, non-toxic, and water-resistant properties. It is hypothesized that epidermal carbonic anhydrase (CA) mediates the deposition of carbonate salts, such as calcium carbonate, to the post-ecdysial shell through generating bicarbonate ions. This hypothesis will be tested through investigation of changes in epidermal CA activity and calcium deposition to post-ecdysial shells after knocking down the CA expression, using RNA interference, and the blue crab, *Callinectes sapidus*, will be used as the model organism. A short sequence of double-stranded RNA targeting the CA mRNA will be injected into newly molted crabs to break apart the CA mRNA, and both epidermal CA activity and the metal content in crab shells will be examined. The changes in both enzymatic activity and exoskeletal metal content will give insight into the role played by epidermal CA in the assembly of crab shell "cement". By exploring this unique process of crab shell formation, the scientific community can grow in its understanding of how crab shell can give a clue for manufacturing underwater materials.

1. INTRODUCTION

Crabs, like other crustaceans, must use regular molting cycles as a way to grow due to their rigid exoskeleton. After shedding its exoskeleton, which is also known as molting or ecdysis, the crustacean enters the postmolt stage and could be called "soft-shell". Postmolt is followed by intermolt, a very important stage where the new shell is hardened into the sturdy skeleton associated with crustaceans. The hardened crab shell could be described as a matrix made up of chitin and proteins which is "filled in" by minerals such as calcium and other inorganics (Stevenson, 1985).

Unfortunately, the mechanism by which these minerals such as calcium are deposited within the crab shell matrix is currently poorly understood. The enzyme carbonic anhydrase (CA) has been implicated in deposition of calcium to the crab shell during postmolt and intermolt (Giraud, 1981). Calhoun and Zou (2016) were able to find correlation between CA activity and the amount of calcium or magnesium in the exoskeleton. However, definitive evidence has not yet been obtained for this implication. This study will seek to provide definitive evidence for the activity of CA in mineralization of the crab shell through the use of RNA Interference. By injecting double-stranded RNA into postmolt blue crabs, *Callinectus sapidus*, to inhibit CA gene expression, it is hypothesized that there will be a significant decrease in calcium deposition to the new shell.

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

2. METHODS

First, following trouble-shooting with varying PCR conditions, dsRNA transcripts will be designed using the Ambion MEGAscript™ RNAi Kit. There will be two sequences of dsRNA synthesized based on the cDNA sequences for two CA genes discovered in *Callinectus sapidus*, referred to as *CasCAc* and *CasCAg*. Around the time that these transcripts are being synthesized, late premolt crabs will be purchased from local softshell crab distributers and kept in recirculating tanks with artificial seawater until they reach early intermolt stage. Molt stage will be determined based on microscopic examination of a piece of the swimmeret (Mangum, 1985). Four groups of at least 5 early intermolt crabs will be selected for injection. The first will be injected with nonspecific dsRNA to act as the control. The second group will be injected with *CasCAc* dsRNA, the third with *CasCAg* dsRNA, and the final group with a cobination of *CasCAc* and *CasCAg*. All of these injections will occur at days 0 and 2, and samples will be collected at day 4. Epidermal tissue collected will be snap-frozen and stored at -80ºC awaiting analysis of enzymatic activity. Carapaces will be air-dried awaiting metal analysis.

Analysis of the amount of CA activity inside the epidermal samples will be calculated according to the equation CA activity = $2(T_0 – T)/(T*\text{protein})$ (CA units/mg protein) as outlined by Calhoun and Zou (2016). This equation will use the time required for pH to decline following a centrifugation protocol of the samples with Tris-HCl buffer. The amount of calcium found in the carapaces will be determined by first excising a sample of the carapace, grinding it into a powder, and dissolving it into a mixture with varying concentrations of HNO3. This mixture can then be analyzed by Optima 8000 ICP-OES spectrometer for metal content.

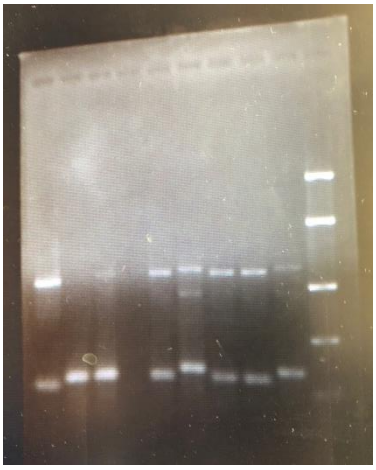


Figure 1. Lanes 2 and 3 show the strongest bands using what has thus far been the most effective PCR conditions.

3. RESULTS

As of now, all work has been on troubleshooting with PCR to determine the best conditions for copying the cDNA template which will be used in the RNA Interference protocol.

REFERENCES

Calhoun, S. and Zou, E. 2016. Epidermal carbonic anhydrase activity and exoskeletal metal contents during the molting cycle of the blue crab, *Callinectus sapidus*. J. Exp. Zool. 325A: 200-208.

Giraud, M. 1981. Carbonic anhydrase activity in the integument of the crab *Carcinus manaes* during the intermolt cycle. Comp. Biochem. Physiol. 69A: 381-387.

Stevenson, J. R. 1985. Dynamics of the integument. In: Bliss DE, Mantel LH eds. The Biology of the Crustacea, vol. 9. Academic Press, NY, 43-146.

The Mechanism of Dimethyl Sulfoxide (DMSO) in Enhancing Tentacle Regeneration in *Nematostella vectensis*

Kymber Bly[1], Ada Tusa[2], and Patricia Mire[3]
1 Department of Biology, The University of Louisiana at Lafayette, klf3189@louisiana.edu
2 Department of Biology, The University of Louisiana at Lafayette, aft1999@louisiana.edu
3 Department of Biology, The University of Louisiana at Lafayette, pmire@louisiana.edu

ABSTRACT

Nematostella vectensis, the starlet sea anemone, is a model organism used in genetic, developmental, and physiological studies (Putnam, et al., 2007). In the present study, *Nematostella vectensis* is examined for its ability to undergo tentacle regeneration. Previous studies using dimethyl sulfoxide (DMSO) as a solvent showed an increase in tentacle regeneration rates when compared to the seawater controls (Puckett and Tusa, 2017). Here, we set out to determine the minimum required incubation time of DMSO to produce enhancement in tentacle regeneration rates. This was achieved by conducting a series of time trials in which animals each were treated with 0.2% DMSO solution for either 1, 3, 6, 12, 24, or 36 hours. The animals were also assessed for their memory of DMSO treatment by conducting a repeat excision of tentacles. To investigate the mechanism of DMSO, electroporation was used to alter membrane permeability and observe its effect on regeneration rate. Results indicate that animals treated with a 3 hour incubation of DMSO experienced the fastest rate of regeneration when compared to the other experimental groups in the time trial. Furthermore, animals from the 1 and 3 hour incubation groups evaluated for memory of DMSO produced repeat regeneration rates comparable to their original respective groups. The regeneration rates for the 3 hr DMSO treatment group and the electroporation group of 1,000 μF x 30Ω were not significantly different, indicating an enhanced effect on regeneration rate by electroporation. This suggests that DMSO's ability to alter membrane permeability changes the electrochemical gradient of ions in the cells, leading to enhanced tentacle regeneration in *Nematostella vectensis*. These experiments establish an optimal DMSO incubation time, indicate memory of DMSO treatment, and suggest that the regeneration of tentacles is affected by a pathway sensitive to membrane permeability.

1. INTRODUCTION

The sea anemone, *Nematostella vectensis,* has arisen as a model organism for biological studies due to its fully sequenced genome and ease of rearing in the laboratory (Putnam, et al., 2007). It is especially useful due to its ability to regenerate damaged tissues. In previous studies of tentacle regeneration, 0.1% dimethyl sulfoxide (DMSO) solution was used as a solvent to facilitate entrance of nonpolar molecules through the cell membranes. The 0.1% DMSO negative control group showed an unexpected stimulatory effect on tentacle regeneration when compared to 0.0% DMSO seawater controls (Puckett and Tusa, 2017). Experiments testing varying concentrations of DMSO suggested that incubation in 0.2% DMSO solution for 48 hours yielded the most enhanced effects on tentacle regeneration long-term (Bly, Tusa, and Mire, 2017). The current study includes (1) 0.2% DMSO treatments over varying

incubation times to determine the minimum time required to enhance regeneration rates. After complete regeneration, animals were also (2) evaluated for memory of prior DMSO exposure by conducting a repeat excision of tentacles and determining tentacle regeneration rates. DMSO has been shown to create water pores in membranes (Notman, et al., 2006) and increase fluidity of membranes making them leaky (Gurtovenko and Anwar, 2007), as well as causing cell proliferation (Wen, et al., 2015). The current study also tests (3) the possibility that altering membrane permeability by electroporation may enhance regeneration rates. Electroporation was performed at three settings, and tentacle regeneration rate was measured. Similar tentacle regeneration rates resulting from electroporation and DMSO treatment would suggest a membrane permeability-altering mechanism of action by DMSO.

2. METHODS

A time course experiment was conducted to indicate the effect of incubation time on the rate of tentacle regeneration. 21 animals were deprived of food for 72 hours before being isolated into individual petri dishes. These anemones were treated with an anesthetizing solution, 50 mM potassium chloride (KCl), for one hour and then imaged to record the pre-cut tentacle lengths. Next, all tentacles on each animal were excised as close to the oral disc as possible using scalpels under a dissecting microscope. Images were taken after this removal of tentacles to record post-cut tentacle lengths. The control group consisted of three animals placed into 16 ppt (parts per thousand) seawater alone. The six experimental groups of three animals each were treated with 0.2% DMSO solution for either 1, 3, 6, 12, 24, or 36 hours. Upon completion of DMSO treatment, the animals were then placed into fresh 16 ppt seawater. Images were taken of each animal daily to monitor regeneration. All tentacle measurements consisted of an average of three tentacles per animal. Measurements were taken using ImageJ software, and the lengths were averaged and plotted against time in order to determine the rate of regeneration.

After three months, animals from the 1 and 3 hour time course groups were evaluated for memory of DMSO treatment. The animals were anesthetized using the method above and imaged to record the pre-cut tentacle lengths. The same process for tentacle excision, recording of measurements, and determination of regeneration rate was followed.

For electroporation, six animals were deprived of food and anesthetized as above (except in 33 mM KCl). All tentacles were excised, and the animals remained in the KCl solution for the duration of electroporation. Three groups of two animals each were pulsed using an electroporator at 1,000 μF x 30Ω, 3,000 μF x 10Ω, 4,000μF x 50Ω every 30 minutes over 3 hours. Animals were transferred to fresh 11 ppt seawater and imaged daily. The measurements were recorded and the tentacle regeneration rate was determined by the same protocol.

3. EXPERIMENTAL RESULTS

The time course experiment yielded regeneration rates for animals treated with 0.2% DMSO for different time periods. Average tentacle lengths were plotted over time and each data set was fit to a linear trendline (Figure 1).

In each of the six DMSO treatments, rate of regeneration fit to a linear function, with R^2 values all greater than 0.9195 (Figure 1). The animals exposed to a 0.2% DMSO solution for 3 hours experienced the highest rate of regrowth over 18 days (slope=0.56) followed by 6 hours (slope=0.4894), 1 hour (slope=0.4859), 36 hours (slope=0.4529), 24 hours (slope=0.4212), and 12 hours (slope=0.354).

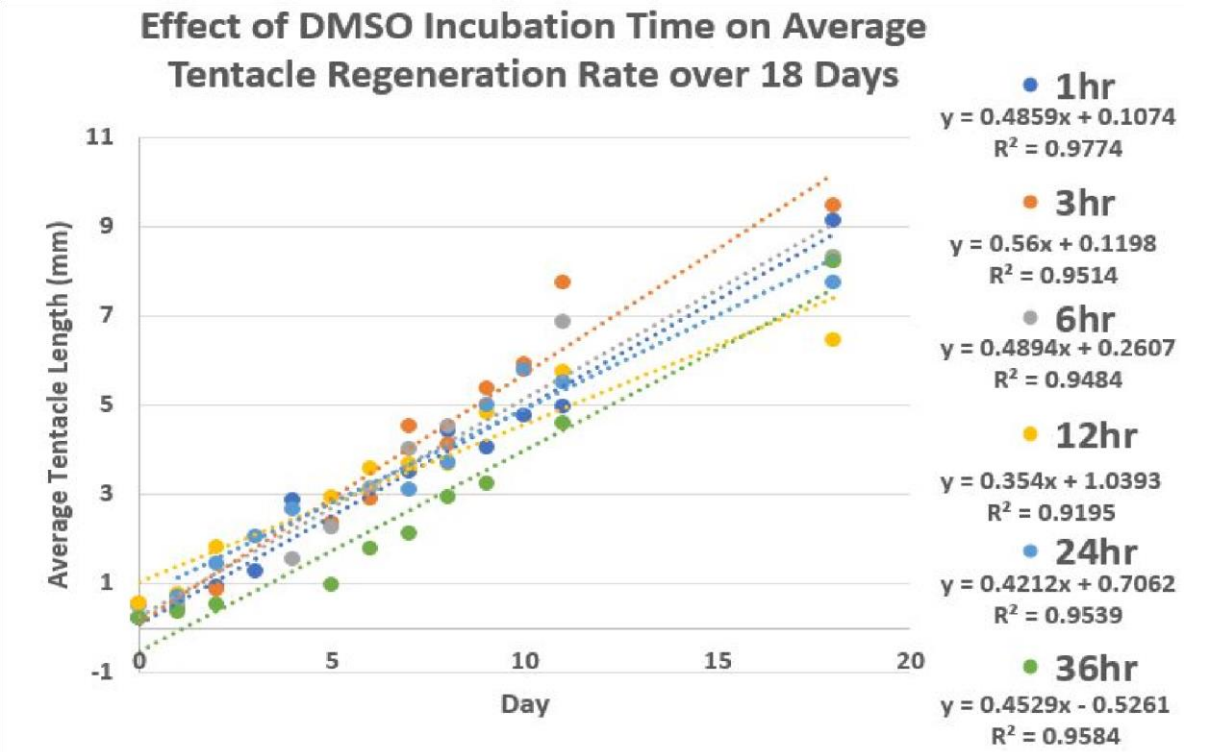


Figure 1. DMSO incubation for varying exposure times shows the minimum time required to enhance tentacle regeneration rate over 18 days.

Animals from the first set of experiments were evaluated for memory of DMSO treatment by comparing the recut regeneration rates to the original DMSO rates as well as to those of seawater controls. Average tentacle lengths were plotted over time and each data set was fit to a linear trendline (Figures 2 and 3). Data for groups of animals treated with 0.2% DMSO for 1 hour and 3 hours are shown in Figures 2 and 3, respectively.

While the animals from the 1 hour DMSO treatment group displayed a linear regeneration rate (R^2=0.9736), the recut (R^2=0.773) and seawater control (R^2=0.6952) animals did not fit well to a linear trendline (Figure 2). T-tests conducted on the original 1 hour DMSO treatment and recut regeneration rate showed that there was no significant difference between the groups over 11 days (Student's t-test p=0.461, Table 1).

Animals recut after treatment with DMSO for 3 hours yielded a linear regeneration rate (R^2=0.9068). T-tests conducted on the original 3 hour DMSO treatment and recut regeneration rate showed that there was no significant difference between the groups over 11 days (Student's t-test p=0.947, Table 1).

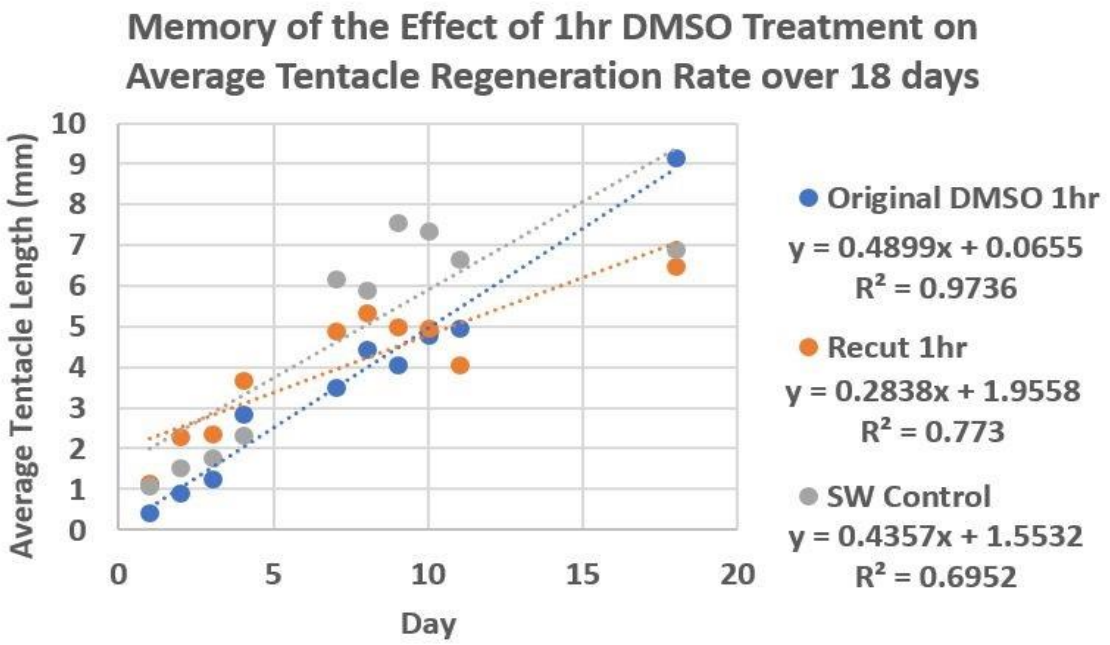


Figure 2. Data points and trendline equations for animals treated with 0.2% DMSO for 1 hour over 18 days were compared to the regeneration rates for recut and seawater control animals.

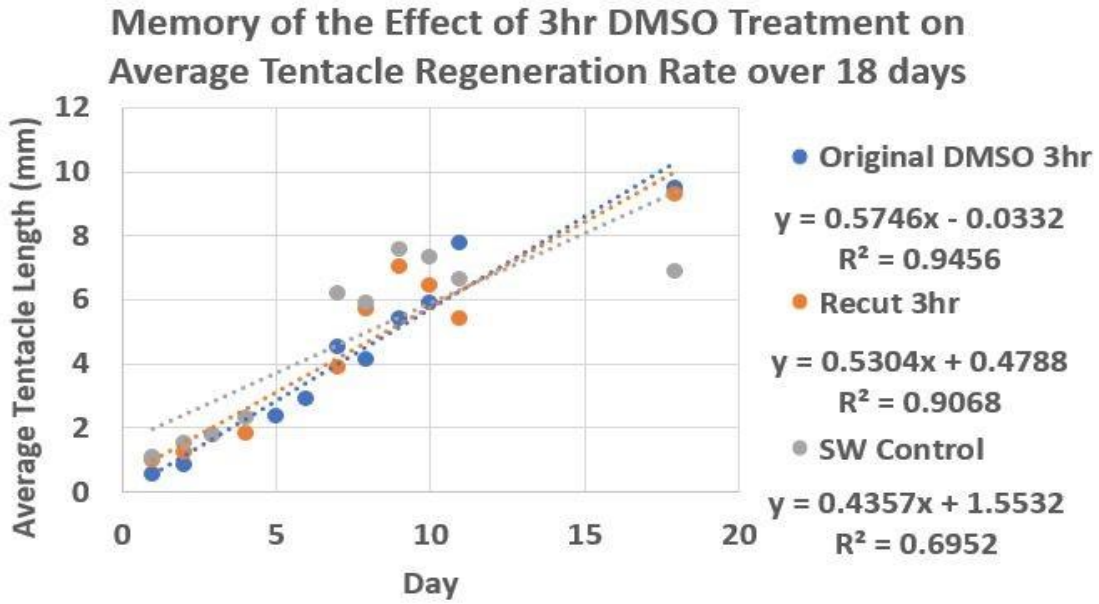


Figure 3. Data points and trendline equations for animals in 0.2% DMSO for 3 hours over 18 days were compared to the regeneration rates for recut and seawater controls.

Table 1. T-Tests between Original DMSO and corresponding Recut groups yield p > 0.05.

T-Test Comparison	P Value
Original DMSO 1 hr vs. Recut - 11 day	**0.461**
Original DMSO 3 hr vs. Recut - 11 day	**0.947**

The electroporation experiments yielded regeneration rates for animals exposed to different capacitance and resistance settings. Average tentacle lengths were plotted over time and each data set was fit to a linear trendline. In each of the electroporation treatment groups, rate of regeneration fit to a linear function, with R^2 values all greater than 0.9018 (Figure 4). Animals exposed to 1,000 μF x 30Ω experienced the highest tentacle regeneration rates (slope=0.6787) over 18 days, followed by 3,000 μF x 10Ω animals (slope=0.5521) and 4,000μF x 50Ω (slope=0.4675). Group 1 animals regenerated at a significantly faster rate when compared to Group 3 animals (p value=0.0298, Table 2). This shows a trend of optimal regeneration rate at lower capacitance and higher resistance settings.

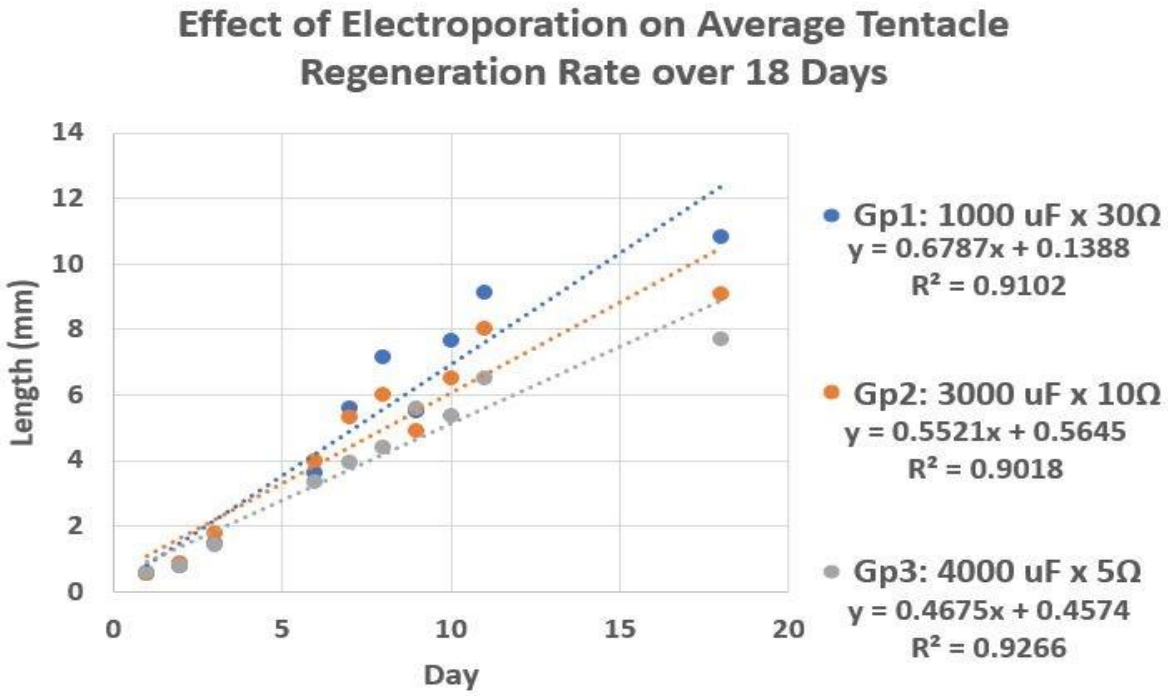


Figure 4. Effect of electroporation at three capacitance and resistance settings on tentacle regeneration over 18 days shows optimal enhancement at 1,000 μ F x 30Ω.

Table 2: Rates of regeneration for the three electroporation settings are compared.

T-Test	P Value
Electroporation Gp1 vs Gp2	**0.2198**
Electroporation Gp1 vs Gp3	**0.0298***
Electroporation Gp2 vs Gp3	**0.3028**

Electroporation regeneration rates were compared to those of DMSO-treated animals for different time periods (Table 3). Statistically significant differences were found when comparing the Group 1 electroporation rates to those of the 1 hour DMSO group over both 11 ($p=0.000608$) and 18 days ($p=0.03124$). Similarly, statistically significant differences were found when comparing tentacle regeneration rates for electroporation Group 1 to the 48 hour DMSO group over both 11 ($p=0.0354$) and 18 days ($p=0.00421$). These results suggest that electroporation enhances tentacle regeneration rate at a significantly higher level than 1 and 48 hour DMSO treatments. Conversely, t-tests between animals of the Group 1 electroporation treatment and 3 hour DMSO group yielded no significant difference in rates at 11 ($p=0.09909$) and 18 days ($p=0.2667$). This suggests that electroporation produces similar regeneration enhancement when compared to 3 hours of DMSO treatment.

Table 3. Electroporation group 1 rates were compared to DMSO for 1, 3, and 48 hours.

Ele Group 1	Original DMSO 1 hr	Original DMSO 3 hr	DMSO 48 hr
Day 11	**0.000608***	**0.09909**	**0.0354***
Day 18	**0.03124***	**0.2667**	**0.00421***

4. DISCUSSION

Animals treated with a 3 hour incubation of DMSO experienced the fastest rate of regeneration when compared to the other experimental groups (Figure 1). There is no significant difference between the slope resulting from the 3 hour incubation and the 48 hour incubation ($p>0.14$). This demonstrates that a similar enhancement effect by DMSO on tentacle regeneration can be achieved by a much shorter incubation time.

A replicate experiment of the 1 and 3 hour time course animals was conducted (data not shown). There was not a significant difference ($p>0.5$) between the slopes produced for both 3 hour groups, showing consistency for this time interval.

The animals evaluated for memory of the effect of DMSO produced regeneration rates comparable to their original respective groups (Table 1). The re-excised 1 hour animals displayed diminished regeneration, consistent with the slope observed in the original excision (Figure 2) demonstrating memory of their lack of enhanced regeneration. The re-excised 3 hour

animals regenerated with an enhanced rate when compared to the seawater controls over 18 days (Figure 3). This regeneration rate suggests a retained memory of the effect from DMSO. Animals pulsed at 1,000 μF x 30Ω (Group 1, Figure 4) regenerated tentacles at the highest rate when compared to the other groups (Table 2). The 3 hr DMSO group and the electroporation group 1 were not significantly different, indicating an enhanced effect on regeneration rate by electroporation (Table 3). A significant difference between electroporation group 1 and DMSO 1 hour incubation and 48 hour groups was found, also supporting an enhancement in regeneration rates by electroporation (Table 3). The similarity between the effects of electroporation to the effects of DMSO indicates the mechanism of DMSO in enhancing tentacle regeneration (Table 3). Therefore, this suggests that DMSO's ability to alter membrane permeability changes the electrochemical gradient of ions in the cells, leading to enhanced tentacle regeneration in *Nematostella vectensis*.

5. ONGOING STUDIES

Now that electroporation is known to mimic DMSO treatment effects, the change in membrane permeability is suggested to play a major role in this process. Next, we aim to investigate the role of calcium and potassium ions, among others, in tentacle regeneration.

REFERENCES

Bly, K., Tusa, A., Mire, P. (2017). The Effect of Dimethyl Sulfoxide (DMSO) on Tentacle Regeneration in Nematostella vectensis. Poster session presented at Honors Undergraduate Research Convention.

Gurtovenko, A. A., & Anwar, J. (2007). Modulating the Structure and Properties of Cell Membranes: The Moleculear Mechanism of Action of Dimethyl Sulfoxide. J. Phys. Chem. B, 111 (35), 10453–60.

Notman, R., Noro, M., O'Malley, B., and Anwar, J. (2006). Molecular Basis for Dimethylsulfoxide (DMSO) Action on Lipid Membranes. J. Am. Chem. Soc., 128(43), 13982-13983.

Puckett, A., & Tusa, A. (2017, April). Effects of inhibition of Delta- Notch Signaling Pathway on Tentacle Regeneration in Nematostella vectensis. Poster session presented at Biology Undergraduate Research Symposium.

Putnam, N. H., Srivastava, M., Hellsten, U., Dirks, B., Chapman, J., Salamov, A....Rokhsar, D. S. (2007). Sea anemone genome reveals ancestral eumetazoan gene repertoire and genomic organization. Science 317(5834), 86-94. doi:10.1126/science.1139158

Wen, J., Tong, Y., & Zu, Y. (2015). Low concentration DMSO stimulates cell growth and in vitro transformation of human multiple myeloma cells. British Journal of Medicine, 5 (1), 65-74.

Community and Social Support of Second-Generation Immigrants in the US

Zachary Boudreaux[1], Donaka Autry[2], Andre Rodriquez[3], and Manyu Li[4*]
1 2391 Coteau Rd, Houma, LA 70364, Nicholls State University, zboudreaux1@its.nicholls.edu
2 655 Marie Antoinette St. Lafayette LA 70506, University of Louisiana at Lafayette, dxa1838@louisiana.edu
3 1630 Rue de Belier, Lafayette Louisiana 70506, University of Louisiana at Lafayette, arodriquez1234@gmail.com
4 P.O. Box 43644, Lafayette, LA 70504, University of Louisiana at Lafayette, manyu.li@louisiana.edu

ABSTRACT

Immigrants and their children often report difficulties in sociocultural adaptation, partly due to the cultural distance they experienced between their cultures of origin and the host country cultures (e.g. Bierwiaczonek & Waldzus, 2016; Searle & Ward, 1990; Shenkar, 2001; Ward & Kennedy, 1993). This study aimed at identifying second-generation immigrants' source of social and community support, as well as their involvement in social and community organizations. The interview data in this study were part of a larger project examining immigrants' sociocultural adaptation and community engagement. The participant was interviewed by a well-trained researcher. At the beginning of the interview, the researcher made sure that the participants identified as immigrants. If the student stated that he/she did not identify as an immigrant, the student was informed that he/she did not fit the inclusion criteria for this study. The results of this experiment produced several themes generated throughout each second-generation immigrant; these themes were that each participant received social support from their family members and peers, along with extended social support from affiliating organizations in the area and strangers that may come from a similar background as the participant. However, regarding if the participant was interested in helping the immigrant community, the answer was always a resounding "yes", but they were unsure of how to approach the idea. They hadn't found ways or time to go about helping immigrants similar to themselves in the community. This small study only further pushes cross-cultural research forward in regard to second-generation immigrants, along with the aspects of their life and how they wish to impact others that come after them. America used to be known as a nation of immigrants, but after several centuries we have accomplished our own culture; however, we seemed to have lost touch with how to assist immigrants of today.

Key Words: Immigration, Community Engagement, Social Support

1. INTRODUCTION

Immigrants and their children often report difficulties in sociocultural adaptation, partly due to the cultural distance they experienced between their cultures of origin and the host country cultures (e.g. Bierwiaczonek & Waldzus, 2016; Searle & Ward, 1990; Shenkar, 2001; Ward & Kennedy, 1993). These difficulties were found to have negative effects on immigrants' well-being and psychological adjustment (Phinney, Horenczyk, Liebkind, & Vedder, 2001; Suárez-Orozco, Todorova, & Qin, 2006). Social and community support has been found to be crucial in the sociocultural adaptation of immigrants and their children (Katz, 2014; Solis, Fernadez, & Alcala,

2013). This study aimed at identifying secondgeneration immigrants' source of social and community support, as well as their involvement in social and community organizations.

Many of these studies that examined immigrants' sociocultural adaptation focused on individual factors, such as cultural similarity/distance (Ward & Kennedy, 1999), personality (Brisset, Safdar, Lewis, & Sabatier, 2010) and motivation (Neto & Wilks, 2017). However, the recent focus on community psychology has changed how the issue is being studied. Community psychology is a discipline of psychology that emphasizes the role of cultural, social, environmental and structural factors on individual changes. Therefore, instead of looking only at individual factors, recent research suggested that community-related variables played a significant role in one's sociocultural adaptation (Katz, 2014; Li, Frieze, Nokes-Malach, & Cheong, 2013; Solis et al., 2013). Therefore, through semi-structure interviews, this study examined the role of social and community support, such as friends, families and community organizations, on second-generation immigrants' adaptation.

2. METHOD

The interview data in this study were part of a larger project examining immigrants' sociocultural adaptation and community engagement. Participants were recruited through UL Lafayette SONA participant pool in the Psychology Department. Only participants who identified themselves as immigrants were invited. Participation in the study was completely voluntary, although students may have fulfilled partial research requirement or received 1.5 bonus credits by participating in the experiment.

The semi-structured interview was conducted on a one-to-one basis and has been audio recorded in a private room in the Department of Psychology. The participant was interviewed by a well-trained researcher. At the beginning of the interview, the researcher made sure that the participants identified as immigrants. If the student stated that he/she did not identify as an immigrant, the student was informed that he/she did not fit the inclusion criteria for this study. Then, a consent form was presented to the participants. The participants were also informed that the interview would be audio-recorded. They were presented with the Media Recording Release Form. The participants were informed that any of the student's identifiable personal information will not be revealed in the interview transcription. For this reason, the researcher asked the student not to mention any identifiable personal information (e.g., names of the friends or families) during the interview. However, if the student accidentally mentioned information attached to personal identities, the transcriptionist removed those identities from the transcripts.

Fourteen participants were recruited. Among them, four were first-generation immigrants and ten were second generation immigrants. To focus on second-generation immigrants' experiences, only second-generation immigrants were included in this analysis. Table 1 showed the cultural heritage of the second-generation immigrants included in this analysis.

The interviews were transcribed verbatim by the second and fourth authors. A thematic analysis approach was used to identify themes in the interview transcriptions that relate to social and community support. The first and fourth authors each read the transcriptions and identified the themes.

Table 1. Sample characteristics of the interviewees.

Participants	Cultural heritage	Gender
1	Hispanic (Spain)	Male
2	Hispanic (Mexico)	Female
3	Danish	Female
4	Hispanic (Panama)	Female
5	Filipino	Male
6	Vietnamese	Female
7	Guatemalan	Female
8	Hispanic (Mexico)	Male
9	Nigerian	Male
10	Laos	Female

3. RESULTS

Several themes were identified:

3.1 Peer support regarding family and friends

When asked questions regarding whether the participants received social support from their family members and peers, all responses were met with positive reactions.

> *"Like if you're a little different [my family will] be like "ehh he's a little different it's okay" -Participant 1*

> *"So yeah, I am much closer to my dad's side of the family. But at the same time, with my mom's side, they are just very open and there for me. I don't know what I would do without them." -Participant 3*

> *"It's almost like everyone's connected like there's a sense of togetherness when you're around other black people. It's like we all get each other" -Participant 4*

3.2 Support received from affiliating organizations and strangers

Questions that focused on support from their own community and persons from similar backgrounds provided positive feedback, showing that these second-generation immigrants are receiving social support.

> *"It feels natural because even though they're Hispanic too and we're from different nationalities I don't feel like that around them. I just feel like I get recognized as just Hispanic and it makes me feel good." -Participant 1*

> *"I feel like when I went to Mexico I was just as comfortable there as I was here. They accepted me, they knew me by name which is weird because I'd never met these people in my life, but they were related to me." -Participant 8*

"[ASA does] cultural heritage events, they show the culture and let people know that there is a group for African students and African American students who have parents that there's a group for them." -Participant 9; (ASA stands for African Students Association)

"I do like to participate in stuff on campus with like VSoul. It's a Vietnamese group at UL…. It's just like a social organization, they do a lot of nice things just for fun. They do a lot of cultural activities as well" -Participant 10; VSoul stands for Vietnamese Student Organization at UL

3.3 Intention to contribute to the immigrant community

When being asked whether they were helping in immigrant communities, participants expressed that they were interested in helping other immigrants, but they hadn't found ways or time to do that.

"I want to help but like I don't feel like I have enough platform and access to be able to help" – Participants 4

"Like if someone comes and they need a job then we'll pitch in and go help them." – Participant 7

4. DISCUSSION

Throughout this research, we have concluded that all second-generation are receiving some variation of social support, whether it be from their peers, organizations, or even strangers from similar backgrounds. This is consistent to Maslow's (1943) hierarchy of needs, that is, these individuals were receiving the social support needed in order to grow personally and allowing themselves to meld well into this melting pot of a nation. However, their main struggle seems to concern the fact that they were not sure how to help immigrants that come after them in helping adjust to a different cultural climate. Future studies may continue to look at the relationship between immigration and perceived social support, given the social climate of the time. This continued research would allow us to look at the trend of if this country is becoming more open towards immigration, or perhaps becoming more against it; thus, becoming a conundrum as it is a nation built by immigrants.

REFERENCES

Bierwiaczonek, K., & Waldzus, S. (2016). Socio-cultural factors as antecedents of crosscultural adaptation in expatriates, international students, and migrants. *Journal of Cross-Cultural Psychology*, *47*(6), 767–817. https://doi.org/10.1177/0022022116644526

Brisset, C., Safdar, S., Lewis, J. R., & Sabatier, C. (2010). Psychological and sociocultural adaptation of university students in France: The case of Vietnamese international students. *International Journal of Intercultural Relations*, *34*, 413–426. https://doi.org/10.1016/j.ijintrel.2010.02.009

Katz, V. S. (2014). *Kids in the middle: How children of immigrants negotiate community interactions for their families*. New Brunswick, New Jersey, and London: Rutgers University Press.

Li, M., Frieze, I. H., Nokes-Malach, T. J., & Cheong, J. (2013). Do friends always help your studies? Mediating processes between social relations and academic motivation. *Social Psychology of Education*, *16*(1), 129–149. https://doi.org/10.1007/s11218-012-9203-5

Neto, F., & Wilks, D. C. (2017). Predictors of Psychological Adaptation of Cape Verdean Students in Portugal. *Journal of College Student Development*, *58*(7), 1087–1100. https://doi.org/10.1353/csd.2017.0085

Phinney, J. S., Horenczyk, G., Liebkind, K., & Vedder, P. (2001). Ethnic Identity, Immigration, and Well-Being: An Interactional Perspective. *Journal of Social Issues*, *57*(3), 493–510.

Searle, W., & Ward, C. (1990). The prediction of the psychological and sociocultural adjustment during cross-cultural transition. *International Journal of Intercultural Relations*, *14*, 449–464.

Shenkar, O. (2001). Cultural distance revisited: towards a more rigorous conceptualization and measurement o f cultural differences. *Journal of International Business Studies*, *32*(3), 519–535.

Solis, J., Fernadez, J. S., & Alcala, L. (2013). Mexican immigrant children and youth's contributions to a community centro: Exploring civic engagement and citizen constructions. *Sociological Studies of Children and Youth*, *16*, 177–200. https://doi.org/10.1108/S1537-4661(2013)0000016012

Suárez-Orozco, C., Todorova, I., & Qin, D. B. (2006). The Well-Being of Immigrant Adolescents: A Longitudinal Perspective on Risk and Protective Factors. In T. Villarruel, F. A., Luster (Ed.), *Child psychology and mental health. The crisis in youth mental health: Critical issues and effective programs, Vol. 2. Disorders in adolescence* (pp. 53– 83). Westport, CT: Praeger/Greenwood.

Ward, C., & Kennedy, A. (1993). Where's the "culture" in cross-cultural transition?: Comparative studies of sojourner adjustment. *Journal of Cross-Cultural Psychology*, *24*(2), 221–249. https://doi.org/10.1177/0022022193242006

Ward, C., & Kennedy, A. (1999). The measurement of sociocultural adaptation. *International Journal of Intercultural Relations*, *23*(4), 659–677. https://doi.org/0147-1767/99

Condom Availability and Safe-Sex Behaviors

Mia R. Comeaux[1], Kelsey Mayes[2], Haven Evans[3], Cristian Rivera, M.S.[4], and Amy L. Brown, PhD[5]

1University of Louisiana at Lafayette, Student, mrc0199@louisiana.edu
2 University of Louisiana at Lafayette, Student, kxm9358@louisiana.edu
3 University of Louisiana at Lafayette, Student, hje1649@louisiana.edu
4 Louisiana State University, Graduate Student; University of Louisiana at Lafayette, Adjunct Instructor, c00251729@louisiana.edu
5 University of Louisiana at Lafayette, Associate Professor, alb6095@louisiana.edu

ABSTRACT

In order to understand why college students would not use protection and to produce interventions that will increase condom use and decrease risk for STDs, according to previous literature, we must begin by understanding the correlations among college students' attitudes toward, perceived norms about, and behavioral intentions to use condoms. In this study, we administered a survey that included a Sexual History Survey, Condom Use History Survey, and Condom Use Attitudes Survey, along with a demographics survey. Our population was students who live in either of two UL Lafayette residence halls. The demographics of the 283 participants we explored concerning condom use intentions were gender (the majority were females), sexual orientation (the majority were heterosexual), and sexual experience. The data presented here were results from a preliminary survey that was part of a larger intervention on condom availability and condom attitudes and behaviors. Our predictions were supported by our findings. Attitudes toward and perceived norms about prophylactic use were significant predictors of behavioral intentions to use condoms, and this finding was significant regardless of gender, sexual orientation, or sexual experience of participants.

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

1. INTRODUCTION

Louisiana ranked first in the United States in highest rate of congenital syphilis and gonorrhea, second in highest rate of chlamydia, and third in highest rate of primary and secondary syphilis in 2013 (CDC, 2014). Additionally, Baton Rouge and New Orleans were the second and fourth cities in the U.S., respectively, with the highest estimated rates of HIV infection in 2013 (LDHH, 2014b). These high rates put sexually active Louisiana college students at risk for these STDs, especially if they do not use prophylactics. Over 70% of college students at the University of Louisiana at Lafayette (UL Lafayette) have indicated that they are sexually active. Approximately 47% of those students indicated that they did not use a condom at last vaginal intercourse. Why would students put themselves at this high health risk by not using protection?

Extensive literature attempts to explain condom use behaviors by examining correlations between condom use attitude and behaviors. Bryan, Aiken, and West (1997) reviewed research suggesting that one of the most consistent predictors of condom use was people's attitudes about condom use. This is consistent with the theory of planned behavior (TPB). TPB can be used to explain and predict condom use behaviors by their association to condom use attitudes

and self-efficacy (Montanaro & Bryan, 2014). Broadly, the theory of planned behavior proposes that attitudes and perceived behavioral control directly influenced intentions to engage in a behavior (Ajzen & Madden, 1986).

Social stigmas or perceived social norms have been shown to be a barrier to the use of prophylactics. There is a stigma associated with openly discussing or making indications of one's sexual activity, such as procuring condoms (Kirby & Brown, 1996; Wells & Alano, 2013). This may lead some students to avoid obtaining condoms for fear of judgment. Past studies have suggested that providing condoms to students in unattended machines may lead to more condom procurement (Wells & Alano, 2013). This suggests that the mere presence of another individual when obtaining condoms could lead one to feel judged and avoidant of the situation completely.

This study seeks to understand why college students would not use protection and to produce interventions that will increase condom use and decrease risk for STDs by examining the correlations among college students' attitudes toward, perceived norms about, and behavioral intentions to use condoms. The current analyses examined college students' sexual history, condom use history and condom use attitudes along with demographics such as sexual orientation and gender. Based on the Theory of Planned Behavior and previous literature, we predicted that the attitudes of and perceived social norms regarding condom use will predict condom use behavior.

2. METHODS

2.1 Participants

The participants in this study were students of at least 18 years of age who live in either of two of UL Lafayette's residence halls – one a treatment hall, one a control hall. Students in these dorms were invited to participate in this study via the university's email system. We collected online survey responses from 299 students; after removing participants who did not complete the survey in its entirety, analyses were run on 283 participants. The majority of participants identified as White (62.9%), heterosexual (78.1%) females (68.6%). Most participants were sophomores (45.2%) with a mean age of 19.63 years (SD: 1.21). Among those participants, only 63% reported experiencing sexual intercourse (vaginal or anal).

2.2 Measures

The survey included three measures in addition to the demographics survey. Participants completed a Sexual History Survey that asked if participants have engaged in oral, anal, or vaginal sex; it also asks for the number of sexual partners in the past 60 days. The Condom Use History survey assessed the general risk involved during participants' most recent sexual encounters by asking about their recent condom-use behaviors and condom procurement on campus. The Condom Use Attitudes measure assessed participants' attitudes toward (α = .8552), perceived norms of (α = .6821), and behavioral intentions (α = .9097) to use condoms.

3. RESULTS

To examine the relation between behavioral intentions, attitudes, and perceived norms, multiple regression analyses were conducted. Each regression included attitudes toward condom use

and perceived norms about condom use as predictor variables for behavioral intent to use condoms. Each model was divided by gender (male or female), sexual orientation (heterosexual or non-heterosexual), and sexual experience (experienced or not experienced).

Attitudes toward and perceived norms about condom use were significant predictors of behavioral intent to use condoms across gender, sexual orientation, and sexual experience.

Specifically, the results were as follows:

- Predictions of behavioral intentions based on gender:
  - Male:
    - Attitudes: $b = 0.63$, $t = 8.19$, $p < .0001$.
    - Perceived norms: $b = 0.41$, $t = 4.89$, $p < .0001$.
  - Female:
    - Attitudes: $b = 0.64$, $t = 10.94$, $p < .0001$.
    - Perceived norms: $b = .0.43$, $t = 6.42$, $p < .0001$.
- Predictions of behavioral intentions based on sexual orientation:
  - Heterosexual:
    - Attitudes: $b = 0.66$, $t = 13.33$, $p < .0001$.
    - Perceived norms: $b = 0.37$, $t = 6.39$, $p < .0001$.
  - Non-Heterosexual:
    - Attitudes: $b = 0.50$, $t = 4.12$, $p = .0001$.
    - Perceived norms: $b = 0.62$, $t = 5.10$, $p < .0001$.
- Predictions of behavioral intentions based on sexual experience:
  - Experienced:
    - Attitudes: $b = 0.73$, $t = 12.66$, $p < .0001$.
    - Perceived norms: $b = 0.35$, $t = 5.63$, $p < .0001$.
  - Not Experienced:
    - Attitudes: $b = 0.49$, $t = 6.41$, $p < .0001$.
    - Perceived norms: $b = 0.60$, $t = 6.78$, $p < .0001$.

4. DISCUSSION

The findings in this study were robust and corroborated the Theory of Planned Behavior. Attitudes toward and perceived norms about prophylactic use were significant predictors of behavioral intentions to use condoms, and this finding was significant regardless of gender, sexual orientation, or sexual experience of participants.

The results regarding participants who did not have sexual experience were surprising. Theoretically, the relation among attitudes, perceived norms, and behavioral intent to use condoms would matter more to people for whom condom use is more relevant (i.e., those who are currently sexually active). However, we found that – even for those participants who were not sexually experienced – attitudes and perceived norms were significant predictors of their behavioral intentions to use condoms. This finding that the influence of attitudes and perception of social norms on intentions to use condoms is not limited to those who are currently sexually active suggests that this discourse is relevant to a broader societal group.

The findings in this study suggest the importance of framing safe-sex practices, like the use of condoms, as normal, positive social behaviors. A potential barrier to the use of condoms may be a perceived social stigma surrounding the purchasing of prophylactics, thereby discouraging procurement of them. Presenting condom uptake and use as a socially acceptable and desirable behavior, then, may serve to increase behavioral intent to use condoms. A

second potential implication of this study pertains to the finding that attitudes and perceived norms significantly predicted intentions to use condoms for those who did not have sexual experience. This may suggest that comprehensive sexual education is equally pertinent to both sexually-experienced and non-sexually-experienced populations.

REFERENCES

Bryan, A. D., Aiken, L. S., & West, S. G. (1997). Young women's condom use: The influence of acceptance of sexuality, control over the sexual encounter, and perceived susceptibility to common STDs. *Health Psychology, 16*, 468–479. https://doi.org/10.1037/0278-6133.16.5.468

Centers for Disease Control and Prevention (CDC). (2014). CDC Fact Sheet: Reported STDs in the United States. Retrieved from http://www.cdc.gov/std/stats13/std-trends-508.pdf

Kirby D. B., & Brown, N. L. (1996). Condom availability programs in U.S. schools. *Family Planning Perspectives, 28*, 196-202. https://doi.org/10.1363/2819696

Louisiana Department of Health and Hospitals (LDHH). (2014b). Q4 HIV Surveillance Report. *Louisiana Office of Public Health STD/HIV Program, 12*. Retrieved from http://new.dhh.louisiana.gov/assets/oph/Center PHI/2014HealthReportCard/Q4_HIV_Surveillance_Report.pdf

Montanaro, E. A., & Bryan, A. D. (2014). Comparing theory-based condom interventions: Health belief model versus theory of planned behavior. *Health Psychology, 33*, 1251–1260. https://doi.org/10.1037/a0033969

Olenick, I. (1999). Free condom provision raises use among those with multiple partners. Family Planning Perspectives, 31, 205-206. https://doi.org/10.1363/3507103

Wells, C. J., & Alano, A. (2013). Prophylactic procurement of university students in southern Ethiopia: Stigma and the value of condom machines on campus. *PLOS One, 8*. https://dx.doi.org/10.1371%2Fjournal.pone.0060725

Self-Compassion and Valued Living

Jessica Criddle[1], Darryl O. Rachel, M.B.A.[2], Emily Sandoz, Ph. D.[3]

[1]jmc3285@louisiana.edu, University of Louisiana at Lafayette

[2]dor8661@gmail.com, University of Louisiana at Lafayette

[3]emilysandoz@louisiana.edu, University of Louisiana at Lafayette

ABSTRACT

Psychological flexibility and self-compassion have both been shown to positively impact psychological health and share many common factors. This study examined the association between psychological flexibility and living within one's values. Self-compassion was also investigated as a mediator of this relationship. Three self-report measures were used to explore these relationships in college students. It was found that psychological flexibility predicts achievement of values progress and that self-compassion fully mediates this link. Additionally, psychological inflexibility but not self-compassion was found to predict obstruction of valued living. This has implications for further research and the development of interventions on achieving valued living.

Key Words: Self-Compassion, Psychological Flexibility, Values

1. INTRODUCTION

Self-compassion, characterized by self-kindness, mindfulness, and a sense of kinship with other humans, has been associated with a number of positive outcomes (Neff, 2013). Intrapersonally, self-compassion predicts less anxiety, depression, and distress, and correlates with overall psychological well being (Neff & Pommier, 2013). Interpersonally, self-compassion is associated with social connectedness and kindness toward others (Jazaieri et al., 2013). Psychological flexibility, characterized by awareness and openness to experience in service of chosen values, correlates with a range of positive psychological outcomes (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Kashdan & Rottenberg, 2010). Several common factors tie self-compassion to psychological flexibility, namely willingness to observe and experience negative emotions and thoughts, shifting one's perspective to fit new contexts, and showing one's self kindness (Dahl et al., 2009; Martin, Staggers & Anderson, 2011). The flexible perspective inherent in both of these qualities indicates that self-compassion may be connected with valued living, or the tendency to choose meaningful action across a range of contexts. This study explored the relationships between psychological flexibility, self-compassion, and valued living.

2. METHODOLOGY

Seventy-six undergraduate students in psychology classes at University of Louisiana at Lafayette volunteered as participants in this study. As part of the university's online subject pool, they were not screened by any factors other than their elective selection of this study. Compensation came in the form of psychology class credit. Of these participants, 51 were female and 23 were male. Sixty-one percent identified as White and twenty-six percent as Black Participants completed three self-reported assessments and provided demographic data (gender and ethnicity) on a computer in the presence a researcher. The three self-report

measures used in this study were the Acceptance and Action Questionnaire-II (AAQ-II), the Self Compassion Scale (SCS), and the Valuing Questionnaire (VQ).

Psychological flexibility is measured with the AAQ-II (Bond et al., 2011). Seven questions such as, “My painful experiences and memories make it difficult for me to live a life that I would value,” measure willingness to continue to behave according to our established, self-defined value even when experiencing aversive feelings and situations. A seven point Likert scale ranges from, “never true,” to, “always true,” and assigned values from 1 to 7, respectively. A high overall score demonstrates psychological *in*flexibility.

Actively living according to one’s values is assessed using the VQ (Smout, Davies, Burns, & Christie, 2014). Values progress (VP) and values obstruction (VO) are the two subscales. Ten statements reflecting action in line with values are evaluated by the participants by how closely they resemble the participants experience in the past week. Responses range from not at all true to completely true on a seven point Likert scale, given values of 1 to 7. Higher overall scores on the VQ reflect living more in line with one’s values.

The SCS (Neff, 2013) assesses self-compassion as a composite of six traits: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identified. Twenty six statements embodying these traits are rated by frequency self-reported by participants. The five point scale ranges from almost never to almost always and is given values of 1 to 5, respectively. High overall scores indicate high self-compassion.

3. RESULTS

Higher scores of psychological inflexibility correlated with increased values obstruction (r = .073, p<.001) and decreased self-compassion (r = -0.66, p < .001) and values progress (r = -.38, p < .001). Increased self-compassion was linked with higher levels of values progress (r = =.047, p < .001) and lower levels of values obstruction (r = -0.43, p < .001). Additionally, increased values obstruction was found to negatively correlate with values progress (r = -.28, p < .05). The possible mediating role of self-compassion on the effect of psychological inflexibility on valued living was explored using regression analysis. Results revealed increases in psychological inflexibility predicted decreases in self-compassion (R^2 = 0.44, F(1, 74) = 58.6, b= -0.05, t= -7.66, p < 0.0001) and values progress (R^2 = 0.14, F(1, 74) = 12.56, b= -0.26, t = -3.54, p = 0.007). Self-compassion predicted increased values progress (R^2 = 0.22, F(1, 74)= 21.09, b = 4.57, t = 4.59, p < 0.0001). Together, these findings indicate a possible mediating relationship. To appraise this relationship, self-compassion was controlled for (b = 3.78, t = 2.84, p = 0.0059) and the relationship between psychological flexibility and values progress was again examined. Here psychological flexibility no longer significantly predicted values progress (b= -0.08, t = -0.88, p = 0.38), indicating full mediation by self-compassion, see *Figure 1*.

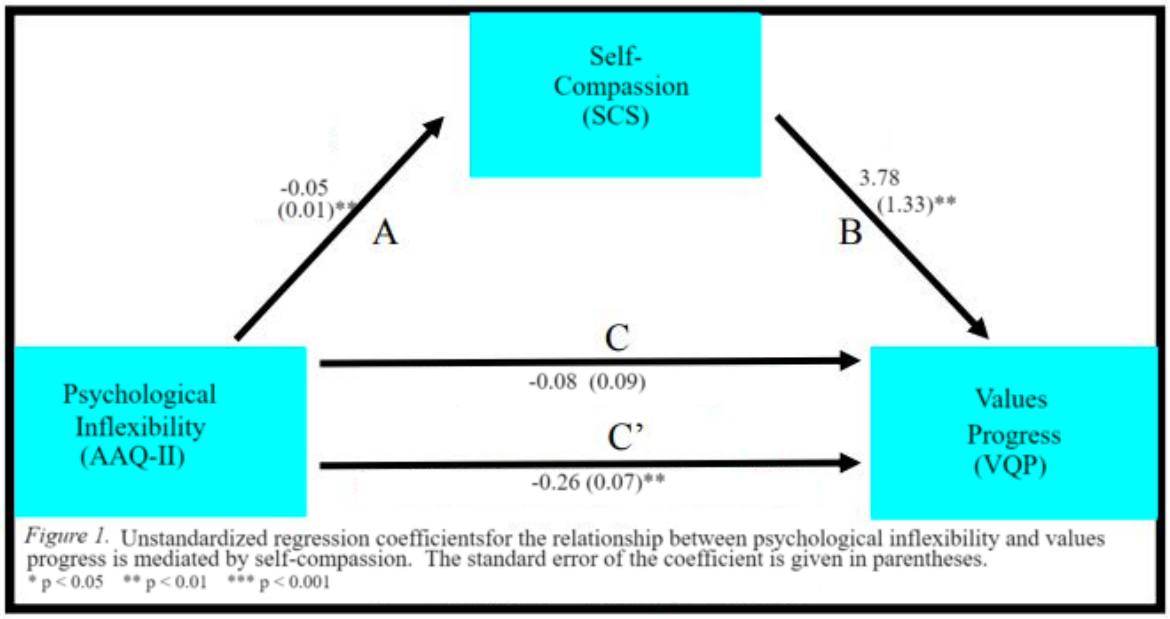


Figure 1. Unstandardized regression coefficientsfor the relationship between psychological inflexibility and values progress is mediated by self-compassion. The standard error of the coefficient is given in parentheses.
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 1.

Next the possible mediating role of self-compassion on the effect of psychological inflexibility on values obstruction was explored. Regression analysis showed values obstruction as being predicted by psychological inflexibility (R^2 = 0.53, F(1, 74) = 82.10, b = .53, t = 9.06, p< 0.0001) and self-compassion as negatively predicted by psychological inflexibility (R^2 = 0.44, F(1, 74) = 58.6, b= -0.05, t= -7.66, p < 0.0001). Self-compassion negatively predicted values obstruction (R^2 = 0.18, F(1, 74) = 16.37, b= -4.46, t= -4.05, p = 0.0001) but was not found to play a mediating role. Psychological flexibility soley predicted obstruction of values (*adj.* R^2 = 0.52, F(2, 73) = 41.43, b = 0.58, t = 7.39, p < 0.0001), see *Figure 2*.

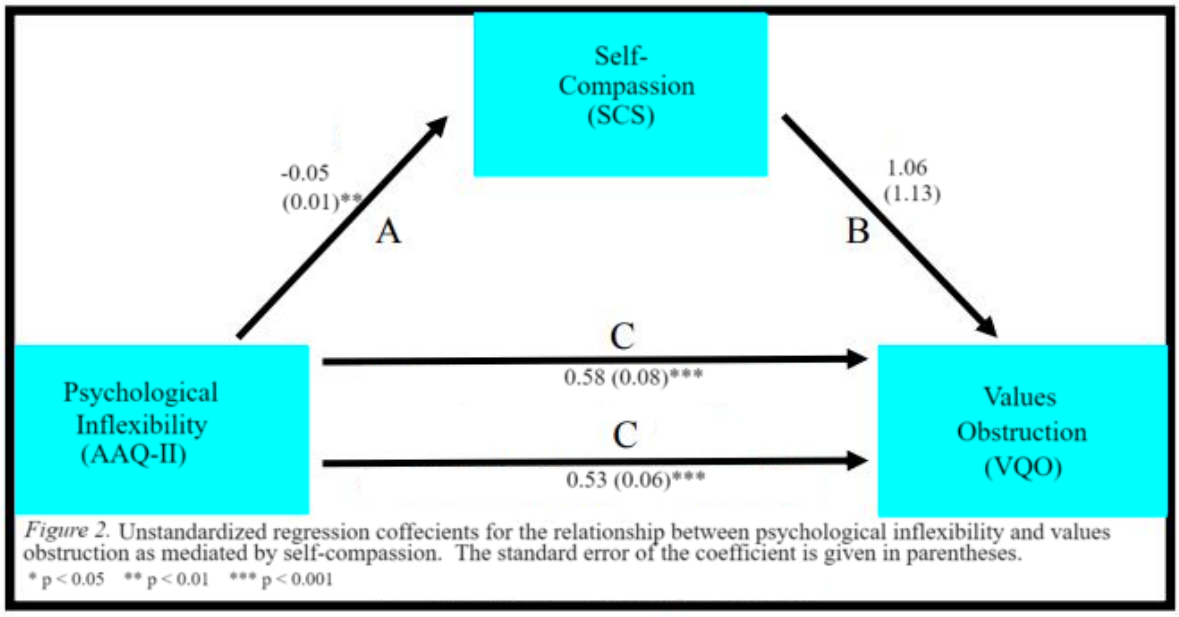


Figure 2. Unstandardized regression coffecients for the relationship between psychological inflexibility and values obstruction as mediated by self-compassion. The standard error of the coefficient is given in parentheses.
* p < 0.05 ** p < 0.01 *** p < 0.001

Figure 2.

4. DISCUSSION

The study provided somewhat unexpected results. As predicted, it was found that self-compassion plays a role in the relationship between psychological flexibility and valued living. Surprisingly, it fully mediated the relationship in a way that possibly omits overall psychological flexibility as a direct source of values progress. In other words, it may be that the mechanism by which psychological flexibility fosters valued living is by enhancing self-compassion. Despite Hayes' (2008) hypothesis that self-compassion is essentially interconnected with psychological flexibility, the current study is the first to suggest that values progress in a nonclinical sample may be predicted principally through self-compassion.

Consistent with other studies, (e.g. Smout, Davies, Burns, & Christie, 2014) values progress and values obstruction were negatively correlated. The multivariate pattern of prediction of values obstruction, however, differed from values progress. In short, self-compassion did not mediate the relationship between psychological flexibility and values obstruction. Psychological inflexibility ahd a direct effect on values obstruction. Together these findings suggest that (1) treating oneself with compassion may be of primary importance in living meaningfully and (2) engaging one's experience with flexibility may be of primary importance in navigating the inevitable obstacles involved in doing so. These findings have the possibility to inform both assessment and intervention in therapeutic settings.

REFERENCES

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., Waltz, T., & Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire - II: A revised measure of psychological flexibility and experiential avoidance. *Behavior Therapy, 42,* 676-688.

Dahl, J. C., Plumb, J. C., Stewart, I., & Lundgren, T. (2009). *The Art and Science of Valuing in Psychotherapy: Helping Clients Discover, Explore, and Commit to Valued Action Using Acceptance and Commitment Therapy.*Oakland, CA; New Harbinger Publications, Inc.

Hayes, S.C. (2008a). The roots of compassion. Keynote address presented at the fourth Acceptance and Commitment Therapy Summer Institute, Chicago,IL. http://www.globalpres.com/mediasite/Viewer/?peid=017fe6ef4b1544279d8cf27adbe92a51

Jazaieri, H., Jinpa, G.T., McGonigal, K., Rosenberg, E.L., Finkelstein, J., Simon-Thomas, E., Cullen, M., Doty, J.R., Gross, J.J. & Goldin, P. R. (2013). Enhancing compassion: A randomized controlled trial of a compassion cultivation training program. *Journal of Happiness Studies*, *14*(4), 1113-1126.

Martin, M. M., Staggers, S. M., & Anderson, C. M. (2011). The relationships between cognitive flexibility with dogmatism, intellectual flexibility, preference for consistency, and self-compassion. Communication Research Reports, 28, 275-280

Neff, K.D., & Pommier, E. (2013). The relationship between self-compassion and other-focused concern among college undergraduates, community adults, and practicing meditators. *Self and Identity*, *12*(2), 160-176.

Neff, K., & Tirch, D. (2013). Self-compassion and ACT. *Mindfulness, acceptance, and positive psychology: The seven foundations of well-being*, 78-106.

Smout, M., Davies, M., Burns, N., & Christie, A. (2014). Development of the valuing questionnaire (VQ). *Journal of Contextual Behavioral Science*, *3*(3), 164-172.

Extended Abstract: Assessing Efficacy of *Stop the Bleed* Education

Julia Daigle[1], Dr. Bruce Felgenhauer[2], Dr. Bridget Price[3] and Dr. Christy Lenahan[4]
[1] 117 Ella Street, Lafayette, LA 70506; University of Louisiana at Lafayette; jcd2399@louisiana.edu
[2] 410 E. St Mary Blvd, Lafayette, LA 70503; University of Louisiana at Lafayette; bfelgenhauer@louisiana.edu
[3] 906 East 1st St., Thibodeaux, LA 70301; Nicholls State University; bridget.price@nicholls.edu
[4] 411 E. St Mary Blvd, Lafayette, LA 70503; University of Louisiana at Lafayette; cmd3978@louisiana.edu

ABSTRACT

Stop the Bleed is a national grassroots, education campaign effort that focuses on empowering the public to recognize and control life-threatening bleeding emergencies. The White House, Homeland Security, and the American College of Surgeons - Committee on Trauma, and the Hartford Consensus have endorsed the program since 2015. *Stop the Bleed* is a call to action plan to train the public on hemorrhage recognition and control until medical personnel are available for management. An additional initiative is to place bleeding control kits in every public place. This project will focus on educating 80-100 professionally trained and lay persons utilizing handouts and presentation information provided by the *Stop the Bleed* campaign. The education process involves the use of material focused on hemorrhage recognition while the second component of training involves active and return demonstration of tourniquet use, wound packing with gauze, and hemostatic agents for major bleeding control. A retrospective study evaluating pre and post questionnaires will be utilized to assess knowledge of bleeding control education. The goal of this project is to prove that the *Stop the Bleed* campaign initiative can effectively train individuals regardless of current knowledge level. The significance of this study is to prove efficacy and support training of the public in responding to natural and unintentional disasters that result in uncontrolled bleeding.

Key Words: Hemorrhaging, Stop The Bleed, Bleeding Control

1. PURPOSE

According to the National Academies of Sciences (2016), the leading cause of death among Americans less than 46 years of age is trauma. Mortality from hemorrhage after trauma ranges from 30% to 40% with 33% to 56% of those hemorrhaging expiring during the prehospital period (Kauvar, Lefering, & Wade, 2006). Depending on which blood vessels are affected a person can bleed to death as quickly as two to three minutes (Department of Homeland Security, 2015). Educating the public on hemorrhage control improves self-reported willingness to assist in bleeding emergencies (Ross, Redman, Mapp, & Brown, 2018). Moreover, studies have indicated that in-person hemorrhage control training for laypersons is the most efficacious way to enable bystanders in assisting with bleeding emergencies (Goralnick et al., 2018). The purpose of this project is to evaluate efficacy of established *Stop the Bleed* in-person education among professionally trained and laypersons.

2. SIGNIFICANCE

Mass casualty incidents in recent history illustrate the importance of hemorrhage control education. Over the past 10 years, the U.S. has experienced 18 of the deadliest mass shootings in its history (Willingham & Ahmed, 2017). It is estimated that 124,760 people are shot each day in America and 35,141 of persons shot die from their injuries (Brady Campaign, 2016). Additionally, terrorist attacks on U.S. soil continue to occur with the most recent attacks utilizing motor vehicles as the weapon of choice: James Alex Fields killed one person and injured 19 during a "Unite the Right" rally held on August 12, 2017 in Charlottesville, VA and Sayfullo Habibuppaevic Saipov killed eight people and injured 12 more when driving a pickup truck onto a busy bicycle path in New York on October 31, 2017 (Cable News Network, 2018). In 2016, motor vehicle crashes took the lives of 37,461 people in the U.S. (Insurance Institute for Highway Safety Highway Loss Data Institute, 2018). These and other incidents such as the 2015 Amtrek train derailment that killed eight people and injured hundreds more (CBS Philly, 2015) demonstrate the high potential of public exposure to uncontrolled bleeding and the need for efficacious hemorrhage control education.

Literature evaluating efficacy of *Stop the Bleed* education is scant and focuses primarily on a person's confidence and willingness to assist in bleeding emergencies. A study by Ross et al. (2018) evaluated an individual's self-efficacy and willingness to use a tourniquet pre and post *Stop the Bleed* education. Results indicated a statistically significant improvement in self-efficacy and willingness to use a tourniquet after *Stop the Bleed* education. Of note, persons with "formal medical certification" were excluded from this study. The Iowa Department of Public Health in collaboration with the American College of Surgeons Committee on Trauma, Iowa Chapter and the Trauma Systems Advisory Council implemented *Stop the Bleed* statewide in the summer of 2017 (Iowa Department of Public Health, 2018). Student evaluations of the program are provided, but remain focused on self-efficacy and willingness to assist in bleeding emergencies. Currently, there is no published data from the Iowa Department of Health on student evaluations of *Stop the Bleed*.

3. AIMS

The aim of this project is to assess efficacy of *Stop the Bleed* education in improving knowledge of hemorrhage control among professionally trained and laypersons. The researchers hypothesize that implementation of *Stop the Bleed* education will significantly improve knowledge of hemorrhage control in both groups.

4. METHODS

A 10-item questionnaire was developed by the researchers. The questionnaire was designed to evaluate an individual's knowledge of hemorrhage control in bleeding emergencies. Each researcher recruited two associates, one medical professional and one layperson (similar to the targeted research population), to review an initial draft of the questionnaire and to respond to specific questions about clarity, readability, length, and recommendations to improve each section of the questionnaire. Suggestions from reviewers were incorporated and a final draft was sent to the same associates for final review and approval.

The questionnaire was distributed to persons attending planned *Stop the Bleed* education at locations throughout the state of Louisiana during the month of October. Locations included state nursing conferences and industrial companies within the southeast region of Louisiana. Questionnaires, labeled "Pre-Questionnaire" were distributed to participants prior to beginning *Stop the Bleed* education, which includes approximately 20 minutes of didactic instruction and a "hands on" demonstration/return demonstration portion. The same

questionnaire, labeled “Post-Questionnaire” was distributed once *Stop the Bleed* is completed. All questionnaires were submitted anonymously into a locked box and contained no information that allowed for identification of survey participants. Data was not analyzed until all *Stop the Bleed* education had been completed.

The researchers discussed the purpose of the questionnaires with persons participating in *Stop the Bleed* education. If *Stop the Bleed* participants were interested in participating in this study a consent form was given to them to review prior to participation. Once interested participants reviewed the consent, pre *Stop the Bleed* education questionnaires were distributed. Participants were able to refuse to complete the questionnaire(s) prior to beginning or discontinue participation at any time during the study without bias or repercussion from the principle investigators. This was explicitly stated on the participant consent form.

5. RESULTS

Descriptive statistics were run on all questions and pre and post total scores for both professionally trained and layperson’s groups (Appendix A, B). Overall mean scores for every question demonstrated significant improvement between pre ad post questionnaires in both groups. In the professionally trained group (n = 89) the pre questionnaire mean score was a 3.96 as opposed to the post questionnaire mean score of an 8.81. In the laypersons group (n = 57) the pre questionnaire mean score was a 3.84 as opposed to the post questionnaire score of a 7.89.

A repeated measures ANOVA was also run on pre and post questionnaire total scores in both groups. For the professionally trained group the results of the ANOVA were significant, $F(1, 88) = 476.69$, $p < .001$, indicating there were significant differences among the values of the pre questionnaire results and post questionnaire results. For the laypersons group the results of the ANOVA were significant, $F(1, 56) = 223.23$, $p < .001$, indicating there were significant differences among the values of pre questionnaire results and post questionnaire results.

6. PROTECTION OF HUMAN SUBJECTS

To ensure protection of human subjects and ethical research, all researchers and assistants involved in this project have completed Human Subjects Training via CITI. Each participant will be provided with a consent form prior to participating in this study. If there are any questions or concerns related to consent the primary investigator will be available to address them. To ensure anonymity of participants pre and post *Stop the Bleed* questionnaires will not include any identifying information. All questionnaires will be placed in a locked box that will not be accessed until all data has been collected.

The only potential risk to participants is loss of time used to complete the pre and post *Stop the Bleed* questionnaires as well as the *Stop the Bleed* education program. However, potential individual benefit is robust in that persons participating in *Stop the Bleed* education should obtain vital information about hemorrhage control. This not only benefits the individual, but the general public as well. Participants will also have the opportunity to become *Stop the Bleed* certified instructors. Finally, evaluation of the *Stop the Bleed* program will assess its efficacy and determine if there is a need for a more detailed educational intervention.

7. PLANS FOR DISSEMINATION OF RESULTS

The researchers plan to disseminate results at local and state conferences, directly to the Louisiana Emergency Response Network (facilitator of *Stop the Bleed* education in Louisiana), and publish the results in the Journal of the Louisiana State Medical Society.

REFERENCES

8 dead, more than 200 injured following Philadelphia train derailment. (2015, May 12). *CBS Philly.* Retrieved from https://philadelphia.cbslocal.com/2015/05/12/crews-responding-to-reported-train-derailment-in-port-richmond/

Brady Campaign. (2016). *Key gun violence statistics.* Retrieved from http://www.bradycampaign.org/key-gun-violence-statistics

Cable News Network. (2018, September 12). *US terrorist attacks fast facts.* Retrieved from https://www.cnn.com/2013/04/18/us/u-s-terrorist-attacks-fast-facts/index.html

Goralnick, E., Chaudhary, M. A., McCarty, J.C., Goldberg, S. A., Herrera-Escobar, J. P., McDonald, M., Haider, A. H. (2018). Effectiveness of instructional interventions for hemorrhage control readiness for laypersons in the public access and tourniquet training study (PATTS): A randomized clinical trial. *Journal of the American Medical Association Surgery, 153*(9), 791-799. doi:10.1001/jamasurg.2018.1099.

Insurance Institute for Highway Safety Highway Loss Data Institute. (2016). *General statistics: 2016.* Retrieved from https://www.iihs.org/iihs/topics/t/general statistics/fatalityfacts/overview-of-fatality-facts

Iowa Department of Public Health. (2018). *About stop the bleed campaign.* Retrieved from https://idph.iowa.gov/bets/stop-the-bleed

Kauvar, D. S., Lefering, R., Wade, C. E. (2006). Impact of hemorrhage on trauma outcome: an overview of epidemiology, clinical presentations, and therapeutic consideration. *The Journal of Trauma, 60*(6), S3-11.

Ross, E. M., Redman, T. T., Mapp, J. G., & Brown, D. J. (2018). Stop the bleed: The effect of hemorrhage control education on laypersons' willingness to respond during a traumatic medical emergency. *Prehospital and Disaster Medicine, 33*(2). 127-132. doi:https://doi.org/10.1017/S1049023X18000055

U. S. Department of Homeland Security. (2015). *Survivability in improvised explosive device and/or active shooter incidents.* Washington, DC: Office of Health Affairs.

Willingham, A. J., & Ahmed, S. (2017, November 6). Mass shootings in America are a serious problem and these 9 charts show just why. *Cable News Network.* Retrieved from https://www.cnn.com/2016/06/13/health/mass-shootings-in-america-in-charts-and-graphs-trnd/index.html

Appendix A
Stop The Bleed Professionally Trained Results
(n = 89)

	Mean	Standard Deviation	Skewness	Kurtosis
Pre Q1	0.27	0.45	1.04	-0.92
Post Q1	0.99	0.11	-9.27	84.01
Pre Q2	0.38	0.49	0.49	-1.76
Post Q2	0.72	0.45	-0.97	-1.05
Pre Q3	0.25	0.43	1.17	-0.63
Post Q3	0.80	0.40	-1.48	0.2
Pre Q4	0.25	0.43	1.17	-0.63
Post Q4	0.94	0.23	-3.85	12.68
Pre Q5	0.10	0.30	2.65	5.00

Post Q 5	0.55	0.50	-0.20	-1.96
Pre Q6	0.72	0.45	-0.97	-1.05
Post Q6	0.92	0.27	-3.13	7.80
Pre Q7	0.80	0.40	-1.48	0.20
Post Q7	0.97	0.81	-5.17	24.70
Pre Q8	0.36	0.48	0.59	-1.66
Post Q8	0.98	0.15	-6.44	39.52
Pre Q9	0.15	0.36	2.00	2.02
Post Q9	0.98	0.15	-6.44	39.52
Pre Q10	0.70	0.46	-0.86	-1.27
Post Q10	0.98	0.15	-6.44	39.52
Pre Total	3.96	1.71	0.52	0.14
Post Total	8.81	1.11	-1.08	1.06

Appendix B
Stop The Bleed Laypersons Results
(n = 57)

	Mean	**Standard Deviation**	**Skewness**	**Kurtosis**
Pre Q1	0.51	0.50	-0.04	-2.00
Post Q1	0.96	0.19	-0.505	23.54
Pre Q2	0.18	0.38	1.71	0.91
Post Q2	0.49	0.50	0.04	-2.00
Pre Q3	0.07	0.26	3.37	9.33
Post Q3	0.65	0.48	-0.62	-1.61
Pre Q4	0.11	0.31	2.57	4.62
Post Q4	0.91	0.29	-2.91	6.50
Pre Q5	0.11	0.31	2.57	4.62
Post Q 5	0.19	0.40	1.56	0.42
Pre Q6	0.60	0.49	-0.39	-1.85
Post Q6	0.98	0.31	-2.57	4.62
Pre Q7	0.75	0.43	-1.18	-0.60
Post Q7	0.96	0.19	-5.05	23.54
Pre Q8	0.54	0.05	-0.18	-1.97
Post Q8	0.88	0.33	-2.30	3.82
Pre Q9	0.14	0.35	2.07	2.29
Post Q9	0.98	0.13	-7.35	52.02
Pre Q10	0.82	0.38	-1.71	0.91
Post Q10	1	0	-	-
Pre Total	3.84	1.39	-0.28	-0.07
Post Total	7.89	1.36	-0.50	0.18

The Effect of Circadian Rhythms on Penalties in the National Football League

Keli I. Doles[1], Jeremy J. Foreman[2]
1 School of Kinesiology, University of Louisiana at Lafayette
2 School of Kinesiology and Center for Sports Success, University of Louisiana at Lafayette

ABSTRACT

Humans have peak performance times based on circadian rhythms, which may pose disadvantages for people trying to perform at a high level in different time zones. The purpose of this study is to determine if this disadvantage affects penalties accrued in NFL football games. From 2009-2015, 890 penalties were called in games where Pacific Time teams played in Eastern Time zones before 2pm Eastern Time. Of those penalties, 44.5% were called on the Eastern home teams and 55.5% were on the Pacific away teams. However, in a smaller sample of late games, more penalties are called on the away (Pacific) teams (i.e., 54.8% of penalties). Therefore, it appears that the away teams accrue more penalties than the home teams, however a more thorough examination is needed.

1. INTRODUCTION

Scheduling in the National Football League (NFL) is a major controversy. From determining bye weeks to home field advantage there are numerous factors that go into deciding the schedule of games, however, when the NFL releases its schedule the subject of circadian rhythms is not often mentioned in comments. Humans have a peak performance time that is correlated with the "biological clock" formally known as circadian rhythms. These rhythms are based on a system of entrainment which works as an oscillator swinging in two directions, 12 hours each way and approximately 24 hours in one full cycle. These cycles are relatively consistent; however, environmental changes can create a phase advance (Aschoff, 1965). Phase advances often occur when traveling across multiple time zones, resulting in disruption of the entrainment system. In the NFL, athletes travel across the country multiple times a year, and adjustment periods before games are often insufficient. For instance, when Eastern Time zone athletes compete against Pacific Time zone athletes, one team could be at a three hours disadvantage based on their peak performance time. The purpose of this study is to determine if this disadvantage affects penalties accrued, based on peak performance times.

2. LITERATURE REVIEW

2.1 Peak Performance Times

Human performance fluctuates depending on the time of the day. Studies have shown that optimal performance takes place later in the afternoon this is due to correlation of body temperature often being greatest at this time of day (Abedelmalek et al., 2013). Multiple Wingate studies have been conducted to investigate whether or not peak, max and mean power were higher in the afternoon. Though results of mean and peak power were inconclusive, Bernard et al. confirmed maximal anaerobic power is higher in the afternoon (Down, 1985; Hill & Smith, 1991; Melhim, 1993, as cited in Souissi et al., 2003). Additionally, aerobic energy has been

found to be greater in the afternoon as well and this may be due to an increase in calcium release in the sarcoplasmic reticulum (Chtourou et al., as cited in Abedelmalek et al., 2013).

2.2 Sleep Deprivation

Disruption of entrainment results from traveling across time zones, resynchronization can take days to occur and can often result in sleep deprivation. Lack of respite has serious adverse effects, strikingly on reaction time. The National Basketball Association (NBA) noticed an increase in the number of game related injuries when traveling which they believe may be due to their lack of sleep affecting their cognition (Holmes, 2015). For example, the reaction time of individuals who stayed up all night is comparable to alcohol intoxicated individuals with a BAC between 0.05 and 0.1. Some symptoms of alcohol intoxication include: poor judgement, lack of coordination, and lethargy. More than one study has shown that athletes suffering from lack of sleep experience similar symptoms (e.g., Holmes, 2015; “NBA Waking Up,” n.d.). When sleep deprived, athletes can take three times longer to react (“NBA Waking Up,” n.d.). Increasing reaction time expands the likelihood of errors in sports, which may be demonstrated by the number of penalties accrued in sports.

3. METHOD

The purpose of this study is to examine whether traveling across multiple time zones affects penalties accrued, based on peak performance times. To examine the relationship between peak performance time and penalties accrued, data from regular season NFL games is collected from 2009-2015. From this sample period, every game where an Eastern Time and Pacific Time team plays against each other will be analyzed to determine which teams accrue more penalties, based on the game start time.

4. RESULTS

From 2009-2015, there were 890 penalties in games where Pacific Time teams played in Eastern Time zones before 2pm Eastern Time. Of those 890 penalties, 396 (44.5%) were on the Eastern home teams and 494 (55.5%) were on the Pacific away teams. However, late games, in which Pacific teams may have an advantage in the Eastern Time zone, also show there are more penalties on the away (Pacific) teams. More specifically, 46 (54.8%) out of the 84 penalties were on the away (Pacific) teams and 38 (45.2%) out of the 84 penalties were on the home (Eastern) teams. Therefore, it appears that the away teams accrue more penalties than the home teams, regardless of peak performance times based on circadian rhythms.

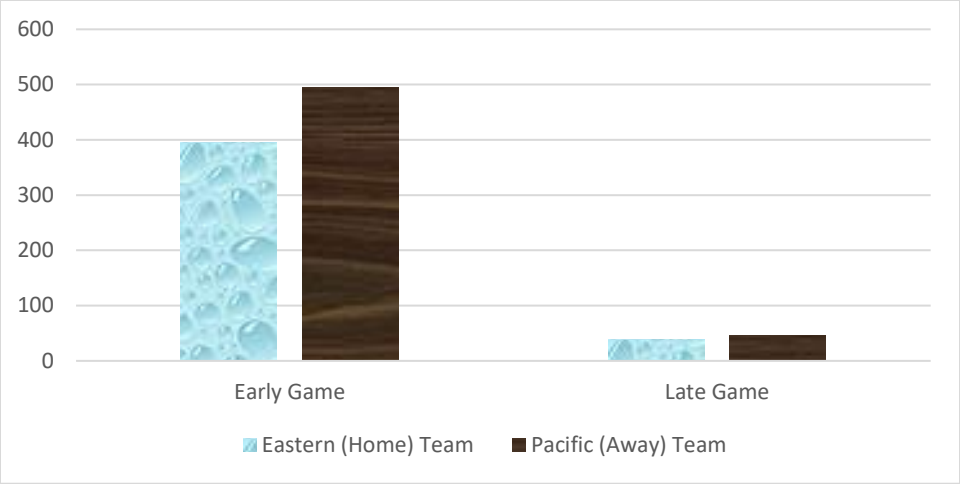


Figure 1. Penalties Accrued by Eastern Time Zone (Home) Teams and Pacific Time Zone (Away) Teams in the Early Afternoon and Evening (Eastern Time).

5. CONCLUSION

As presumed, the disadvantage of playing three hours behind optimal performance time was significant enough to affect penalties accrued. In addition, the lack of respite could be the cause of some of the penalties accrued, considering that the majority of penalties were accrued by the away team. Perhaps lack of respite and circadian rhythms could be compared to home field advantage in future studies. The results of this study could be beneficial in the process of determining the schedule of the NFL and other sports leagues. It could also aid in sports management research of advantages and how a change in time and location effects the team statistics and even gamblers projecting winnings. Outside of sport this study could possibly aid in research of circadian rhythms, sleep deprivation and their relation to injury.

REFERENCES

Aschoff, J. (1965). Circadian rhythms in man. *Science, 148*, 1427-1432.

Abedelmalek, S., Chtourou, H., Aloui, A., Aouichaoui, C., Souissi, N., & Tabka, Z. (2013). Effect of time of day and partial sleep deprivation on plasma concentrations of IL-6 during a short-term maximal performance. European Journal of Applied Physiology, 113, 241–248.

Chtourou, H., Hammouda, O., Souissi, H., Chamari, K., Chaouachi, A., & Souissi, N. (2012, September). Retrieved October 22, 2018, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3445640/

Down, A., Reilly, T., Parry-Billings, M. (1985). Time of day and performance of the anaerobic test. *Journal of Sports Science, 3*, 214.

Hill, D. W. & Smith, J. C. (1991). Circadian rhythm in anaerobic power and capacity. *Canadian Journal of Sport Science, 16*, 30-32.

Holmes, B. (2015, July 08). Hurt locker rooms: The four injury risks today's young players face. Retrieved from http://www.espn.com/nba/story/_/id/13217004/the-four-injury-risks-today-young-nba-players-face

Mansbach, P. (2017, July 15). Phase response curve (PRC). Retrieved from https://www.circadiansleepdisorders.org/info/PRC.php

Melhim, A. F. (1993). Investigation of circadian rhythms in peak power and mean power of female physical education students. *International Journal of Sports Medicine, 14*, 303-306.

NBA waking up to dangers of blue light and sleep deprivation. (n.d.). Retrieved from https://www.swanwicksleep.com/blogs/news/78053958-nba-waking-up-to-dangers-of-blue-light-and-sleep-deprivation

Souissi, N., Sesboüé, B., Gauthier, A., Larue, J., & Davenne, D. (2003). Effects of one night's sleep deprivation on anaerobic performance the following day. *European Journal of Applied Physiology, 89*, 359–366.

Cultural and Ethnic Identity Conflicts Experienced by Ethnic Minority Immigrants in the US

Joshua Dupuis[1], Andre Rodriquez[2], Donaka Autry[3], and Manyu Li[4]

[1] 3959 Meadow Ridge Dr. Baton Rouge, LA 70817, Department of Psychology, University of Louisiana at Lafayette, jcd8590@louisiana.edu

[2] 1630 Rue de Belier, Lafayette Louisiana 70506, Department of Psychology, University of Louisiana at Lafayette, arodriquez1234@gmail.com

[3] 655 Marie Antoinette St. Lafayette LA 70506, Department of Psychology, University of Louisiana at Lafayette, dxa1838@louisiana.edu

[4] P.O. Box 43644, Lafayette, LA 70504, Assistant Professor, Department of Psychology, University of Louisiana at Lafayette, manyu.li@louisiana.edu

ABSTRACT

This interview study aimed at understanding first and second-generation immigrants' cultural conflicts and how they resolve it. Previous studies found that immigrants and their children experience cultural conflicts, as these individuals often experience bicultural or bi-ethnic identities. Fifteen participants were recruited through UL Lafayette SONA participant pool in the Psychology Department. Only participants who identified themselves as immigrants were invited. A deductive content analysis approach was used to analyze the interview transcriptions. Participants' experiences of their presence or absence of cultural conflicts, and their barriers to heritage or host cultures were summarized. Although most participants, especially first generation immigrants, expressed that they experienced cultural conflicts and how they sometimes disliked local cultures, some participants did not experience any cultural conflicts. Reasons such as light skin tone or strong appreciation of the host culture were cited by immigrants who did not experience cultural conflicts.

Key Words: Cultural Conflicts, Immigrants, Second-Generation Immigrants, Bicultural Identity.

1. INTRODUCTION

Immigrants and children are open to an internal struggle, where their ethnic identity may conflict with their national identity, as they have migrated from their origin culture to a host culture. Such conflict may also affect how they form their self-identity (AhnAllen, Suyemoto, & Carter, 2006). This process is considered as part of the acculturation process (Gibson, 2001). This interview study aimed at understanding first and second-generation immigrants' cultural conflicts and how they resolve it.

Rumbaut (2010) discussed a surge of immigration, which has led to a changing degree of diversity within the US. The surge of immigration allowed more ethnic minorities into the United States, further allowing ethnic minority children to be born native to the United States. Individuals with foreign cultures that have migrated into the United States often struggle in finding a balance between host and origin cultures while forming the identification of one's own self. Phinney, Horenczyk, Liebkind, & Vedder (2001) discussed a bi-dimensional model of self-identity, where ethnic identity and national identity are independent of one another, and the two identities respond to environmental and biological factors. In addition, Ryder, Alden, & Paulhus (2000) also found that there are differing dimensions that go into the formation of self-identity,

favoring the bi-dimensional model of self-identity. Therefore, this study examined the described experiences of immigrants' perceived cultural and ethnic identity conflict.

2. METHOD

Fifteen participants were recruited through UL Lafayette SONA participant pool in the Psychology Department. Only participants who identified themselves as immigrants were invited. Participation in the study was completely voluntary. Students who participated received 1.5 research credits.

The semi-structured interview was conducted on a one-to-one basis and was audio recorded in a private room in the Department of Psychology. The participant was interviewed by a well-trained researcher (the second, third and fourth authors). At the beginning of the interview, the researcher made sure that the participants identify as immigrants. If the student stated that he/she did not identify as immigrants, the student was informed that he/she did not fit the inclusion criteria for this study. Then, a consent form was presented to the participants. The participants were informed that the interview would be audio-recorded. They were presented with the Media Recording Release Form. The participants were informed that any of the student's identifiable personal information would not be revealed in the interview transcription. For this reason, the researcher asked the student not to mention any identifiable personal information (e.g., names of the friends or families) during the interview. However, if the student accidentally mentioned information attached to personal identities, the transcriptionist would remove those identities from the transcripts.

Fifteen participants were recruited. Among them, 5 were first-generation immigrants and 10 were second generation immigrants. Table 1 showed the cultural heritage of the immigrants participated in this study.

Table 1. Sample characteristics.

Participants	Generations	Cultural heritage	Gender
A	2	Hispanic (Spain)	Male
B	2	Hispanic (Mexico)	Female
C	1	German	Male
D	1	Vietnamese	Female
E	2	Danish	Female
F	1	Columbian	Male
G	1	British	Male
H	2	Hispanic (Panama)	Female
I	2	Filipino	Male
J	2	Vietnamese	Female
K	2	Guatemalan	Female
L	2	Hispanic	Male
M	2	Nigerian	Male
N	2	Laotian	Female

The interviews were transcribed verbatim by the third and fourth authors. A deductive content analysis approach was used to identify themes in the interview transcriptions that relate to

struggle or conflicts the immigrant participants felt because of their bicultural identities. The first and fourth authors each read the transcriptions and coded the themes.

3. RESULTS

Several themes were identified:

3.1 Immigrants' Cultural Conflicts

Seven participants expressed that they experienced cultural conflicts. A common theme among the participant's cultural conflicts was that most of the conflict the participants face comes from other people's misunderstandings about the participants' home culture.

> *"Colombia has gone through a lot with stereotypes and drugs and and the drug wars and stuff. People are just trying to leave that behind and look out to the future and see that it can get better." – Participant F*
>
> *"They (Americans) don't really have knowledge about other countries. They are like in a cage. They just know things about America and sometimes they ask me questions like if we have iPhone and stuff like that." – Participant C*

Those who did not express any cultural conflicts expressed several reasons, such as appreciation of both cultures,

> *"Well, I feel like it's [bicultural] a good advantage that I'm able to speak two languages. And so it gives me more opportunity with jobs, and communicating with people, and meeting new people. And I have a wider knowledge of cultures and diversity. So it can help me be more accepting of other ones and understand other people's cultures better." – Participant A*

Some participants mentioned that their light skin tone made them identify more with the Caucasian culture and so they did not feel bicultural and did not feel any cultural conflicts,

> *"Not that much (cultural conflicts) because they assume I'm white, because I look very white, so like people don't usually believe me when I say that I'm Hispanic, or that English isn't my first language because I look American." – Participant B*

3.2 Barriers to Heritage Culture

Some immigrants also faced a unique form of cultural conflicts with their heritage/home culture. For example, many expressed that they did not speak their home language and had language barrier communicating with people from home culture. .

> *"While I was there it was kind of hard because only one of my cousins really speaks English and the rest of them don't at all. He only stayed with us for a couple days then he had to go back to work, so once he left it was really hard to communicate because we didn't speak the same language, but it also wasn't because I used google translate a lot. But we were able to communicate without language a lot of the times." – Participant J*
>
> *"There are some, just because I am not able to understand the language. I would like to. But I really don't know my families there, I want to know them, want to see them, visit them, but some of them don't speak English." Participant E*

A few participants also mentioned that they did not feel attached to their home culture because of light skin tone,

"Because I know in Mexico when we're interacting with people, like outside of the family, or even if I just go places with my family, because I look different than all of them, they look Mexican, Mexican, and I'm very white, and like I had blonde hair for the longest, I just looked weird because they all have dark hair, dark skin, very traditional Mexican features, and so it's like I'm less accepted by other people outside the family, and people there because I don't look the part." – Participant B

3.3 Barriers to Host Cultures

Some immigrants expressed that they disliked American cultures,

"It's [America] diverse, I guess I would say because there are so many cultures but I'd say American culture is changing over the years because we're integrating and adapting to each other. I feel like we're almost isolated from the rest of the world because we focus on ourselves so much. Like there's a whole world out there but America is like its own little place." – Participant H

"…talking about immigration with American friends versus with a Hispanic friend is two different answers. Like yes Americans are sympathetic but not that much. Then I can talk to a Hispanic friend who can relate because they have a family member who is trying to get out and they know how the situation goes. Because Americans are easy to say just become a citizen but it actually takes years. But they don't care they just think it's like a flip of your hair but it's not. So there's definitely different viewpoints." Participant K

4. DISCUSSION

The immigrants in the study expressed many differing ideas about cultures both American and their home cultures; including barriers and conflicts. Many immigrants expressed that other people's misunderstandings about their home cultures led to uncomfortable situations. Future studies could further analyze how immigrants mesh with America's culture and common issues will be made known, making it somewhat easier for the non-immigrants to ease them into to American Culture.

REFERENCES

AhnAllen, J. M., Suyemoto, K. L., & Carter, A. S. (2006). Relationship between physical appearance, sense of belonging and exclusion, and racial/ethnic self-identification among multiracial Japanese European Americans. *Cultural Diversity and Ethnic Minority Psychology, 12(4)*, 673. http://dx.doi.org/10.1037/1099-9809.12.4.673

Gibson, M. A. (2001). Immigrant adaptation and patterns of acculturation. *Human development, 44(1),* 19-23. https://doi.org/10.1159/000057037

Phinney, J. S., Horenczyk, G., Liebkind, K., & Vedder, P. (2001). Ethnic identity, immigration, and well-being: An interactional perspective. *Journal of social issues, 57(3)*, 493-510. http://dx.doi.org/10.1111/0022-4537.00225

Rumbaut, R. G., & Komaie, G. (2010). Immigration and adult transitions. *The Future of Children, 20(1),* 43-66. http://dx.doi.org/10.1353/foc.0.0046

Ryder, A. G., Alden, L. E., & Paulhus, D. L. (2000). Is acculturation unidimensional or bidimensional? A head-to-head comparison in the prediction of personality, self-identity, and adjustment. *Journal of personality and social psychology, 79(1),* 49. http://dx.doi.org/10.1037/0022-3514.79.1.49

The Nautical Ancestry of Lafourche-Terrebonne

Gwyneth Engeron[1] and John P. Doucet[2]
1. University Honors Program and the Center for Bayou Studies, Nicholls State University, Thibodaux, Louisiana, gengeron@its.nicholls.edu
2. College of Arts and Sciences, University Honors Program, and the Center for Bayou Studies, Nicholls State University, Thibodaux, Louisiana, john.doucet@nicholls.edu

ABSTRACT

The first mass settlement of Lafourche and Terrebonne Parishes occurred in 1785 with the arrival of "second coast" Acadians. The Second Acadian Coast, which extended northward toward Baton Rouge and southward toward historical Lafourche Crossing, refers to the riverine highland where the single largest immigration of Acadian exiles in North American history settled. Upon exile, this group of about 3000 sought repatriation in France for thirty years before journeying to Louisiana in 1785 to join previous Acadian settlers. They arrived from France at the port of New Orleans on the famous "Seven Ships," and from the city most settlers were distributed by the Spanish territorial government to settle the Second Coast region. Modern historical references suggest that Lafourche-Terrebonne (known in 1807-1822 as "Lafourche Interior Parish") was settled primarily from passengers of one of the ships, namely the frigate *l'Amitie*. We extracted and transcribed 1785 disembarkment data from historical records, as well as geographical land ownership from the 1810 U.S. Census, to determine the graphical distribution of Acadian settlers from the Seven Ships. Surprisingly, the 1810 settlement of Lafourche-Terrebonne is diverse, with settlers from each of the Seven Ships and predominantly from the *St. Remi* (not *l'Amitie*). In addition, the majority of settlers to the new region derive from areas not associated with the Second Coast immigration. Our results shed new light on primary Lafourche-Terrebonne settlement, as well as a new appreciation for the diversity of influences that shaped modern communities and what became the prevalent Cajun culture of the region.

1. INTRODUCTION

Lafourche and Terrebonne Parishes in southeastern-coastal Louisiana are home to people of diverse ancestries and traditional lifeways. The cultural history of this geological region began about 2500 years ago, as the Mississippi River built the Lafourche Delta, providing land to support the lifeways of mound builders, coastal natives, and settlers from foreign continents. The earliest documented and planned settlements along Bayou Lafourche, however, began in the late eighteenth century under dominion of the Spanish territorial government of Louisiana.

In 1785, the Spanish government of Louisiana accepted and settled the largest single immigration of people within the boundaries of modern-day Lafourche and Terrebonne Parishes. These settlers were Acadian refugees—not those directly emigrating from eastern coastal Canada during the *Grand Derangement* (exile) three decades earlier but rather a large group sailing from western coastal France. These 3000 exiles had originally sought repatriation in France, the motherland of their ancestors and language. However, after 30 years, and after suffering the forsaken promises of the French government regarding their support, they in turn sought to secondarily settle in Louisiana, which had become refuge for Acadian exiles from other parts of the Atlantic coastline. In 1785, a famous flotilla of "Seven Ships" sequentially sailed from coastal France, carrying the forsaken Acadian repatriates, to the port of New Orleans. The ships, which spent between 53 and 114 days at sea travelling between coastal

France and New Orleans, were *Le Bon Papa*, *La Bergere*, *Le Beaumont*, *Le Saint-Remi, l'Amitie*, *La Ville d'Archangel*, and *La Caroline*. After some weeks of social stabilization and land transactions in temporary communities in New Orleans, the carriage of each ship was settled along the riparian waterways of central Louisiana, including areas above Baton Rouge and below Dondaldsonville. Those who were settled along historical Bayou Lafourche are the original settlers of Lafourche and Terrebonne Parishes as well as the ancestors of all their Lafourche-Terrebonne descendants who share their surnames and who have settled and populated the lower reaches of those parishes in the ensuing 233 years.

To distinguish the 1785 Acadian settlers from those who were settled earlier in the general area of modern-day Lafayette, Louisiana, historians have described the latter mass settlement as the "Second Acadian Coast." However, historians often describe the settlement pattern in only general terms, without details regarding specific families or specific locations of land grants. Regrettably, this practice generates misconceptions of the actual ancestral settlement process. For instance, many reputable historical references describe the settlement of Bayou Lafourche "all the way down to Lafourche Crossing" as consisting of passengers from a single ship, namely, *l'Amitie*. In fact, only a few local genealogists and history enthusiasts have published monographs on the specifics of Second Coast settlement.

Given the nature of the extended family structure of modern-day Acadian descendants, their interest in history and genealogy, as well as the extensive history of ancestral families maintained by the British occupancy forces in their ancestral land as well as Atlantic ship captains and the Catholic Church in the U.S., it is remarkable that more detailed assessment of Second Coast settlement does not exist. This study brings together details of the ancestral Lafourche-Terrebonne settlement—particularly land grant and passenger ship data—not only to determine if Lafourche-Terrebonne ancestors derived from *l'Amitie* but also to demonstrate graphically the relative settlement locations of the Acadian ancestors of Lafourche-Terrebonne.

2. RESOURCES & METHODS

We constructed a graphical representation of the distribution of Seven Ships settlers along Bayous Lafourche and Terrebonne in modern-day Lafourche and Terrebonne Parishes—known collectively as "Lafourche Interior Parish" between 1807 and 1853. Two resources were used from the Archives and Special Collections at Nicholls State University. The first, titled *First Land Owners and Annotated Census of Lafourche Interior Parish*, was used to obtain maps of first land owners' names listed on the land plots they owned. For each plot of land that contained a family code with a family surname, the family code was correlated to the U.S. Census of 1810 (25 years after initial settlement) included in the same resource. From the census, the full name, birthdate, and birthplace of the male settler was recorded. With the full name of the settler obtained, the second resource, *The Seven Acadian Expeditions of 1785*, was used to determine the ship from which the settler disembarked, as well as other information. We transcribed information from these two sources in to an MS Excel spreadsheet that could both be linearly displayed as well as sorted to determine the ship from which most Lafourche-Terrebonne ancestors derived.

3. RESULTS

A graphical representation of Lafourche-Terrebonne ancestral settlers, their ships of disembarkment, and the relative location of their land grants was produced using MS Excel. Settlers from all seven ships were settled in the region, as evidenced by their land ownership recorded in the U.S. Census of 1810. The vast majority of settlers selected land along Bayou

Lafourche, and only a few settled along Bayou Terrebonne. Among the ships, *Le Saint Remi* carried the largest number of settlers to the Lafourche-Terrebonne region (34), followed by *l'Amitie* (23). The table below shows the number of settlers carried by each ship. Without exception, only land along the natural levees of Bayous Lafourche and Terrebonne was settled.

Table 1.

Ship Name	# Settlers	% of total
Le Saint Remi	34	37.4
L'Amitie	23	25.3
Le Beaumont	12	13.2
La Ville d'Archangel	11	12.1
Le Bon Papa	6	6.6
La Caroline	2	2.2
La Bergere	3	3.3
Total	91	

4. SUMMARY & CONCLUSIONS

We have developed the first graphical display of ancestral Acadian settlement in Lafourche-Terrebonne that shows both original plots of original Spanish land grants together with ships of carriage. Such a display will help Lafourche and Terrebonne Parish residents better understand their geographical history in the region, as well as link this history to the emigration history of the famous Seven Ships.

We have disproven the common presumption of multiple historians that the Lafourche Interior Parish was settled prevalently by passengers of *l'Amitie*. Although *l'Amitie* carried about 25% of Lafourche-Terrebonne settlers, *La Saint Remi* carried a greater number of future settlers.

In addition to showing the distribution of nautical origins of first Lafourche-Terrebonne settlers, we also show the relative distribution along Bayous Lafourche and Terrebonne. The vast majority of settlers selected land along Bayou Lafourche, while Bayou Terrebonne was sparsely settled.

While we have demonstrated the graphical settlement of first settlers in Lafourche—Terrebonne, we intend in the future to map the nautical ancestry of the entire Acadian settlement on Bayou Lafourche, from Donaldsonville southward to our current data set.

ACKNOWLEDGEMENTS

The authors acknowledge the assistance of Emily Pitre, Helen Thomas, and Clifton Theriot of the Archives and Special Collections at Ellender Memorial Library, Nicholls State University.

REFERENCES

Brasseaux, C. (1987) *The Founding of New Acadia.* Baton Rouge, LA: LSU Press.

Brownlee, H.F. (2010) *The Seven Acadian Expeditions of 1785.* Algiers, LA: Algiers Historical Society.

Hebert, Tum. "The 7 Ships Passenger List." *Acadian-Cajun Genealogy & History*. 2010. http://acadian-cajun.com/7ships.htm.

Westerman, A. (1995) *First Land Owners and Annotated Census of Lafourche Interior Parish.* Houma, LA: Terrebonne Genealogical Society.

Marine Debris Cleaner, Phase 1: Navigation

Ryan Fabre[1], Ahmad Fayed[2,§]
[1]Computer Engineering Technology Student, Southeastern Louisiana University, Hammond, LA 70402
[2]Assistant Professor, Department of Industrial and Engineering Technology, Southeastern Louisiana University, Hammond, LA 70402, ahmad.fayed@selu.edu

ABSTRACT

The purpose of this project is to provide a solution to the recently occurring environmental problem caused by debris in the world's bodies of water. The challenge is to design a vessel that can autonomously detect sea debris, navigate toward them, pick them up and return back to its launching location. The project has multiple parts that fall mainly into two mechanisms; a navigation mechanism and a retrieval mechanism. In the first phase of the project, the navigation part for the proposed marine debris cleaner is investigated. The navigation mechanism acts as the base for the whole project and has multiple functions and sub-mechanisms. The navigation mechanism includes an object detection module, that detects specific object within a given distance, a vessel speed control, which controls the vessel speed while approaching debris, and a steering mechanism which control the direction of the rudder based on the original direction of the detected debris and the differential direction as the vessel approaches the detected debris. The navigation could also in the future include a homing module that will allows the vessel to come back to certain coordinates. The retrieval mechanism is an appended part of the project that will be investigated and completed in the next phase. A prototype has been created to simulate the navigation functions of the debris cleaner using Arduino board, LIDAR sensor, 2 servo motors, 1 brushless DC motor and a Raspberry Pi camera.

Key Words: Marine Debris Cleaner, Navigation Mechanism

1. INTRODUCTION

Each year an estimated 8 million metric tons, or 17 billion pounds, of plastic flows into the ocean [1]. This amount of debris is increasing constantly and causing huge environmental pollution problem. It destroys the aquatic life, contributes to harmful bacteria and limits the recreational activities. There is currently no practical solution to solve this issue. This project is a step towards creating an efficient solution that can keep our environment clean again. This project focuses in the navigation mechanism, the primary mechanism that makes the retrieval mechanism even possible to be able to function. The navigation mechanism contains servo control, distance measurement, and brushless DC motor control. All of these have been tested over the past few months and are now completed. Some of the completed portions of the navigation system include distance measurement, servo control, and control of the brushless dc motor.

2. DISTANCE MEASUREMENT BETWEEN OBJECT AND VESSEL:

2.1. LIDAR sensor

To get accurate distance readings, we decided to use a LIDAR-Lit v3 sensor, Figure 1 [2]. The LIDAR sensor measures the distance to a target by illuminating the target with pulsed laser light

and measuring the reflected pulses with a sensor. Differences in laser return times and wavelengths can then be used to make digital location of the target. The sensor was a suitable replacement that consumed the same amount of power and was only a little bigger than the ultrasonic sensor. The LIDAR sensor also provided a more extended range than the first sensor (up to 40 m compared to 4 m), [3]. The sensor will be mounted to a servo to sweep an angle of 60° back and forth until an object is detected.

Figure 1. LIDAR-Lite v3 sensor

The code for the LIDAR sensor uses the LIDAR-Lite v3 library to create an instance called lidarLite. It then uses its distance function which measures accurate distances in centimeters with a margin of error of 1cm. The reading for the distance function uses the SCL and SDA. The SCL is the I2C clock measures when the data comes back, and SDA is the I2C data [2]. The instance that is created also configures the I2C connection to 400Hz. This frequency is the default of the I2C. I2C is used to attach lower-speed peripheral ICs to processors and microcontrollers in short-distance, intra-board communication. The code in Figure 2

```
#include <Wire.h>
#include <LIDARLite.h>
#include <Servo.h>

LIDARLite lidarLite;
int cal_cnt = 0;
int servoPin;

Servo myservo;
Servo esc;

void setup()
{
  Serial.begin(9600); // Initialize serial connection to display distance readings
  myservo.attach(5);
  esc.attach(8);
  pinMode(8,OUTPUT);

  lidarLite.begin(0, true); // Set configuration to default and I2C to 400 kHz
}
void loop()
{
   int dist;

   // At the beginning of every 100 readings,
   // take a measurement with receiver bias correction
   if ( cal_cnt == 0 ) {
     dist = lidarLite.distance();      // With bias correction
   } else {
     dist = lidarLite.distance(false); // Without bias correction
   }
   cal_cnt++;
   cal_cnt = cal_cnt % 100;
   delay(500);
   Serial.print(dist);
   Serial.println(" cm");
   delay(10);
   esc.write(8);
}
```

Figure 2. Code for LIDAR Sensor

In Figure 3 and Figure 4, an example of how the two servos will work is shown. Initially the sensor servo (the front servo) is at 90 degrees (towards the front of the boat). When the system is deployed, the servo will scan an angle of ±60 º (from 30 degrees to 160 degrees). When object is detected using camera (currently simulated by a push button) the sensor servo will save the angle of detection and send it to the rudder servo to move to the proper rudder angle

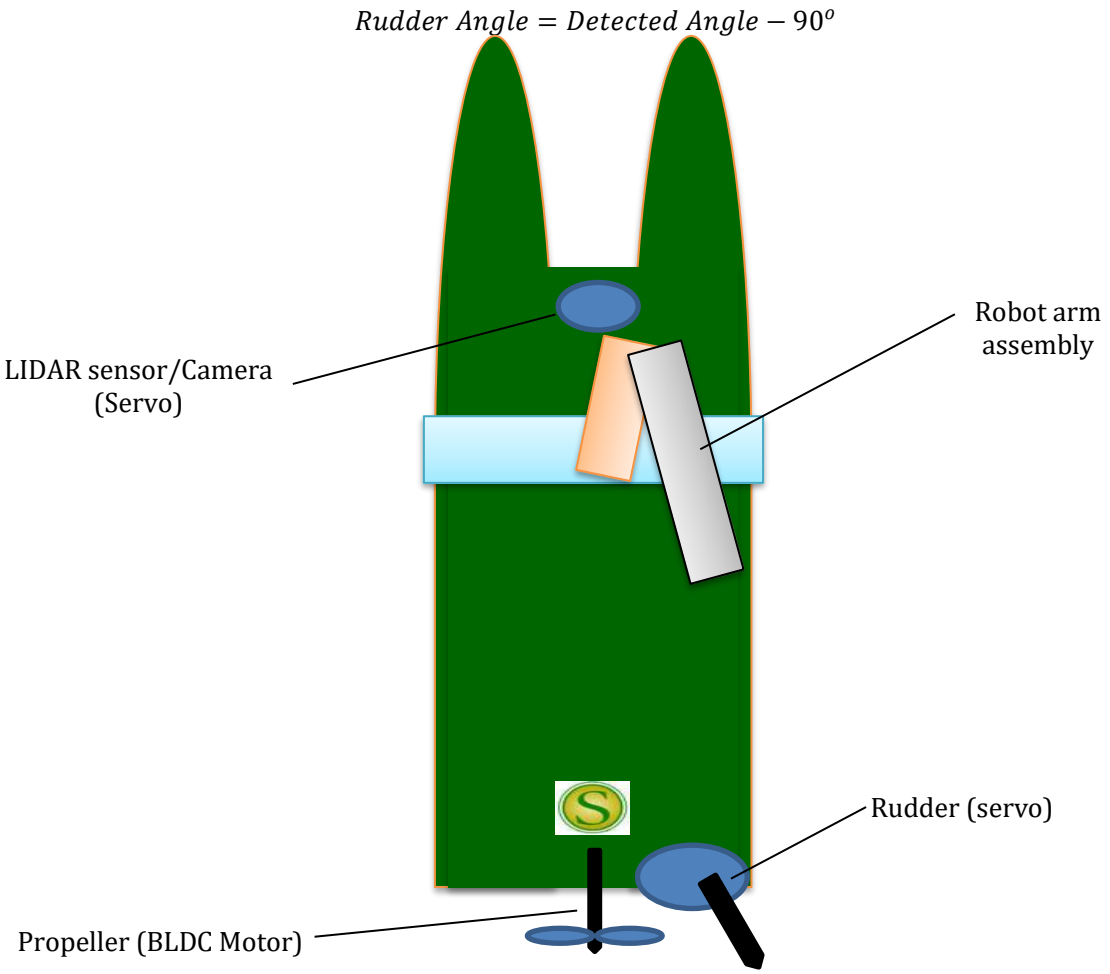


Figure 3. Schematic for Boat Assembly

The schematic in Figure 5 shows us how the LIDAR sensor works. A light wave is triggered toward an object illuminating and the time it took to measures the light that bounced of the object gives distance measurement that can be used to determine the speed of the brushless dc motor used on the marine debris cleaner.

The schematic in Figure 6 shows the setup for the LIDAR sensor. The sensor have the red wires connected to the 5 volts for power. The black wire is connected to the ground. The green wire is the SCL connection that is connected to the SCL pin on the Arduino, for the I2C clock. The blue wire is the SDA connection connected to the SDA pin on the Arduino, for the I2C data. A 1000uF capacitor is used to maintain a level voltage. This completes the setup for the LIDAR sensor.

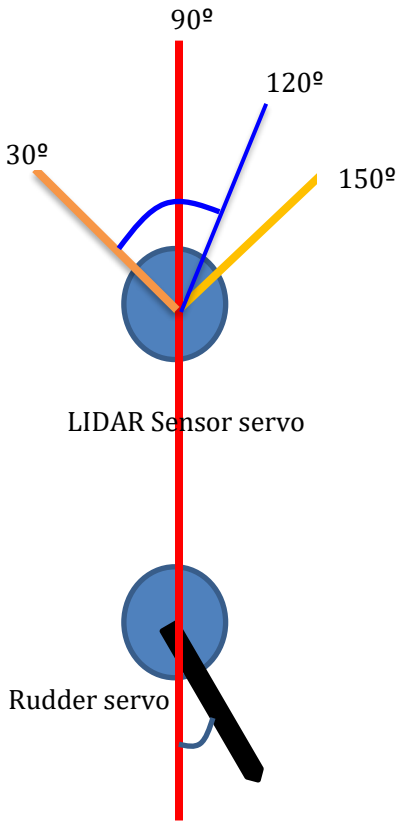


Figure 4. Sensor servo and rudder servo mechanism

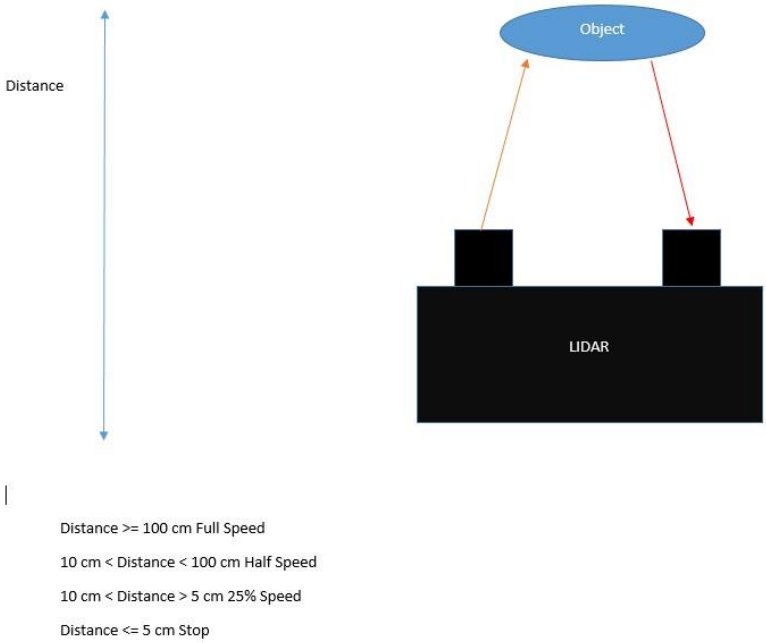


Figure 5. Schematic for LIDAR Sensor

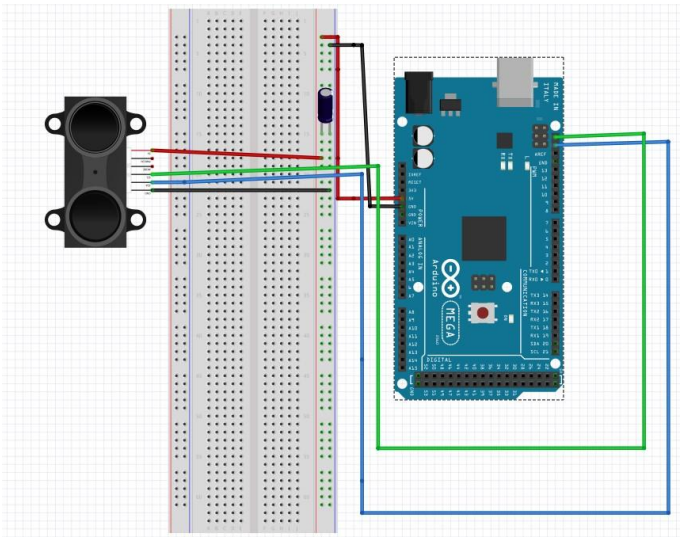


Figure 6. LIDAR Sensor Schematic

3. DEBRIS DETECTION

The detection of debris is necessary for the device to navigate directly to it. In the field of computer vision, object recognition technology is used for detecting the desired object in a digital image of the video. Two different libraries for image processing were researched and tested: OpenCV (Open
Source Computer Vision Library) and Mathwork's Image Processing Toolbox. The Image Processing Toolbox was selected for the project because it is easier to debug.

A flowchart algorithm, Figure 7, was followed using Matlab to detect a red color. The result was a script that detected red objects using an external web camera. When an object was detected, a box was printed around the centroid of the object. Then, the x and y position of the object was calculated concerning number of pixels in the image. Next, the position variable is mapped to the center of the image. This allows the script to determine if the object was directly in front of the camera.

Because the objective is for the vessel to be autonomous, the previous script algorithm needed to be translated to a Simulink model. Using "Simulink and Raspberry Pi Workshop Manuel" as a guide, I created a Simulink model that detected blue objects outputs the x and y variable. The code runs on a Raspberry Pi. This allows the object detection mechanism to work without the use of a computer. The Raspberry Pi could then output the position of the object to an Arduino that controls the steering of the vessel.

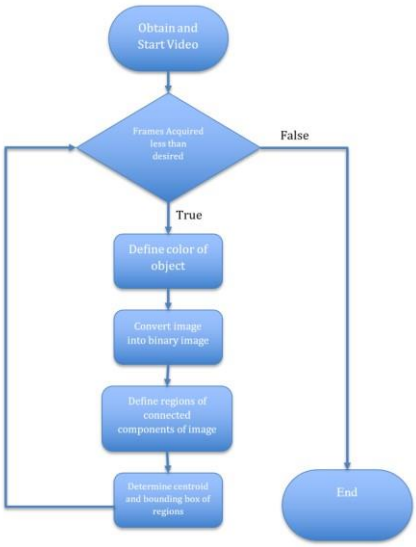


Figure 7. Flow Chart of the Image Analysis and Object Detection Algorithm

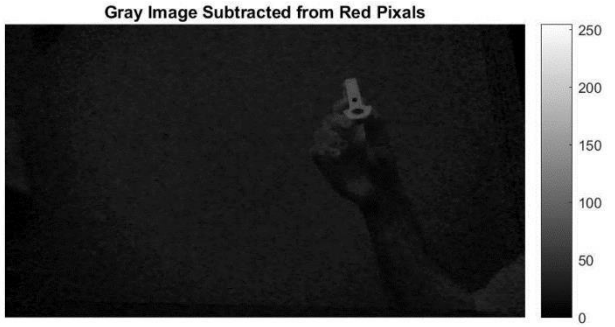


Figure 10. Object Detection Step One

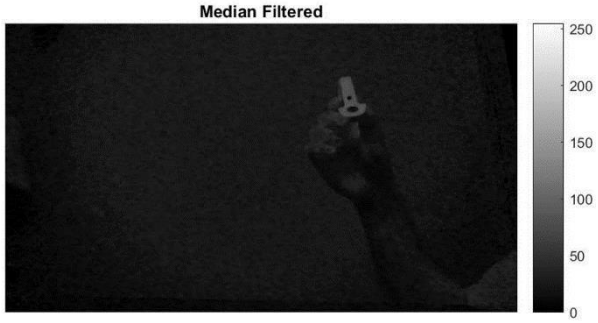


Figure 9. Object Detection Step Two

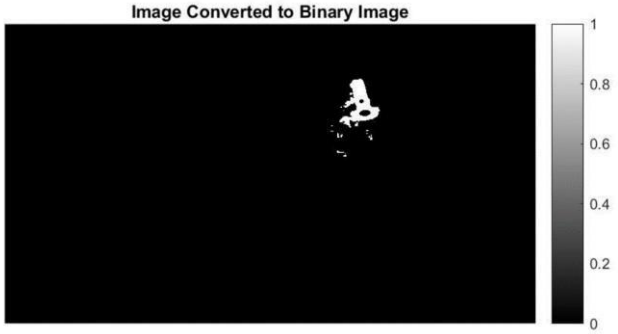


Figure 8. Object Detection Step Three

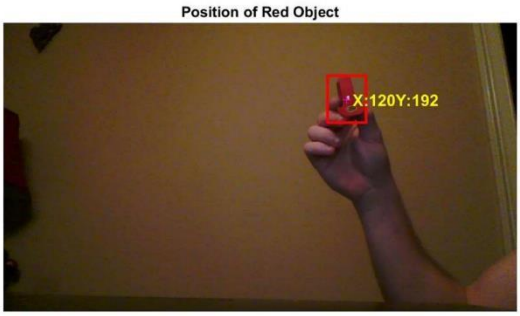


Figure 11. Red Object Detected

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

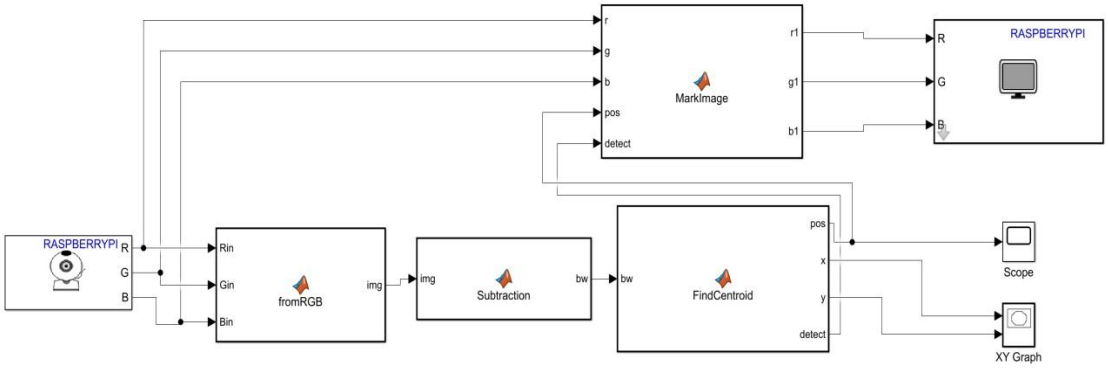


Figure 12. Raspberry Pi Object Detection

4. STEERING CONTROL OF SENOR AND RUDDER SERVOS:

The servo control is another part of the navigation that controls the sensor servo sweeping backing and forward and when it stops. There is another servo that will be controlled that controls the rudder position. The sensor servo will be in the front of the vessel, and the rudder servo will be inside near the rear controlling the shaft. All of the steering servo control is complete. The first portion of servo control stops the sweeping motion using an interrupt. When an object is detected angle is saved, and the rudder servo is then moved to plus or minus ninety degrees based on whether the detected angle is greater than or less than zero. A value called delta is defined as ninety degrees minus the value of the interrupt position. This portion of the servo control has been simulated using a push button. In the future, a camera will trigger the interrupt. The second position of the servo control is completed. So we tried combing the second part into the end of the service routine. We used print statements after the servos were written to and found out that the code was being executed. We later found out that the execution was happening so fast there is not enough time for the second servo to move to the original position. We have found a way to implement an interrupt without using an actual interrupt service routine. Delays are unable to be used in interrupts explicitly because interrupts stop the whole program which is what a delay does. Interrupts are allowed to use a delay in microseconds because interrupts happen in microseconds. The only problem with that is the interrupts happen in only a few microseconds meaning a delay in microseconds would not be long enough. Using an implicit interrupt allows us to be able to use delays.

In the code for Figure 14, the interrupt service routine is shown. The function rudderControl is called from the main loop when a button value changes. The button used simulates a camera that will detect an object. The function reads the last position that the servo had before it detached. This position was then saved. A variable called delta determines whether that position is greater than or less than 90 degrees. This position either adds 90 if it is less than 90 or subtracts 90 if it is greater than 90. This position is the written to the rudder servo.

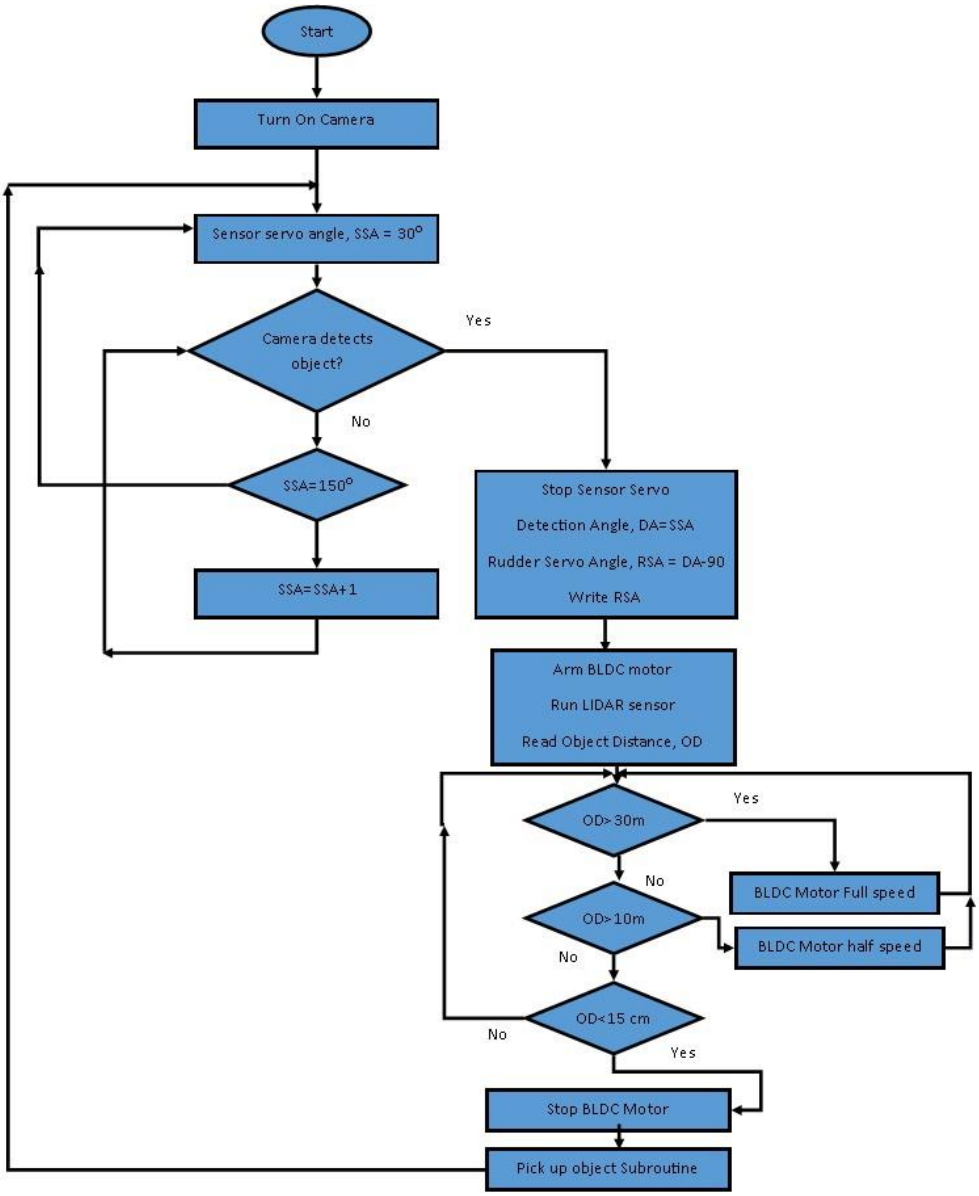


Figure 13. Flowchart of First Servo Loop

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

```
void rudderControl() {
    delta = 90 - servoVal;
    return_init_pos2 = 90 + delta;
     Serial.println("Interrupt Position");
     Serial.println(servoVal);
    if(readVal == 1){
      if(delta > 0){
      for (pos2 = 90; pos2 = (90 + delta); pos2++ ) {
        //      abs(delta)/delta
        rudderservo.write(pos2);
        newPos = rudderservo.read();
        Serial.println("Rudder Destination1");
        Serial.println(newPos);
        Serial.println(delta);
        Serial.end();
      }
    }

      if (delta<0) {
       for (pos2 = 90; pos2 = (90 + delta); pos2-- ) {
```

```
     myservo.attach(5);
      if(delta > 0){
      d = 1;
      }
    else if (delta < 0){
     d = -1;
     }
      else {
      d = 0;
      }
      Serial.println("Const val1");
        Serial.println(delta);
        Serial.println(angle);
        Serial.println(d);
        Serial.end();
        Delta=abs(delta);
     for (angle = 1; angle = Delta; angle++ ) {
       //      abs(delta)/delta
     returnForServo1 = return_init_pos1+angle*d;
      myservo.write(returnForServo1);
     returnForServo2 = return_init_pos2-angle*d;
```

Figure 14. Code for Interrupt Service Routine

The setup for the servos in Figure 15 connects the yellow wires as signals. The red as 5v, and the black as grounds. The sensor servo is connected to pin 5 on the Arduino. The rudder servo is connected to pin 6 on the Arduino.

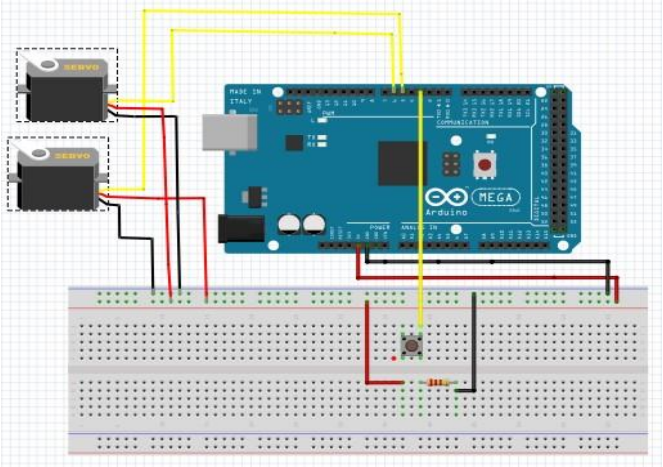


Figure 15. Sensor and Rudder Servos

5. BRUSHLESS DC MOTOR CONTROL

The brushless DC motor control is also another vital part of the navigation. The speed of the motor will be determined by the distance to the object. As the vessel gets closer the vessel will slow down in speed. The brushless DC motor is controlled using the servo library. The motor has feedback via an electronic speed control allowing for control of the speed. The brushless motor requires a high amount of current. The speed control for the BLDC motor was controlled by first arming the esc by writing a value to it and using the correct combination of delays to allow power to be collected.

The code for the brushless dc motor in Figure 16 arms the esc in the setup to set up the maximum and minimum current that the esc needs to operate. Then a function called Speed Control is called from the main loop and writes the speed to the motor from the esc based off of a distance reading that comes from the LIDAR sensor. Full power is runs at distances 100cm and greater, 75% percent power at distances less than 100cm but greater than or equal to 50cm, 25% power between distances of less than 50cm and greater than or equal to 10cm, any less than 10cm the motor will stop allowing for pick up.

```
esc.attach(10);
esc.write(75);

void  speedControl(){
  dist = lidarLite.distance();
  if(dist>100){
    esc.write(110);
    delay(200);
  }
  if((dist<100) && (dist >= 50)){
      esc.write(100);
    delay(100);
  }
  if((dist<50) && (dist >=10 )){
    esc.write(85);
    delay(100);
  }
  if(dist<10){
    esc.write(0);
  }
```

Figure 16. Code for Brushless DC Motor Control

The setup for the brushless DC motor connects the red wire from the power supply to the esc, Figure 17 and Figure 18. It also connects the black which is the ground to the black of the esc. The process is the same from the bread board. The yellow wire is the signal that connects to orange wire on the esc to pin 10 on the Arduino. The power is not connected to prevent the esc or com port from being damaged. The top wire on the motor from the esc is the signal, the middle is power, and the last one is the ground.

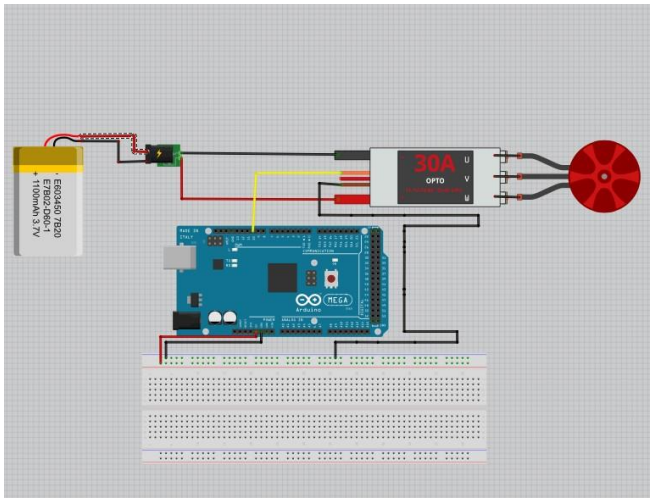


Figure 17. Brushless DC Motor Schematic

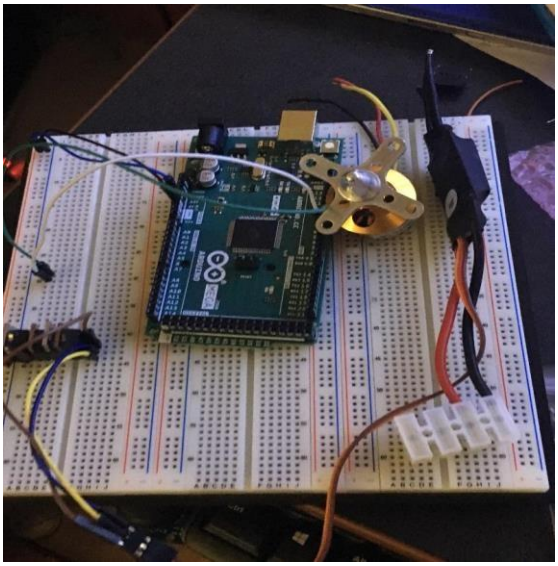


Figure 18. Brushless DC Motor with MOSFETS

The whole setup appears on Figure 19.

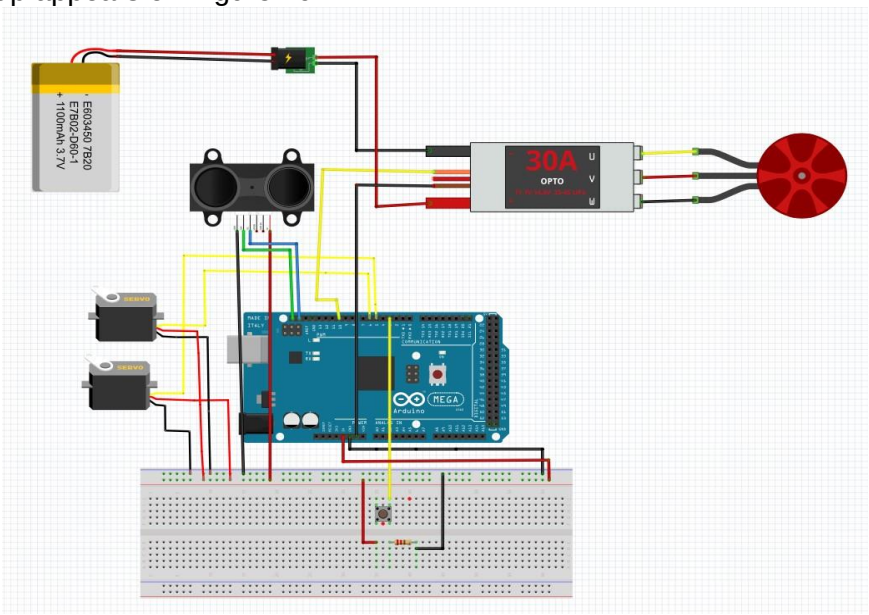


Figure 19. Master Navigation Circuit

6. CHALLENGES

This project has had many challenges in both all parts. The first problem resulted in us having to buy a new distance sensor because the ultrasonic sensor was not accurate enough for this application. The next problem was a significant programming issue using interrupts and the ability not to accept a delay that we need. We found a solution to it by implicitly interrupting the program. The next problem was with the brushless dc motor; however, it was merely an issue of not having the proper connectors to supply the electronic speed control (ESC) with enough amps. We got a better power supply and eventually found the correct sequence that would be needed to use the esc.

7. CONCLUSIONS

In this project, we were able to complete the first stage of the project which was the navigation mechanism. The retrieval mechanism was not completed due time constraints. We have made certain that our research can be used for continuation of the project with students in the future. We learned more about how different program languages use communicate to external components and within its internal networks. We faced some challenges such as finding a design that would fit with this kind of application and using effective researching methods to conserve time. Finally, we could successfully finish the first phase of the project which is the navigation mechanism.

8. FUTURE WORK

This project mainly focused in the navigation part and the work will be extended to include the object detection and pick up mechanism. This will allow to have a full prototype of the Debris collector.

REFERENCES

https://oceanconservancy.org/blog/2016/08/22/the-problem-of-ocean-trash/
https://www.sparkfun.com/products/14032
http://static.garmin.com/pumac/LIDAR_Lite_v3_Operation_Manual_and_Technical_Specifications.pdf

Polarization and d33 Experimentation of Carbon Nano-Fiber/Piezoelectric Composites

Christian Gary[1], Daniela Cruz[2], Tyler Hacker[3], Jude Anthony Simon[4], Ahmed Khattab Ph. D.[5], Mohammad Madani Ph.D.[6]

1 Christian Gary, University of Louisiana at Lafayette, Laboratory of Composite Materials, Undergraduate Apprentice, cmg4515@louisiana.edu

2 Daniela Cruz, University of Louisiana at Lafayette, Electrical Engineering Department, Graduate Apprentice, dxs1102@gmail.com

3 Tyler Hacker, University of Louisiana at Lafayette, Laboratory of Composite Materials, Undergraduate Apprentice, c00295379@louisiana.edu

4 Jude Anthony Simon, University of Louisiana at Lafayette, Laboratory for Composite Materials, Undergraduate Apprentice, c00303317@louisiana.edu

5 Ahmed Khattab Ph. D., Associate Dean of Engineering, University of Louisiana at Lafayette, Laboratory of Composite Materials, khattab@louisiana.edu

6 Mohammad Madani Ph.D., Associate Professor, University of Louisiana at Lafayette, Electrical Engineering Department, madani@louisiana.edu

ABSTRACT

Piezoelectric ceramics are used for their sensing capabilities and power generation. These specific materials generate voltage potential under loading, allowing for development solutions such as push-start activated appliances, sonar-reliant devices, and acoustic instruments. Innovations utilizing piezoelectric materials include alternate energy sources like kinetic energy storage through roadway, railroad, and sidewalk implementation. Lead zirconate titanate (PZT) ceramics, a particular form of piezoelectric material, has distinct energy conversion functions. Likewise, nanomaterials, like carbon nano-fibers (CNF), possess optimal performance capabilities due to their good interfacial bonding with the matrix materials. In this study, electric material output testing was performed on composites consisting of PZT and CNF, due to CNF's superior composite enhancements, to find the piezo-electrical effects.

PZT/CNF composite disc samples were made by mixing pre-measured CNF and PZT and pressing each of the mixtures in a cylindrical mold before cooking them. In order to concentrate their electrical poling pathways, each sample was subjected to high electrical fields under high temperatures to lock their material electrical potentials. The developed CNF/PZT samples were subjected to vertical forces that activated the materials' charge output. Each mixture had a different percentage of CNF in it, allowing for the examination of the difference in production of charge based on the amount of CNF it contained. The amount of charge produced in the test material due to applied dynamic load known as the d33 value. These d33 values were found to increase with higher CNF concentration.

1. INTRODUCTION

The purpose of performing d33 nondestructive testing on a piezoelectric material is to find the amount of charge that material produces per unit of force that is applied to it. Piezoelectric materials, otherwise known as PZT, are ceramics that produce small variations of charge after loads are applied to them. Optimization of the outsourced charge was tested by adding Carbon Nano-Fibers (CNF) to PZT samples and observing how their implementation affected the materials' d33 constants. CNF are nanoscopic strands of graphene that have been found to

improve the intensive mechanical properties of any material when they are added by altering the material's nano-structure, such as specific strength and specific toughness.

The procedure of making the composite sample involves a mixture with total mass of under 8 grams of PZT powder and CNF, with the CNF content being between 0% and 1%. The mixture is placed in a cylindrical mold and pressed in a pneumatic press to form a small brittle cylinder about 0.8 centimeters in height and 1 centimeter in diameter. The brittle sample is placed in an open-top crucible and inserted into furnace, heated at 650 degrees Celsius for 1 hour. This phase in the experiment, known as the debinding process, removes the binder, in this case wax, from the PZT powder used. After cooling from the debinding process, the sample is then heated at 1125 degrees Celsius for 1 hour to solidify the ceramic material in a process known as sintering.

The sintered test specimen is cooled and non-destructive testing is performed using a d33 meter to find their pre-poled d33 value The d33 meter calculates the charge that is produced by the material when a force is administered to it. The d33 meter calculates this constant value by applying a force on the sample that is held in between its vibrating probes. The dynamic force allows for charge to be found in the vertical direction of polarization of the sample.

These samples are then placed in a fixture, compacted by two spacers separating the samples from two copper discs of 1-inch in diameter. Wires soldered onto the copper discs are connected to a high voltage power supply and the fixture is placed in a silicon oil bath. Once in place in the bath, the sample is subjected to an electric field sourced by a voltage value 2000 times the sample's thickness at 125 degrees Celsius for 5 minutes and promptly removed from the bath to cool. 24 hours are required for cooling after poling to prevent harm to the samples. Non-destructive testing is performed once again by utilization of the d33 meter.

2. RESULTS

Results from d33 testing found that samples with higher percentages of CNF in them, as high as 1 %, possessed greater d33 values than that of a pure PZT and other lower percentage samples. These values reached over 80 pico-Coulombs per Newton with the 1% CNF sample in comparison to below 70 pico-Coulombs per Newton for the pure PZT sample. These values are drastic differences from non-polarized samples, as their pre-poling d33 values were below 5 pico-Coulombs per Newton. The findings show that CNF could be optimizing the charge output of the samples, proving that their implementation in PZT materials can allow for electrical innovations in society.

REFERENCES

Erhart, J., & Burianová, L. (2001). What is really measured on a d33-meter? Journal of the European Ceramic Society, 21(10-11), 1413-1415. doi:10.1016/s0955-2219(01)00030-9

Assessing Poison Records of an Historic Louisiana Pharmacy, 1909-1920

Gabrielle R. Gautreaux[1] and John P. Doucet[2]

1. University Honors Program and the Center for Bayou Studies, Nicholls State University, Thibodaux, Louisiana, ggautreaux7@its.nicholls.edu

2. College of Arts and Sciences, University Honors Program, and the Center for Bayou Studies, Nicholls State University, Thibodaux, Louisiana, john.doucet@nicholls.edu

ABSTRACT

The J.J. Ayo Pharmacy was an historical business that served the communities of Bowie and Raceland in Lafourche Parish in the first half of the 20th century. The Archives and Special Collections of Nicholls State University collected over 16-linear feet archival materials from the pharmacy produced over the course of its operation (1899-1957). We conducted a descriptive and exploratory study of the pharmacy's Poison Records Book, a ledger that documented sale of contemporaneous poisonous chemicals over the course of 11 years, beginning in 1909. The book provides information on name of drug, intended use, date sold, and quantity sold, as well as customer name and occupation.

Over 800 entries of information from the book were transcribed into a spreadsheet and sorted for analysis. Chemicals and their spectrum of uses were inferred from the explicit intentions recorded as well as from historical and modern chemical references. Some chemicals included phenolics, binary acids, strychnine, and iodine compounds. Common applications of these poisons were disinfection, medical treatment of animals, and elimination of wild nuisance animals. Interestingly, some of the historical poisons listed are widely available in modern formulations. Legal reasons for maintaining such a ledger book distinct from other pharmacy operations coincide with establishment of historical predecessors of today's FDA. Such forensic analysis of dispensed poisons provides historical perspectives not only on the Lafourche wetlands communities, environment, and culture over the early decades of the twentieth century but also the evolution of poison chemicals and their characterization over the course of time.

1. INTRODUCTION

The J.J. Ayo Pharmacy served the communities of Bowie and Raceland in central Lafourche Parish from 1899 to 1957. For regulatory reasons in the early years of pharmacy operations, Dr. Ayo kept a separate poison ledger separate from records of normal pharmacy dispensing. This Poison Record Book contained information on poisons prescribed and purchased under Dr. Ayo's ownership of the pharmacy between the years 1909 to 1920. It lists the date the poison was sold, the name of the purchaser (redacted in this study), the occupation of the purchaser, where the purchaser lived, the amount of the poison purchased, the name of the poison, and the intended use of the poison. Although we suspect that the chemicals deemed poisonous during the turn of the previous century remain poisonous today, a closer look at this information will allow us to determine if clinical or even cultural usages have changed, as well as the issues that required the use of such chemicals during the WWI era in rural wetlands Louisiana.

2. RESOURCES AND METHODS

The Poison Record Book from Ayo Drugstore was donated to the Archives and Special Collections at Nicholls State University and is a component of the J.J. Ayo Historical Collection, comprising 16-linear feet of archival material. The book recorded the name, occupation, home location of the purchaser, as well as the intended use of the poison among other data. Over 800 lines of the book were transcribed into a sortable spreadsheet using MS Excel. Most common poisons and uses were assessed by referencing the scientific and general literature.

3. RESULTS

We transcribed and organized 833 lines from a chronologically recorded Poison Records Book between January 1909 and September 1920. We analyzed the frequency of specific poisons purchases, uses of the poisons, and whether or not the patient's profession attributed to their need for the poison. In general, the poisons listed in this historical data remain known as toxic today. However, it is apparent that some formulations have changed, as Lysol and Triiodine products were common as well as commonly available today. Interestingly, some of the uses of these regulated chemicals have changed. For instance, Lysol is a common surface disinfectant, bacteriostat, and antiviral for both home and clinical settings in 2018. In our historical data, Lysol was dispensed not only for disinfectant reasons but also for finger- and toenail injuries, a use not approved in modern times.

A component of Lysol, namely carbolic acid (known today as phenol) was dispensed to a variety of purchasers also for presumed antiseptic uses. Carbolic acid was commonly dispensed to animal owners, particularly owners of horses and other farm animals, where even today it is known as an antiseptic, wound cleaner, skin penetrant, and external analgesic. Other poisons targeted for animal use include strychnine, commonly dispensed to kill rats and nuisance pets, like wild dogs and cats. Other anti-organismal chemicals include Stearn's Electric Roach Paste, which consisted of white phosphorous. New and popular in the South and other moist geographical areas, this product was subject of a significant hearing with the newly established Food and Drug Administration, which rendered it unsafe and taken off the market.

In addition, to Lysol, other historical poisons have been reformulated or reimagined into new uses for the modern day. Today, triiodine remains commonly in sterilizing, particularly prior to surgeries. It is also marketed as a health supplement today as a supplement to improve thyroid gland function, as normally produced thyroid hormones are polyiodinated. Bichlorate Mercury was known as "corrosive submimate" in the WWI era and prior due to its chemical properties. In industry and at the home, it was used to preserve both wood and metal surfaces. In ancient times, it was used antiseptically to treat wounds, and it eventually became the primary though notorious treatment for venereal syphilis. Its common occurrence in the Poison Record Book not only reflects nonbiological uses but also the absence of readily available antibiotic drugs during this period of time: The annual inventories of the J.J. Ayo Pharmacy during this period of time show no known commercial antibiotics. Today, we know muriatic acid and hydrochloric acid as the same chemical (aqueous HCl). However, data from the Poison Records Book suggests that the two terms referred to different preparations, as they were regularly dispensed for different purposes.

4. SIGNIFICANCE

The role of the environment in maintaining long-term human health has never been more apparent than it is to 21st century medicine. Modern advances in treatment therapies have improved outcomes in such chronic diseases as cancer and diabetes, as well as (though less

so) neurodegenerative conditions. While treatments and prognoses improve on the clinical side of health care, understanding the precise origins of chronic diseases remain unknown. We know that environmental exposures cause deleterious long-term effects; consider leukemias in petroleum workers, mesothelioma in factory workers, and parkinsonism in farmers in contact with organophosphate pesticides. It is incumbent on us in this generation not only to go forward with new medical breakthroughs but to study retroactively, with particular regard to early-life and even trans-generational, extended family exposure. Studies such as this one will hopefully lead to better answers on disease origins deriving from the environment.

5. SUMMARY AND CONCLUSIONS

We have conducted a descriptive and exploratory study of the Poison Records Book, a ledger that documented sales of contemporaneous poisonous chemicals dispensed by the J.J. Ayo Pharmacy between 1909 and 1920. The ledger showed a predominance of 10 poisons, some of which in different formulations are available over the counter today. Some chemicals are no longer used due to their unredeemable toxicity. The particular applications of some poisons has changed since the period or four study, namely Lysol and triiodine.

Our assessment shows the connection between historic political acts related to the medical field and the extent of medical records in regards to identifying harmful agents. Hopefully, retroactive studies such as this one will shed light on the environmental origins of chronic, adult-onset diseases.

ACKNOWLEDGEMENTS

Archives and Special Collections, Nicholls State University
Department of Biological Sciences, Nicholls State University
University Honors Program

REFERENCES

Aviv U, Kornhaber R, Harats M, Haik J. The burning issue of white phosphorus: a case report and review of the literature. *Disaster Mil Med.* 2017 Aug 30; 3:6.

Bostock J. Experiments to ascertain how far the presence of albumen and muriatic acid interfere with action of bichloride of mercury and protomuriate of tin upon each other. *Edinb Med Surg J.* 1825 Jan 1; 23(82):65-69.

Fessenden RA. A safe method of using mercury bichloride for the antisepsis of wounds of large surface. *Science*. 1915 Jun 18; 41(1068):904.

Finzer KH. Lysol. *Can Med Assoc J.* 1961 Jun 24; 84(25):1451.

Gurman W. Iodine. *J Am Inst Homeopath*. 1945; 38:383-5.

Hugo WB. Phenols: a review of their history and development as antimicrobial agents. *Microbio*s. 1978; 23(92):83-5.

National Toxicology Program. Toxicology and carcinogenesis studies of mercuric chloride (CAS No. 7487-94-7) in F344 Rats and B6C3F1 Mice. *Natl Toxicol Program Tech Rep Ser*. 1993 Feb; 408:1-260.

JESSICA HARDY VS. USADA (2008)

Jaquinta M. Graves
Kinesiology Department, University of Louisiana at Lafayette, Jaquintagraves30@gmail.com

ABSTRACT

The debate on performance enhancement drugs (PEDs) in sports is a recurring topic due to the severity of the effects. Anti-doping organizations such as the U.S. Anti-Doping Agency exists to highlight the effects of PEDs in athletes. Due to the potential to drastically alter the human body and biological functions is why the USADA's mission is to preserve the integrity of competition. Banned substances include but are not limited to anabolic agents, diuretics, stimulants, and beta blockers. The responsibility of most of these substances are to treat hypertension, relieve severe pain, and treat delayed puberty. Anti-doping programs rely on testing, Six out of ten athletes use PEDs. The ability to detect drug misuse is limited because many athletes know the pharmacokinetics and pharmacology of the drugs they take. The research provided will highlight Olympic athlete, Jessica Hardy in violation to the WADA code.

Key Words: WADA, Violation, Substance, Innocence

1. INTRODUCTION

In 2008, Jessica Hardy qualified for the USA Olympic team. A few weeks later on July 23, 2008, Hardy was notified that the second of her three tests from the Olympic trials came back as positive for low levels of clenbeutrol. This notification subsequently leaked to the media. Her attorney confirmed on July 24, 2008 that Hardy's samples from a test administered on July 4th were positive for clenbuterol. Hardy claimed innocence and said she had never heard of clenbuterol. Media coverage of the issue noted that tainted supplements have played a part in some previous instances of bans. Under both American and international regulations, a lack of knowledge of the source of the substance ingested is not considered to be a defense against a positive result. The WADA has established a core document that provides the framework for anti-doping policies, rules, and regulations within all sports. The U.S. Anti-Doping Agency is a national non-profit anti-doping organization that provides results of athlete drug tests.

Figure 1. World Anti-Doping Agency. The primary purpose of WADA is to monitor anti-doping activities worldwide, by providing a framework of anti-doping rules. This organization is led by the International Olympic Committee.

2. METHODOLOGY

The statistics of the USA Olympic Games in 2008 was reviewed to understand the effect of Hardy's violation to appear at the games. The WADA policy code was reviewed and noted in the presentation to make note of the types of violations athletes are held to a standard of.

3. SUMMARY AND CONCLUSIONS

The effect of this penalty imposed upon Jessica Hardy is a one year period of ineligibility. Secondly, due to Rule 45, she has no eligibility to compete in the next Olympic Games. Overall, although some choose to debate the approval of doping in sports the WADA and USADA has still chosen to define the purpose of clean competition. There are not enough benefits to masks the dangers of doping in sports. Regardless of Hardy's innocence against the violation she was being punished for, Hardy had to regain the trust of fans as well as supplement companies. Once you're labeled as someone who undermines the integrity of clean competition; it is difficult to regain the confidence to compete again.

REFERENCES

https://www.wada-ama.org/sites/default/files/resources/files/wada-2015-world-anti-doping-code.pdf

https://www.usada.org/testing/results/arbitration-decisions

Omondi-Ochieng, P. (2017). Performance enhancement drugs & United States professional sports. Lambert Academic Publishers, Saarbrucken, Germany: ISBN: 978-3-330-34365-8.

Simon Outram, Bob Stewart. (2013) Enhancement drug use in society and in sport: the science and sociology of stimulant use and the importance of perception. Sport in Society 16:6, pages 789-804.

World Anti-Doping Agency. (n.d.). Retrieved from https://www.wada-ama.org/

Direct Scanning Transmission Ion Microscopy at Louisiana Accelerator Center

Nicholas Henderson[1]
1 Louisiana Accelerator Center, University of Louisiana Lafayette, C00295187@louisiana.edu

ABSTRACT

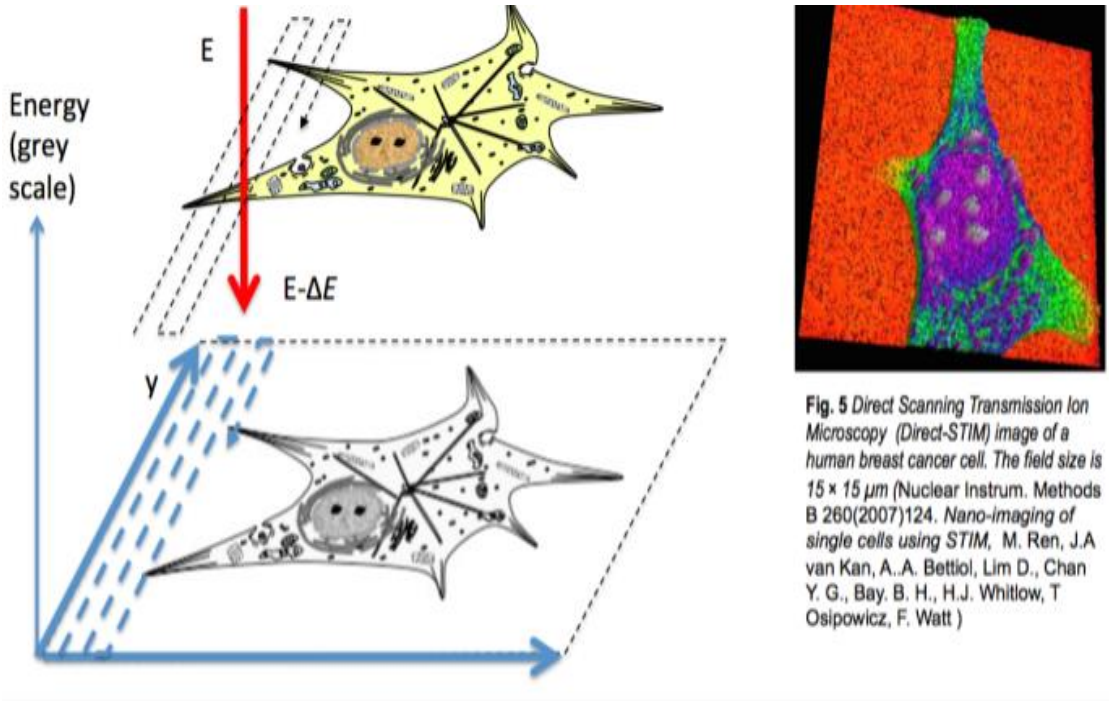
Direct scanning transmission ion microscopy (direct STIM) at the Louisiana Accelerator Center (LAC) is a potential useful tool for imaging thin biological tissue samples. In STIM a proton or He nucleus is sent through a thin sample and the energy loss measured as the beam is scanned over the sample. STIM can be used alongside with Rutherford backscattering spectroscopy (RBS) and Proton Induced X-ray Emission (PIXE) as part of a complete system for analysis and imaging. The setup is suitable to image and analyze biological tissues. Our goal is to image the structure of individual cells and of biological tissue. The development is being carried on cells and tissues from the tissue archive at the New Iberia Research Center (NIRC).

The STIM system consists of a detector holder that was designed to hold detectors 40 mm from the sample and machined from a piece of aluminum. The holder has a space for both the off-axis STIM (30°) and the direct STIM at 0° detectors as well as a Faraday cup to measure beam currents. The diodes and cup are mounted on thin plastic insulating rings that create a tight fit and avoid short circuiting. The holder is mounted to a manipulator arm, and the diodes are wired to two separate electrical leadthroughs that connect to the electronics chain.

The 1.7 MV Pelletron accelerator at the Louisiana accelerator center is used to provide 2 MeV energy proton beams. The measurements are done in the target chamber of a MeV ion microprobe (μB1). This uses an Oxford triplet lens system to focus the beam down sizes of a μm or so. The imaging works by scanning the beam over the sample and measuring the energy loss for each particle.

1. INTRODUCTION

In the field of biological imaging, there has always been a need for higher resolution images than can be achieved using light. Scanning transmission ion microscopy uses a small beam of focused H^+ or He^{2+} ions to create structural images of tissues or cells. The use of these ions allows for higher resolution images than can be achieved using light, due to the wavelength limitations of visible light. The ions used are from a 1.7 MV Pelletron accelerator located at the Louisiana Accelerator Center (LAC), which accelerates them to an energy of 2 mega electron volts (MeV). The beam is then focused using an Oxford triplet magnetic quadrupole lens system after being cut down by objective and collimator slits on the beam line to lower the count rate to 10,000 particles per second. This results in a current on the scale of femptoamperes. The tissue samples used for imaging were given by the New Iberia Research Center (NIRC).



STIM example. Photo credits: Dr. Harry Whitlow

Figure 1. STIM Example

2. EXPERIMENTAL

The first step needed in developing the STIM imaging setup was designing the detector holder to be sufficiently light, yet large enough to hold two pin diodes for the detectors, a faraday cup to measure beam current, and a mounting device, along with insulators. After designing the detector holder to rest 40 mm from the sample with inline and 30° detectors, it was machined from a solid piece of aluminum and mounted onto a manipulator arm in the microbeam one (μb1) chamber. The pin diode detectors, being easy to overload with current and not being long lasting detectors, were soldered to wire connectors that allow for relatively quick switching between diodes in the case of it being used to its limit. These connectors lead to the output leadthroughs on the exterior of the beam chamber that houses the sample.

The next step was to set up the electronics to be able to image the data from the detectors. A preamplifier connects directly to the output from the chamber. This preamplifier is then connected to a bias voltage supply, a power cable from the amplifier, and the output to the amplifier itself. The amplifier allows for the small current picked up by the detector to be made useful by the computer software. The amplifier has output to both an oscilloscope to check the detectors and to the software input.

The final step needed to prepare for data collection was to calibrate the software with the pin diode. This was done using an alpha radiation source, ^{241} Am. The source was placed on the sample holder in the chamber and data was collected through the pin diode to identify the locations of known peaks from the alpha radiation. These peaks gave data to enter the calibration specifications which allows the software to give useable information.

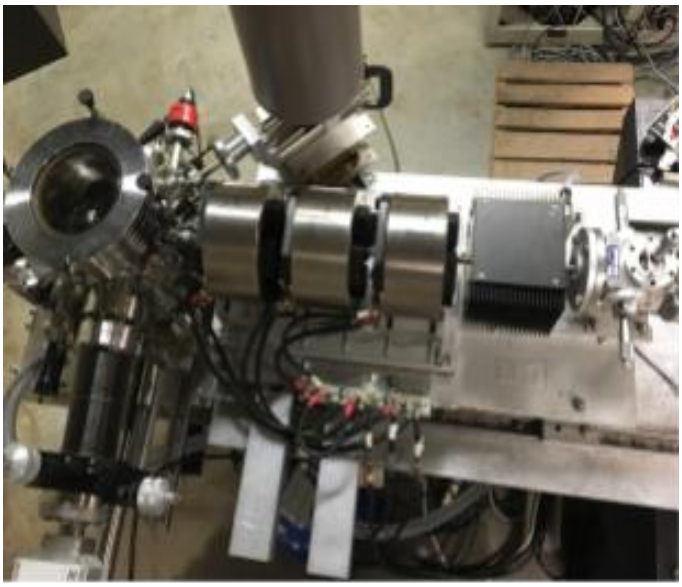
Before running the beam, the chamber must be isolated from the rest of the accelerator and beam line by closing off valves. This is done to prevent damage to the machines from

exposure to air. The chamber is vented to allow gradual restoration of pressure to regular atmospheric levels. Any work done in the chamber must be done while the chamber is in open air. Before reopening the valves to the beam line, the chamber must be restored to pressures on the order of microtorr (or nano atm). This is done by using an oil pump to achieve low pressure in the chamber. Then the chamber is sealed off and opened to a turbopump which lowers the chamber to high vacuum pressures needed to open the chamber to the beam line without causing damage.

To properly run the beam and get the structural images of the cells, the beam must be focused. This is done using the proton induced x-ray emission setup in the same chamber. A copper grid is placed in front of the beam and the magnetic lenses are provided with varying current to achieve a focused image. Once a focused beam is achieved, the pin diode is placed behind the grid and the image is then checked using the pin diode. The tissue sample is then placed in front of the detector to measure the mean energy loss as the beam passes through the sample.

The accelerator at LAC. Photo credits: Dr. Harry Whitlow

Figure 2. The accelerator at LAC



Oxford triplet magnetic quadrupole lenses. Photo credit: Dr. HArry Whitlow

Figure 3. Oxford triplet magnetic quadrupole lenses

3. RESULTS AND DISCUSSION

The results of the research have been limited to images of the grid showing focus due to the time requirements of pumping down the chamber, centering and focusing the beam, and calibrating the software. The system is expected to produce images of simian jejunum tissue and sample cells soon and more results by the December of 2018. The results so far show that the detectors work properly and that the system is properly calibrated and capable of imaging.

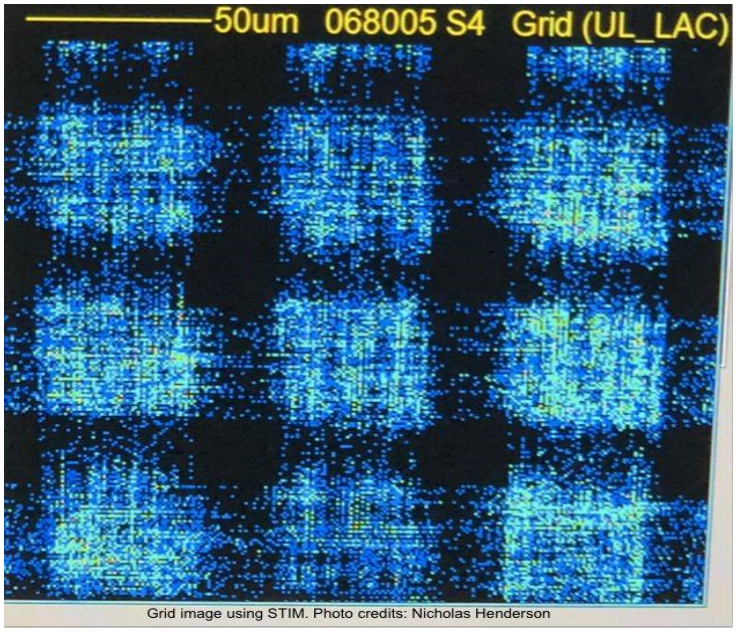


Figure 4. Grid image using STIM

4. CONCLUSION

The results show that the system is ready to image the tissue samples obtained from the NIRC. This indicates that data will be collected soon to start studying the structural details of the tissue samples. Once data is gathered, there will be many more possibilities for future research on medical or biological imaging and structural data. This can be used for studying the effects of pathogens or diseases on animal tissue. When the data is gathered, it can be used to observe the structural changes of a pathogen to tissue by comparing it to the tissue of a healthy subject.

PTSD Symptoms as a Mediator of the Relation between Adverse Childhood Experiences and Somatic Symptoms

Madison Holmes[1], Mikaila Kinsland[2], Nicholas Barker[3], and Bailey Latiolais[4]
1 University of Louisiana at Lafayette, C00063336@louisiana.edu
2 University of Louisiana at Lafayette, C00295101@louisiana.edu
3 University of Louisiana at Lafayette, neb3148@louisiana.edu
4 University of Louisiana at Lafayette, bjl7125@louisiana.edu

Hung-Chu Lin
Supervising Faculty, Psychology Department, University of Louisiana at Lafayette, hung-chu.lin@louisiana.edu

ABSTRACT

Mounting research has informed the relations between childhood trauma and adult physical functioning; the mechanisms underlying the relations, however, remain unclear. Identifying mechanisms linking childhood trauma and poor health outcomes is important to effective interventions and preventative strategies. Recent research has pointed to posttraumatic stress disorder (PTSD) as a potential factor through which childhood adversity relates to physical health symptoms. The purpose of this study was to examine the relation between adverse childhood experiences (ACEs) and somatic symptoms in adulthood; as well, the study examined the role of PTSD symptoms in the association of ACEs with somatic symptoms. A sample of 482 college students responded to an online survey, including (1) the Adverse Childhood Experiences scale, examining childhood trauma that occurred prior to one's eighteenth birthday, (2) the Cohen-Hoberman Inventory of Physical Symptoms, assessing participants' somatic symptoms experienced during the last two weeks, (3) the Depression Anxiety Stress Scales, evaluating current symptoms of depression, anxiety, and stress, and (4) the Life Events Checklist for DSM-5, determining direct or indirect exposure to a variety of Criterion A traumatic events, and (5) the Posttraumatic Stress Disorder Checklist for DSM-5, evaluating DSM-5 symptoms of PTSD. The results revealed an indirect pathway from ACEs to somatic symptoms through PTSD symptoms above and beyond all covariates, including gender, Criterion A trauma, depression, and anxiety. The findings carry implications for prevention and intervention programs aiming at ameliorating the harmful effects of ACEs on adult somatic symptoms.

Key Words: Adverse Childhood Experiences, Depression, Difficulty In Emotion Regulation

1. INTRODUCTION

Prior research has documented the relations between childhood trauma and adult physical outcomes (e.g., Anda, Tietjen, Schulman, Felitti, & Croft, 2010; Felitti et al., 1998). However, limited information in the literature addresses the processes through which adverse childhood experiences (ACEs) connect to poor physical symptoms. Adverse childhood experiences refer to traumatic experiences in the first 18 years of life, ranging in categories from physical abuse,

emotional abuse, sexual abuse, emotional neglect, physical neglect, and witnessing violence against mother or intimate partner violence exposure (Feliti et al., 1998). Somatic symptoms are bodily dysfunctions, such as constant fatigue or digestive issues, and uncomfortable sensory experiences, such as back pain, stomach pain, etc. Some are psychosomatic, like weight gain and headaches (Hart et al., 2013; Kapfhammer, 2006). Posttraumatic Stress Disorder (PTSD) is a common, debilitating disorder which occurs as a psychological and behavioral response to life-threatening or traumatic events (Mehta et al., 2013; Afari et al., 2014). Symptoms of PTSD are re-experiencing trauma, avoiding reminders, apathy, increased arousal, difficulty sleeping, hypervigilance, and exaggerated startle response (Ozer, Best, Lipsey, & Weiss, 2003). To be diagnosed with PTSD, individuals must meet the DSM-5 Criteria listed by the American Psychiatric Association (National Center for PTSD, 2016). According to a study by Subica (2013), people who experienced childhood physical abuse, sexual abuse, or forced sexual trauma increases the likelihood of clinical PTSD. Due to the resilience of adolescent brains, most children easily recover from a single traumatic experience. However, exposure to more than one traumatic event puts the child at higher risk to develop symptoms of PTSD; this risk is amplified if trauma is interpersonal, intentional, and occurs over a long period of time (La Greca et al., 2008; De Bellis & Zisk, 2014). Further, PTSD is closely linked to Functional Somatic Syndromes (FSS), which can include fibromyalgia, chronic widespread pain, irritable bowel syndrome, and others. PTSD has the strongest association with FSS than any predictor measured (Afari et al., 2014).

The purpose of this study was to examine the association of ACEs with somatic symptoms and whether PTSD symptoms mediated this association. Based on the findings from prior research, this study expected to find an indirect pathway from ACEs to somatic symptoms from PTSD symptoms, such that ACEs positively predicted PTSD symptoms, which, in turn, predicted somatic symptoms.

2. METHOD

2.1. Participants and Procedure

This study included 482 college students (361 females, M_{age} = 20.6, SD_{age} = 4.0) recruited via the SONA participant recruitment system of the Psychology Department at the University of Louisiana at Lafayette. Participation was voluntary, but participants were rewarded credits to partially fulfill research requirements for the courses in which they were enrolled. The study was approved by the Institutional Review Board at the University. The participants responded to questionnaires using the computers in the Psychology Department Computer Laboratory.

2.2. Measures

Demographic Information Sheet. This checklist solicits participants' demographic background (e.g., age, gender, race, etc.) and information on general health (e.g., past and current diagnosis of physical or mental issues). In addition, participants respond to family history of illnesses and at-risk life styles items.

Adverse Childhood Experience. The Adverse Childhood Experiences (ACEs; Dong et al., 2003; Felitti et al., 1998) scale is a 10-item self-report questionnaire used to examine an individual's recall of adverse experiences which occurred prior to his/her eighteenth birthday. These adverse early events pertain to an individual's personal history of emotional abuse, physical abuse, sexual abuse, emotional neglect, physical maltreatment and/or neglect, parental

separation/divorce, family substance use, mental illness with the household, and/or parental incarceration. Each of the items are structured as a 'Yes' or 'No' question in regard to the individual's adverse childhood experiences. For instance, an item direct towards a history of physical neglect states "*Did you often or very often feel that (1) no one in your family loved you or thought you were important or special or (2) your family did not look out for each other, feel close to each other, or support each other?*" An exemplar item pertaining to mental illness within the immediate family states "*Was a household member depressed or mentally ill, or did a household member attempt suicide?*" For each item, a 'Yes' response signifies an individual item score of one. The scoring process of ACE is conducted by compositing all the 'Yes' responses from the 10-items; therefore, an individual's ACE score can range from 0 to 10. A score of '0' indicates that the individual experienced no adversities during childhood. According to Dong et al. (2004), an ACE score from 1 to 3 is considered as a low occurrence of adverse events. An ACE score of 4 indicates a moderate level of traumatic events, and an ACE score of 5 or more is considered high level of occurrence of adverse events.

Posttraumatic Stress Disorder Checklist for DSM-5. The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Weathers et al., 2013b) is a 20-item assessment which is utilized to evaluate an individual's responses to his/her most traumatic event. The individual is directed to indicate his/her responses over the past month, specifically. The PLC-5 is a self-report measure which is rates an individual's level of difficulty in response to a traumatic event on a 5-point Likert. The range of the 5-point Likert scale is from 0 (Not at all), 1 (A little bit), 2 (Moderately), 3(Quite a bit), and 4 (Extremely) (Weathers et al., 2013b). An exemplar item includes "Repeated, disturbing, and unwanted memories of the stressful experience?"

Life Events Checklist for DSM-5. The Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013a) is a self-report assessment which is comprised of two parts, and a total of 26 items pertaining to traumatic events. The first component of the LEC-5 is comprised of a checklist containing 17 items pertaining to one's life events. For each item, there are six potential responses. These potential responses include that an event 'happened to me', 'witnessed it', 'learned about it', 'part of my job', 'not sure', and 'doesn't apply'. The participant is directed to indicate (or check off) all of the responses which apply to his/her entire lifetime. Additionally, the second portion of the LEC-5 is comprised of 9-items which are more directed towards the most traumatic event within a subject's lifetime. These items inquire what happened at the event, i.e., if the subject's life was in danger or the manner that he/she experienced the event. An exemplar item – from part one – includes 'Natural disaster (for example, flood, hurricane, tornado, earthquake).' Within part two, an exemplar item is "How long ago did it [the event] happen?"

Depression Anxiety and Stress Scale. The Depression and Anxiety subscales of the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) were used to assess depressive and anxiety symptoms. The DASS-21 is a 21-item scale that measures levels of emotional distress along three dimensions, including depression, anxiety, and stress. The items are rated utilizing a 4-point Likert scale, ranging from 0 (*never*), 1 (*sometimes*), 2 (*often*), and 3 (*almost always*). The DASS-21 contains three 7-item subscales, including the Anxiety, Depression, and Stress subscales. This assessment is defined as a useful tool in determining the severity levels of one's depression, anxiety, and stress as well as how these three variables relate to one another. An exemplar item of the Depression subscale is "*I was unable to become enthusiastic about anything*," the Anxiety subscale "*I felt I was close to panic*."

3. RESULTS

3.1. Correlations

The results indicated that ACEs (*M* = 1.80, *SD* = 1.96) and somatic symptoms (CHIPS, *M* = 47.95, *SD* = 18.32) were positively correlated with each other, *r* = .27, *p* < .0001. Also, ACEs positively correlated with PTSD symptoms (PCL-5, *M* = 20.31, *SD* = 17.87), *r* = .43, *p* < .0001, and PTSD symptoms positively correlated with somatic symptoms, *r* = .40, *p* < .0001.

3.2. Mediation Analysis

Regression analysis indicated that, with gender, DASS Depression, DASS Anxiety, and Criterion A Trauma controlled, ACEs significantly predicted CHIPS: *b* = .11, *SE* = .05, *t* = 2.25, *p* = .02, CI: [.02, .21]. After adding PTSD symptoms as a predictor to the regression model, the main effect of ACEs on CHIPS became nonsignificant, *b* = .05, *SE* = .05, *t* = 0.97, *p* = .33, CI: [-.06, .16]. The findings indicated that PTSD symptoms fully mediated the association between ACEs and CHIPs, such that ACEs positively predicted PTSD symptoms, *b* = .33, *SE* = .05, *t* = 7.38, *p* < .0001, CI: [.24, .42], which in turn positively predicted somatic symptoms, *b* = .18, *SE* = .06, *t* = 3.02, *p* = .003, CI: [.06, .30]. The indirect effect was significant, *b* = .06, *SE* = .02, *t* = 2.68, *p* = .007, CI: [.02, .11] (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

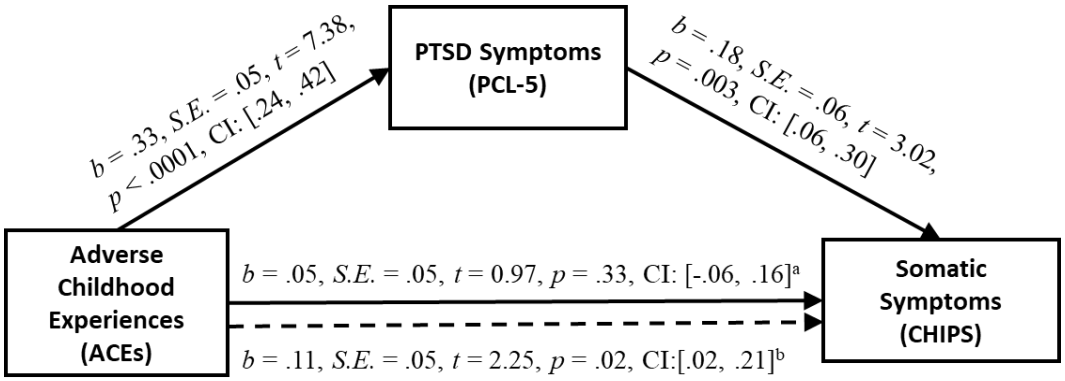


Figure 1. Path diagram of the prediction of somatic symptoms (CHIPS) from adverse childhood experiences (ACEs). All variables were standardized. Gender, depression, anxiety, and Criterion Trauma A were controlled. a Path value next to the solid line indicating the direct effect of ACEs on CHIPS after controlling for PTSD symptoms (PCL-5). b Path value next to the dashed line indicating the total effect of ACEs on SSE. The indirect effect was significant, *b* = .06, *SE* = .02, *t* = 2.68, *p* = .007, CI: [.02, .11] (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

4. DISCUSSION

This study examined the relation between ACEs and somatic symptoms and how PTSD symptoms mediated this relation. As predicted, the results revealed an indirect pathway from ACEs to somatic symptoms through PTSD symptoms above and beyond all the covariates, including gender, depressive symptoms, anxiety symptoms, and criterion A trauma. Specifically, adverse childhood experiences positively predicted PTSD symptoms, which, in

turn, predicted physical symptoms in the body. The findings were in line with prior research underscoring PTSD symptoms as potential mechanisms through which early childhood trauma was connected to adverse physical outcomes (Schnurr & Green, 2004). For individuals who experienced childhood adversity and later developed PTSD, alterations in stress reaction patterns resulting in disrupted neuroendocrine systems (e.g., the locus coeruleus/norepinephrine-sympathetic system and hypothalamic-pituitary-adrenal systems) may confer risks for poor physical functioning (Friedman & McEwen, 2004). To improve chronic somatic symptoms, screening for exposure to childhood trauma and PTSD symptoms and implementing interventions for PTSD symptoms may prove to be essential for ameliorating the harmful effects of childhood adversity on somatic functioning.

REFERENCES

Afari, N., Ahumada, S. M., Wright, L. J., Mostoufi, S., Golnari, G., Reis, V., Cuneo, J. G. (2014). Psychological trauma and functional somatic syndromes: A systematic review and meta-analysis. *Psychosom Medical, 76,* 2-11. doi:10.1097/PSY.0000000000000010.

De Bellis, M. D., Zisk, A. (2014). The biological effects of childhood trauma. *Child and Adolescent Psychiatric Clinics of North America, 23*(2), 185-222. doi: 10.1016/j.chc.2014.01.002.

Feliti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245-258.

Friedman, M. J., & McEwen, B. S. (2004). Posttraumatic stress disorder, allostatic load, and medical illness. In P. P. Schnurr & B. L. Green (Eds.), *Trauma and health: Physical health consequences of exposure to extreme stress* (pp. 157-188). Washington, DC: American Psychological Association.

Kapfhammer, H. (2006) Somatic symptoms in depression. *Dialogues in Clinical Neuroscience, 8*(2), 227-239.

Kilpatrick, D. (2003). *High Percentage of Youth in the U.S. Report Symptoms of Posttraumatic Stress and Other Disorders.* Retrieved from http://www.apa.org/news/press/releases/2003/08/youth-disorders.aspx

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*(1), 52-73. http://dx.doi.org/10.1037/0033-2909.129.1.52

La Greca, A. M., Boyd, B. A., Jaycox, L. H., Kassam-Adams, N., Mannarino, A. P., Silverman, W. K., . . . Wong, M. (2008). *Children and Trauma: Update for Mental Health Professionals*. Retrieved from http://www.apa.org/pi/families/resources/update.pdf

Mehta, D., Klengel, T., Conneely K. N., Sith, A. K., Altmann, A., Pace, T. W., … Binder, E. G.(2013). Childhood maltreatment is associated with distinct genomic and epigenetic profiles in posttramatic stress disorder. *Proceedings of the National Academy of Sciences of the United States of America. 110*(20), 8302-8307.

Schnurr, P. P., & Green, B. L. (2004). Understanding relationships among trauma, posttraumatic stress disorder, and health outcomes. In P. P. Schnurr & B. L. Green (Eds.), *Trauma and health: Physical health consequences of exposure to extreme stress* (pp. 247-275). Washington, DC, US: American Psychological Association.

Subica, A. M. (2013). Psychiatric and physical sequelae of childhood physical and sexual abuse and forced sexual trauma among individuals with serious mental illness, *Journal of Traumatic Stress, 26,* 588-596. doi:10.1002/jts.21845
National Center for PTSD. (2016, June 10). Retrieved from https://www.ptsd.va.gov/professional/ptsd-overview/dsm5_criteria_ptsd.asp
Widom, C. S. (1999). Posttraumatic stress disorder in abused and neglected children grown up, *American Journal of Psychiatry, 156(*8), 1223-1229. doi: 10.1176/ajo.156.8.1223

Difficulty in Emotion Regulation as a Mediator of the Relation between Adverse Childhood Experiences and Attachment Insecurity

Ashley Hughes[1], Lindsey Held[2], and Krista Malley[3]
1 University of Louisiana at Lafayette, akh6663@louisiana.edu
2 University of Louisiana at Lafayette, llh1807@louisiana.edu
3 University of Louisiana at Lafayette, c00293656@louisiana.edu

Hung-Chu Lin
Supervising Faculty, Psychology Department, University of Louisiana at Lafayette, hung-chu.lin@louisiana.edu

ABSTRACT

Research has indicated that adverse childhood experiences (ACEs) are associated with negative outcomes in emotion regulation and attachment insecurity. As well, attachment insecurity is associated with impairment in the regulatory process of emotions. This study examined how ACEs and attachment insecurity related to each and how difficulty in emotion regulation played a role in this relation. A sample of 482 college students responded to self-report measures, including the Adverse Childhood Experiences, the Difficulties in Emotion Regulation Scale, and the Relationship Scales Questionnaire for the assessment of adverse childhood experiences, difficulty in emotion regulation, and attachment insecurity (including attachment anxiety and avoidance) respectively. Separate regression analyses were conducted to examine the mediating role of difficulty in emotion regulation in the associations of ACEs with attachment anxiety and with avoidance, respectively. The results indicated that ACEs scores positively predicted both attachment anxiety and attachment avoidance, and that difficulty in emotion regulation mediated both the associations of ACEs with attachment anxiety and with attachment avoidance. However, difficulty in emotion regulation appeared to play a more important role in accounting for the relation between ACEs and attachment anxiety than in the relation between ACEs and attachment avoidance. The findings suggest that difficulty emotion regulation caused by adverse childhood experiences is more relevant to negative views of the self (typical of attachment anxiety) than to negative views of others (typical of attachment avoidance). Gaining a better understanding of the role of difficulties in emotion regulation in the relation between ACEs and attachment insecurity would allow for possible improvements or early interventions to aid in healthy attachment style development. Implications for targeting emotion regulation as a means of ameliorating harmful effects of ACEs on attachment functioning will be discussed.

Key Words: Adverse Childhood Experiences, Depression, Difficulty In Emotion Regulation

1. INTRODUCTION

Adverse childhood experiences (ACEs) refer to traumatic experiences in the first 18 years of life, ranging in categories from physical abuse, emotional abuse, sexual abuse, emotional

neglect, physical neglect, and witnessing violence against mother or intimate partner violence exposure (Feliti et al., 1998). Mounting research has shown that ACEs are associated with maladaptive attachment functioning, including attachment anxiety and avoidance (e.g., Baer & Martinez, 2006; Owen, Quirk & Manthos, 2012).

The notion of working models of the self and others has been used as a framework to conceptualize how humans form close socio-emotional bonds (Pietromonaco & Barrett, 2000). The working models of the self and others are initially formulated in one's early developmental history within the context of child-caregiver relationship and subsequently carried forward to influence behavior in later interpersonal relationships (Hazan & Shaver, 1987). The working model of the self concerns whether one believes the self to be worthy of affection and love, specifically from attachment figures. Negative models of the self thereby reflect anguish over rejection, and are often referred to as the *anxiety* attachment dimension. The working model of others concerns the trustworthiness of attachment figures in response to the individual's needs. Negative models of the world are associated with mistrust in others, and are often referred to as the *avoidance* attachment dimension (Griffin & Bartholomew, 1994).

Although the literature has documented the associations between ACEs and attachment anxiety and avoidance, limited information has addressed the processes that account for the associations. One possible mechanism for the relation between ACEs and negative outcomes may involve maladaptive emotion regulation because early life stressors are associated with impairments in affective functioning (Pechtel & Pizzagalli, 2011), which in turn is associated with attachment insecurity (Movahed Abtahi, & Kerns, 2017). Emotion regulation involves conscious and nonconscious processes modulating our emotions to reach the optimal levels so that an individual can execute appropriate behaviors in response to specific events (Bargh & Williams, 2007). The ability to effectively regulate emotions develops over childhood and adolescence (Aldao et al., 2009).

This study examined the association of adverse childhood experiences with adult depressive symptoms and how difficulty in emotional regulation exacerbated this mediated this relation. By better understanding the role of emotion regulation in the relation between ACEs and attachment insecurity, strategies can be developed to target emotion regulation competence as a means to ameliorate the impacts of ACEs on attachment insecurity.

2. METHOD

2.1. Participants and Procedure

This study included 482 college students (361 females, M_{age} = 20.6, SD_{age} = 4.0) recruited via the SONA participant recruitment system of the Psychology Department at the University of Louisiana at Lafayette. Participation was voluntary, but participants were rewarded credits to partially fulfill research requirements for the courses in which they were enrolled. The study was approved by the Institutional Review Board at the University. The participants responded to questionnaires using the computers in the Psychology Department Computer Laboratory.

2.2. Measures

Demographic Information Sheet. This checklist solicits participants' demographic background (e.g., age, gender, race, etc.) and information on general health (e.g., past and current diagnosis of physical or mental issues). In addition, participants respond to family history of illnesses and at-risk life styles items.

Adverse Childhood Experience. The Adverse Childhood Experiences (ACEs; Dong et al., 2003; Felitti et al., 1998) scale is a 10-item self-report questionnaire used to examine an individual's recall of adverse experiences which occurred prior to his/her eighteenth birthday. These adverse early events pertain to an individual's personal history of emotional abuse, physical abuse, sexual abuse, emotional neglect, physical maltreatment and/or neglect, parental separation/divorce, family substance use, mental illness with the household, and/or parental incarceration. Each of the items are structured as a 'Yes' or 'No' question in regard to the individual's adverse childhood experiences. An exemplar item pertaining to mental illness within the immediate family states "*Was a household member depressed or mentally ill, or did a household member attempt suicide?*" According to Dong et al. (2004), an ACE score from 1 to 3 is considered as a low occurrence of adverse events. An ACE score of 4 indicates a moderate level of traumatic events, and an ACE score of 5 or more is considered high level of occurrence of adverse events.

Relationship Scales Questionnaire. The Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994) is a 30-item measure designed for assessing attachment dimensions, i.e., internal working models (IWMs) of self and others. Seventeen of these items are used to calculate participants' attachment dimensions. Participants indicate, using a 5-point Likert scale (1 = not at all like me to 5 = very much like me), which statement best described their style in close, adult relationships. Five statements are devoted to secure attachment, five to dismissing style of attachment, four statements contribute to the fearful style, and four items represent the preoccupied attachment pattern. For example, an item for secure attachment would be: "I find it easy to get emotionally close to others"; for fearful attachment: "I find it difficult to depend on other people"; for preoccupied attachment: "I want to be completely emotionally intimate with others"; and for dismissing attachment: "It is very important to me to feel independent". The underlying dimension of self and others are derived from the linear combinations of prototype ratings. The model of self is obtained from subtracting the sum of fearful and preoccupied scores (both have negative self models) from the sum of secure and dismissing scores (both have positive self models). Reversing the calculation (i.e., subtracting the sum of the secure and dismissing scores from the sum of fearful and preoccupied scores) results in an index for the negativity of the model of self, also known as the anxiety dimension. Similarly, the model of others is obtained from subtracting the sum of fearful and dismissing scores (both have positive models of others). Reversing the calculation results in a score reflecting the negativity of the model of others, also referred to as the avoidance dimension. In summary, the underlying attachment dimensions were found using the following equations: Model of Self = (Secure + Dismissing) - (Preoccupied + Fearful); Model of Others = (Secure + Preoccupied) - (Dismissing + Fearful).

Difficulties in Emotion Regulation Scale. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a self-report scale used to evaluate the adult individual's emotion regulation within several facets. The DERS is comprised of 36 items rating emotional regulation on a 5-point Likert scale. The 5-point Likert scale ranges from 1 (*almost never, 0-10%*) to 5 (*almost always, 91-100%*). The DERS contains six subscales, which include Non-acceptance of Emotional Responses (NONACCEPT); Difficulties Engaging in Goal Directed Behavior (GOALS); Impulse Control Difficulties (IMPULSE); Lack of Emotional Awareness (AWARE); Limited Access to Emotion Regulation Strategies (STRATEGIES); and Lack of Emotional Clarity (CLARITY) (Gratz & Roemer, 2004). An exemplar item of the DERS includes "*I experience my emotions as overwhelming and out of control."*

3. RESULTS

3.1. Correlations

The results indicated that ACEs (*M* = 1.80, *SD* = 1.96) positively correlated with attachment anxiety (*M* = -.30, *SD* = 1.68) and attachment avoidance (*M* = .23, *SD* = 1.79), *r* = .17, *p* = .0002, and *r* = .29, *p* < .0001, respectively. Also, DERS (*M* = 96.45, *SD* = 21.72) positively correlated with attachment anxiety and attachment avoidance, *r* = .35, *p* < .0001, and *r* = .28, *p* < .0001, respectively. ACEs and DERS were positively correlated with each other, *r* = .24, *p* < .0001.

3.2. Mediation Analyses

The results of regression analyses indicated that, with gender controlled, ACEs significantly predicted attachment anxiety, *b* = .17, *SE* = .04, *t* = 4.04, *p* <.0001, CI: [.09, .26], and attachment avoidance, *b* = .29, *SE* = .05, *t* = 5.98, *p* <.0001, CI: [.19, .38], respectively. To test the mediating roles of DERS in the associations of ACEs with attachment anxiety and with attachment avoidance, respectively, this study conducted two separate mediation analyses. Each of the mediation analyses included two regression models; the first model entered ACEs as the main predictor, the second model added DERS as another predictor for the estimation of the mediation role. All models were estimated with gender controlled.

3.2.1 Predication for Attachment Anxiety

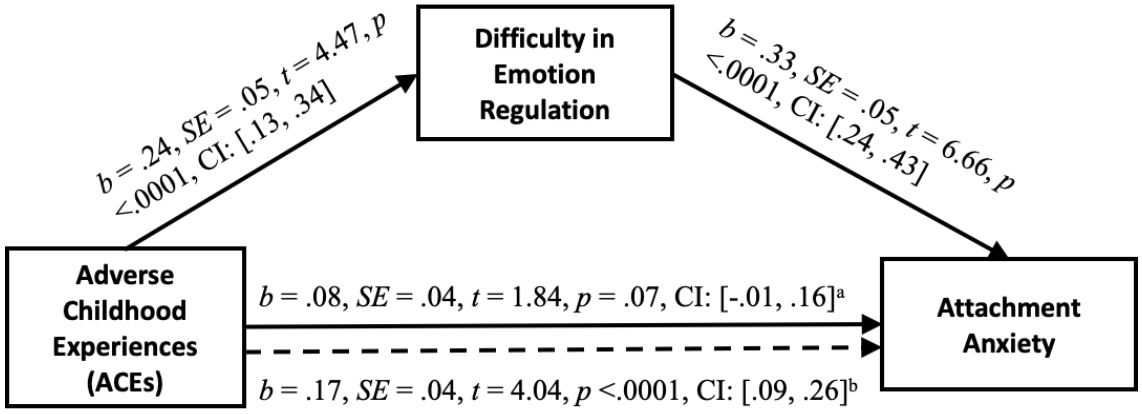


Figure 1. Path diagram of the prediction of attachment anxiety from adverse childhood experiences (ACEs). All variables were standardized. Gender was controlled. a: Path value next to the solid line indicating the direct effect of ACEs on attachment anxiety after controlling for difficulty in emotion regulation. b: Path value next to the dashed line indicating the total effect of ACEs on attachment anxiety. The indirect effect was significant, *b* = .08, *SE* = .02, *t* = 3.64, *p* <.0001, CI: [.04, .12], (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

After controlling DERS in the model, the main effect of ACEs on attachment anxiety became nonsignificant, *b* = .08, *SE* = .04, *t* = 1.84, *p* = .07, CI: [-.01, .16]. The results indicated that DERS fully mediated the association between ACEs and attachment anxiety, such that ACEs

positively predicted DERS, *b* = .24, *SE* = .05, *t* = 4.47, *p* <.0001, CI: [.13, .34], which in turn positively predicted attachment anxiety, *b* = .33, *SE* = .05, *t* = 6.66, *p* <.0001, CI: [.24, .43]. The indirect effect was significant, *b* = .08, *SE* = .02, *t* = 3.64, *p* <.0001, CI: [.04, .12], (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

3.2.2 Predication for Attachment Avoidance

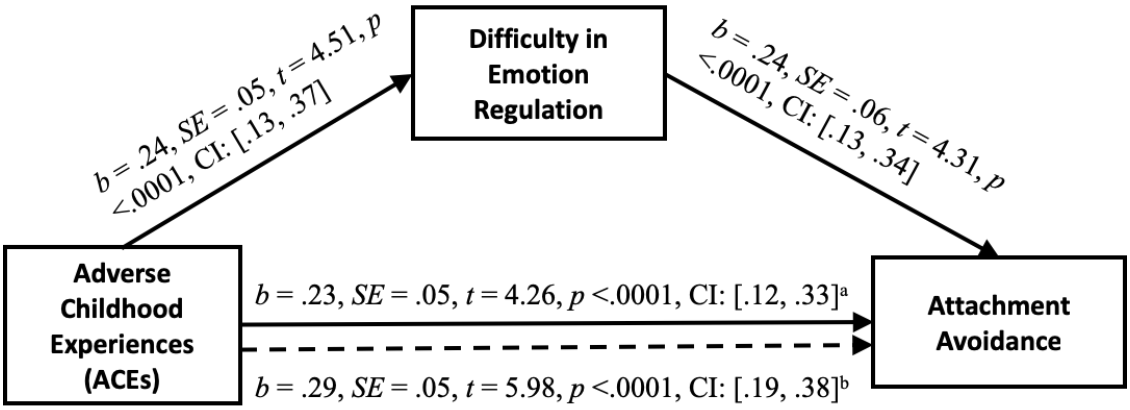


Figure 2. Path diagram of the prediction of attachment avoidance from adverse childhood experiences (ACEs). All variables were standardized. Gender was controlled. a: Path value next to the solid line indicating the direct effect of ACEs on attachment avoidance after controlling for difficulty in emotion regulation. b: Path value next to the dashed line indicating the total effect of ACEs on attachment avoidance. The indirect effect was significant, *b* = .06, *SE* = .02, *t* = 3.11, *p* = .0002, CI: [.02, .10], (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

After controlling DERS in the model, the main effect of ACEs on attachment avoidance although reduced, yet remained significant, *b* = .23, *SE* = .05, *t* = 4.26, *p* <.0001, CI: [.12, .33]. The results indicated that DERS partially mediated the association between ACEs and attachment avoidance, such that ACEs positively predicted DERS, *b* = .24, *SE* = .05, *t* = 4.51, *p* <.0001, CI: [.13, .37], which in turn positively predicted attachment avoidance, *b* = .24, *SE* = .06, *t* = 4.31, *p* <.0001, CI: [.13, .34]. The indirect effect was significant, *b* = .06, *SE* = .02, *t* = 3.11, *p* = .0002, CI: [.02, .10], (bias corrected at 95% confidence interval yielded by a bootstrapping procedure with 5000 resamples).

4. DISCUSSION

This study examined the associations of ACEs with attachment insecurity and how difficulty in emotion regulation mediated the associations. Attachment insecurity was assessed in two dimensions, including attachment anxiety and attachment avoidance. The results revealed that ACEs positively predicted both attachment anxiety and attachment avoidance, and both the associations were mediated by the individual differences in difficulty in emotion regulation. More specifically, difficulty in emotion regulation appeared to play a more important role in accounting for the relation between ACEs and attachment anxiety than in the relation between ACEs and attachment avoidance. Thus, difficulty emotion regulation caused by adverse childhood experiences is more relevant to negative views of the self (typical of attachment anxiety) than to negative views of others (typical of attachment avoidance). The findings have implications for

targeting emotion regulation as a means of ameliorating harmful effects of ACEs on attachment functioning.

REFERENCES

Ainsworth, M. S., & Bowlby, J. (1991). An ethological approach to personality development. *American Psychologist, 46*(4), 333-341. http://dx.doi.org/10.1037/0003-066X.46.4.333

Aldao, A., Nolen-Hoeksema, S., Schweizer, S. (2009). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*, 217-237.

Baer, J. C. & Martinez, C. D. (2006). Child maltreatment and insecure attachment: A meta analysis. *Journal of Reproductive and Infant Psychology, 24*(3), 187-197. doi:10.1080/02646830600821231

Bargh, J. A., & Williams, L. E. (2007). On the nonconscious of emotion regulation. In J. Gross (Ed.), *Handbook of emotion regulation*, 429−445. New York: Guilford Press.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine*, *14*(4), 245-258.

Griffin, D. W., & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of personality and social psychology*, *67*(3), 430.

Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52,* 511–524.

Movahed Abtahi, M., & Kerns, K. A. (2017). Attachment and emotion regulation in middle childhood: changes in affect and vagal tone during a social stress task. *Attachment and Human Development, 19*(3), 221-242.

Owen, J., Quirk, K. & Manthos, M. (2012). I get no respect: The relationship between betrayal trauma and romantic relationship functioning. *Journal of Trauma and Dissociation, 13*(2), 175-189. doi:10.1080/15299732.2012.642760

Pechtel, P., Pizzagalli, D. A. (2011) Effects of early life stress on cognitive and affective function: an integrated review of human literature. *Psychopharmacology, 214,* 55-70. doi:10.1007/s00213-010-2009-2.

Pietromonaco, P. R., & Barrett, L. F. (2000). The internal working models concept: What do we really know about the self in relation to others? *Review of General Psychology, 4*, 155–175.

Correlation of Block Design Task Proficiency and Dorsal Pathway White Matter Integrity in Adolescents with Autism Spectrum Disorder

Jade E. Jenkins[1] and Tracey A. Knaus[2]
1 5705 Cameron Blvd, Apt B, New Orleans, LA 70122, University of New Orleans, jejenki2@uno.edu
2 2000 Lakeshore Drive, New Orleans, LA 70148, University of New Orleans, taknaus@uno.edu

ABSTRACT

Superior performance on block design tasks, an assessment of visuospatial abilities, has been reported in individuals with Autism Spectrum Disorder (ASD). This proficiency supports the weak central coherence theory (WCC) as a feature of information processing in ASD. The visual dorsal pathway, commonly referred to as the "where" pathway, is thought to be used to recognize where objects are in space. The purpose of this study was to determine whether proficiencies in the block design tasks correlated with white matter integrity of the dorsal pathway and with volume of the lateral occipital and superior parietal lobes, critical regions of the dorsal pathway. Twelve right-handed boys with ASD (mean age=14.0, SD=1.6) and 12 typically developing right-handed boys (mean age=13.6, SD=1.5), 12-16 years old, completed the WISC-III and MRI and DTI scans to evaluate the integrity of the dorsal pathway. We hypothesized that block design performance would be better in the ASD group than in controls. We also predicted that better block design performance would be associated with stronger connectivity of the dorsal pathway and greater volume in the lateral occipital and superior parietal lobes, particularly in the right hemisphere. Results are pending final analysis.

Key Words: Autism Spectrum Disorder, Visuospatial Ability, Block Design, DTI

1. INTRODUCTION

The Wechsler Intelligence Scale for Children (WISC) is a commonly used intelligence test for children. Those with Autism Spectrum Disorder (ASD) often score lower in verbal components of the WISC resulting in lower verbal IQ scores due to language deficits, a prevalent characteristic of the developmental disorder. This has created debate over the accuracy of intelligence testing with the WISC in ASD since many subtests have verbal components. On the other hand, superior performance on the block design subtest, an assessment of visuospatial abilities of the WISC, has been reported in individuals with ASD. This proficiency supports the weak central coherence theory (WCC) as a feature of information processing in ASD. The WCC suggests that individuals with ASD tend to show a local processing bias in which there is a predisposition to focus on details of an object rather than broader characteristics such as size or shape. In some cases, this detail-oriented tendency allows some individuals with ASD to succeed in technical careers such as software programming.

Some researchers have begun to view autism's unique characteristics as an example of neurodiversity. Neurodiversity, although not defined unanimously, challenges the idea that ASD as a disorder should be cured. Instead the neurodiversity approach suggests that neurodiverse

individuals, such as those with ASD, not only should be accepted for their strengths and weaknesses but also are a benefit to society.

The visual dorsal pathway, commonly referred to as the “where” pathway, is thought to be used to recognize where objects are in space. This pathway is a white matter tract running from the primary visual cortex (V1) in the occipital lobe through the dorsal prestriate cortex to the posterior/superior parietal cortex. Fractional anisotropy (FA) is a measure that indicates pathway organization, with higher FA values indicating strong pathway integrity. The purpose of this study was to determine whether proficiencies in the block design subtest correlated with white matter integrity of the dorsal pathway and with volume in the occipital and superior parietal lobes, critical regions of the dorsal pathway.

2. METHODS

Twelve right-handed boys with ASD (mean age=14.0, SD=1.6) and 12 typically developing right-handed boys (mean age=13.6, SD=1.5), 12-16 years old, completed the WISC-III and MRI and DTI scans to evaluate the integrity of the dorsal pathway. Volumetric MRIs were processed through Freesurfer software, a semi-automated program for cortical and subcortical parcellation. Grey matter volumes of the primary visual cortex and the superior parietal region were examined. These regions were also used as seed regions for probabilistic tractography (using FSL software) in order to examine the integrity of the dorsal pathway in each hemisphere.

3. RESULTS

Group (ASD, TD) differences in block design performance will be examined. In addition, we will examine group, hemisphere, and group by hemisphere differences in gray matter volume and thickness of primary visual cortex and superior parietal cortex, as well as in dorsal pathway integrity (FA values). Correlations between block design scores and pathway integrity will also be investigated. We expect higher block design scores for the ASD group compared to controls. We also predict that dorsal pathway integrity (FA values) will be higher in the ASD group than the typically developing group. Further, we hypothesize better block design performance associated with stronger connectivity of the dorsal pathway and greater volume in the lateral occipital and superior parietal lobes, particularly in the right hemisphere.

Note to committee: *WIP* Data still being processed. Scheduled to finish week of 10/29.

REFERENCES

Alexander, A. L., Lee, J. E., Lazar, M., & Field, A. S. (2007). Diffusion tensor imaging of the brain. *Neurotherapeutics*, *4*(3), 316-329.

Burggraaf, R., Frens, M. A., Hooge, I. T., & Van der Geest, J. N. (2018). Performance on tasks of visuospatial memory and ability: A cross-sectional study in 330 adolescents aged 11 to 20. *Applied Neuropsychology: Child*, *7*(2), 129-142.

De Jonge, M., Kemner, C., Naber, F., & Van Engeland, H. (2009). Block design reconstruction skills: not a good candidate for an endophenotypic marker in autism research. *European child & adolescent psychiatry*, *18*(4), 197-205.

Drake, J. E. (2013). Is superior local processing in the visuospatial domain a function of drawing talent rather than autism spectrum disorder?. *Psychology of Aesthetics, Creativity, and the Arts*, *7*(2), 203.

Lorenz, T., Reznik, N., & Heinitz, K. (2017). A Different Point of View: The Neurodiversity Approach to Autism and Work. In *Autism-Paradigms, Recent Research and Clinical Applications*. InTech.

Shah, A., & Frith, U. (1993). Why do autistic individuals show superior performance on the block design task?. *Journal of Child Psychology and Psychiatry*, *34*(8), 1351-1364.

Sexual Assault Perpetration and Victimization on College Campuses: Influences, Effects, and How to Reduce

Dylan A. John
University of Louisiana at Lafayette

ABSTRACT

Sexual assault is a common problem on college campuses. This review examines the frequency of sexual assault both perpetration and victimization. Sexual assault here is defined as the legal definition of rape or any sexual acts where the victim may have been coerced into said behaviors, and did not or could not consent. Some influences of sexual assault include behaviors such as attendance of certain social settings, frequency of alcohol consumption, and frequency of casual sex. The effects of sexual assault are detrimental and include sexual dysfunction, post-traumatic stress disorder, anxiety, depression, and others. There are several different methods of preventing sexual assault including educational programs and bystander intervention programs. In addition, this review will examine specific benefits and faults of certain prevention programs.

1. INTRODUCTION

Sexual assault is a contemporary problem faced by college students. This review aims to examine extant literature on several facets of sexual assault; the specific aims include defining sexual assault, observing the frequency at which perpetration and victimization occur, exploring the behaviors and personal characteristics that may influence sexual assault, examining the effects of sexual assault, and lastly, analyzing prevention programs and explore specific facets of bystander intervention.

1.1 Defining Sexual Assault

Before discussing the facets of sexual assault, it is important to understand what is meant when using the term. *Sexual assault* may be broadly defined as any behavior meeting the legal definition of rape, “unlawful sexual intercourse or unlawful sexual intrusion” (*The Free Dictionary*), or any sexual acts (i.e., groping through clothes, skin to skin contact etc.) where the victim may have been coerced into said behaviors, and did not or could not consent (Masho & Ahmed, 2007; Mouilso & Calhoun, 2016; Sutton & Simons, 2015; Tuliao & McChargue, 2014). Note that researchers may devise their own modified definition of sexual assault for the study conducted. For this review, “sexual assault” will be inclusive of any behaviors presented in the definition above.

1.2 Frequency of Sexual Assault Perpetration & Victimization

Perpetrators and victims of sexual assault can be of *any* gender; the aim of this literature review is *not* to exonerate women as perpetrators or ignore men as victims. For the current review, only

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

literature on sexual assault perpetration (SAP) by men and sexual assault victimization (SAV) of women will be observed. Several studies suggest that between 18 and 50% of college men perpetrate sexual assault (Mouilso & Calhoun, 2016; Sutton & Simons, 2015; Testa & Cleveland, 2017; Tuliao & McChargue, 2014). Several studies also suggest that rates of sexual victimization are roughly between 17-54% of college women (Kelley & Gidycz, 2016; Masho & Ahmed, 2007; Rothman & Silverman, 2007; Sutton & Simons, 2015; Smith, White, & Holland, 2003; c.f. Littleton, Tabernik, Canales, & Backstrom, 2009); these findings are dependent on the definition of SAP and SAV presented in each study. When observing frequency of sexual assault on college campuses, it is evident that sexual assault is a contemporary problem faced by college students. It is crucial to understand the influences, effects, and ways to reduce SAP and SAV to ensure the safety and well-being of college students.

1.3 Influences and Effects of Sexual Assault

While there is a vast amount of research on factors contributing to SAP and SAV when pertaining to the general population, there is less research that examines the contributing factors of sexual assault *on college campuses.* Through review of selected literature, results suggest there are several contributing factors to sexual assault perpetration and victimization; contributing factors include a variety of behaviors and personal characteristics.

1.4 Behavioral Influences

Some behaviors that may influence sexual assault include drinking, attendance of certain social settings, and frequency of casual sex (i.e., hooking up); all of which are connected.

Alcohol consumption is involved in over 60% of rapes (Littleton et al., 2009). When examining alcohol use as an influence of SAP/V, it is important to not assume immediate conclusions; alcohol alone does not cause sexual assault perpetration or victimization. However, several studies have shown that college students who partake in problematic drinking or heavy episodic drinking (HED; “5 or more drinks in a row in a single occasion”; Testa & Cleveland, 2017, p. 7) may be at higher risk for perpetrating sexual assault, with heavier drinking associated with higher likelihood of perpetration (Testa & Cleveland, 2017; Tuliao & McChargue, 2014). In addition, alcohol consumption may increase outcome expectancies, inhibit persons from viewing salient negative responses from victims, and may cause persons to be more willing to engage in non-consensual sex (Flowe, Stewart, Sleath, & Palmer, 2011; Testa & Cleveland, 2017; Tuliao & McChargue, 2014)

Alcohol consumption alone may not be the most important influence of sexual assault; as found by Testa and Cleveland (2017), frequency of party and bar attendance was a better predictor for sexual assault perpetration. Participants who exceeded their own personal average of party and bar attendance per semester were at a higher risk of perpetrating sexual assault. In addition to increases in perpetration in party and bar settings, increases in victimization are found as well. Krebs, Lindquist, Warner, Fisher, and Martin (2009) found that the frequency of party attendance was positively correlated to sexual assault victimization and a large number of participants reported being at a party when sexually victimized. Although people who attend party and bar settings are found to be at higher risk of sexual assault perpetration and victimization, what causes this influence?

College students may find that party and bar settings are hook-up conducive settings; this may be due to alcohol consumption and persons seeking sexual partners in these settings (Littleton et al., 2009). In a study by Littleton et al. (2009), approximately 20% of victims of

sexual assault reported that the incident initiated as a hook-up. Women who are impaired by alcohol, in hook-up settings, may be at greater risk for sexual assault victimization due to the perpetrator's intent of finding a sexual partner in a hook-up setting (Littleton et al., 2009).

1.5 Influential Personal Characteristics

Personality traits that can be found among many sexual assault perpetrators include hostile masculinity, need for sexual dominance, participation in impersonal sex (i.e., unrestricted sociosexual orientation; Barriger & Vélez-Blasini, 2013), sense of entitlement, and low levels of empathy (Mouilso & Calhoun, 2016; Tuliao & McChargue, 2014). Similarly, personality traits depicting narcissistic personality disorder include high sense of entitlement, low empathy, and need for admiration (Mouilso & Calhoun, 2016). Due to these correlations, Mouilso and Calhoun (2016) sought to formally connect traits of narcissism with SAP; they hypothesized that individuals with narcissism would be at higher risk for SAP. Results suggest that there is a strong correlation between SAP and narcissistic personality disorder; specifically, traits of maladaptive narcissism—exploitativeness and entitlement—have a strong positive correlation to SAP. Future research should aim to replicate these results and possibly study the traits of narcissism in association to SAP in greater depth. Other personality traits that are connected to sexual assault include insecure attachment styles (Sutton & Simons, 2015) and sociosexual orientation (Barriger & Vélez-Blasini, 2013) which refers to how comfortable an individual is with casual or impersonal sex (i.e. hooking-up). To reiterate, sociosexual orientation, which is relative to comfort of hooking-up, is a personality trait which increases the chance of SAV (Sutton & Simons, 2015).

Upon review of articles pertaining to influences of SAP/V, it is evident that factors such as behaviors, and personal characteristics may influence sexual assault. Although this literature review did not conduct analysis of how influential each factor is in comparison to one another, future research may benefit from exploring which influences of SAP/V are more prevalent than others.

1.6 Effects

There are several negative consequences of sexual assault victimization. These consequences include both mental and physical health difficulties (Masho & Ahmed, 2007). Multiple studies suggest sexual assault victims are more prone to experience symptoms of major depression, anxiety, and post-traumatic stress disorder than non-victims (Chang et al., 2015; Kelley & Gidycz, 2016, Masho & Ahmed, 2007). The results of Masho and Ahmed (2007) suggested that individuals who have experienced SAV may be over five times more likely to develop PTSD than individuals who have not experienced sexual assault. Due to SAV, individuals may also have issues with sexual functioning. Results of Kelley and Gidycz (2016) suggest that women who have experienced SAV may have pain during intercourse or an inability to orgasm during sex. An interesting finding in this study was that women may have an increased sex drive even though they cannot climax. In addition to mental and physical health problems, Krebs et al. (2009) found that women who have previously experienced sexual assault are over six times more likely to experience victimization in the future. This finding displays how crucial it is to reduce the occurrence of sexual assault.

2. REDUCING SEXUAL ASSAULT ON COLLEGE CAMPUSES

2.1 Examination of Sexual Assault Programs

With the estimate of sexual assault victimization on campus being so high, it is crucial to examine programs about sexual assault. There are three types of programs examined in this review: psychoeducation (Rau et al., 2011; Stewart, 2014), prevention (Foubert, 2000; Rau et al., 2011; Rothman & Silverman, 2007; Stewart, 2014), and bystander intervention (Palm Reed, Hines, Armstrong, & Cameron, 2015; Stewart, 2014).

Psychoeducation programs are meant to educate individuals on the definition of consent, sexual assault, rape, and how to help individuals who have suffered these traumatic events. Prevention programs target two groups: possible victims and possible perpetrators. Prevention programs that target victims teach risk reduction techniques and programs targeted at possible perpetrators educate participants on rape myths, definition of consent, sexual assault, and rape. Bystander intervention programs are slightly different from the other two programs; while they encompass all of the aforementioned, they also teach participants how to spot possible situations that may lead to sexual assault and how to intervene to stop a possible sexual assault from occurring.

In addition to psychoeducation, prevention, and bystander intervention programs, there are programs that take an integrative approach. One example of an integrative program which incorporates all of the aforementioned aspects is “The Men’s Project” (Steward, 2014). In this program, participants underwent three weeks of education about male privilege, masculinities, and socialization, five weeks of education about the effects of sexual assault, and three weeks of education about bystander intervention.

Of the programs examined, some were more effective in certain areas than others. In total, the benefits of attending the programs included a decrease in the belief of rape myths (Foubert, 2000; Palm Reed et al., 2015; Stewart, 2014), increase in bystander efficacy and prosocial behavior (Pal Reed et al., 2015; Stewart, 2014), increase in knowledge regarding sexual assault (Palm Reed et al., 2015; Rau et al., 2011), and decrease in the likelihood of reporting perpetration (Foubert, 2000) and victimization (Rothman & Silverman, 2007). Other benefits included reduction in the rates of victimization of non-heterosexual participants (Rothman & Silverman, 2007), and one program may even be effective for those with a history of SAV (Rau et al., 2011). With all these benefits, there were some setbacks. Rau et al. (2011) did not find any decrease in the belief of rape myths among their participants and Foubert (2000) did not find that their participants behaved differently after attending the program.

2.2 Ways to Improve Sexual Assault Programs

Most of the studies examined suggested different ways in which future research may improve. Koelsch, Brown, and Boisen (2012) suggest that bystander intervention programs should be parsed by gender with each gender having different concentrations through their programs. In addition, programs should include discussions about how alcohol effects sexuality and provide concrete examples of various scenarios (Koelsch et al., 2012). Rothman and Silverman (2007) suggested the prevention programs should include men and non-heterosexual participants as target of general prevention strategies. They also suggest using gender neutral language in sexual assault prevention programs. Stewart (2014) suggest that integrative programs such as “The Men’s Project” should examine which facets are more effective than others in regard to aims of the programs.

3. CONCLUSION

With the given definition of sexual assault for this article, perpetration rates range between 18 and 50% of men and victimization rates range between 17-54% of female college students. Through the articles examined it is evident that sexual assault has several influences including alcohol, personal habits, and behaviors of both victims and perpetrators. Even with the given rates and influences, there is still hope for reducing sexual assault through the prevention programs such as “The Men’s Project” (Steward, 2014).

REFERENCES

Barriger, M., & Vélez-Blasini, C. J. (2013). Descriptive and injunctive social norm overestimation in hooking up and their role as predictors of hook-up activity in college student sample. *Journal of Sex Research, 50*(1), 84-94. doi:10.1080/00224499.2011.607928

Chang, E. C., Lin, J., Fowler, E. E., Yu, E. A., Yu, T., Jilani, Z., … & Hirsch, J. K. (2015). Sexual assault and depressive symptoms in college students: Do psychological needs account for the relationship? *Social Work, 60*(3), 211-218. doi:10.1093/sw/swv017

Flowe, H. D., Stewart, J., Sleath, E. M., & Palmer, F. T. (2011). Public house patrons’ engagement in hypothetical sexual assault: A test of alcohol myopia theory in a field setting. *Aggressive Behavior, 37,* 547-558.

Foubert, J. D. (2000). The longitudinal effects of a rape=prevention program on fraternity men’s attitudes, behavioral intent, and behavior. *Journal of American College Health, 48,* 158-163.

Kelley, E. L., & Gidyez, C. A. (2016). Mediators of the relationship between sexual assault and sexual functioning difficulties among college women. *Psychology of Violence,* 1-9. doi:10.1037/vio0000073

Koelsch, L. E., Brown, A. L., & Boisen, L. (2012). Bystander perceptions: Implications for university sexual assault prevention programs. *Violence and Victims, 27(*4). 563-579.

Krebs, C. P., Lindquist, C. H., Warner, T. D., Fisher, B. S., & Martin, S. L. (2007) “Campus Sexual Assault (CSA) Study, Final Report.” *National Center for Campus Public Safety,* www.nccpsafety.org/resouces/library/campus-sexual-assault-csa-study-final-report/

Littleton, H., Tabernik, H., Canales, E. J., & Backstrom, T. (2009). Risky situation or harmless fun? A qualitative examination of college women’s bad hook-up and rape scripts. *Sex Roles 60*, 793-804. doi:10.1007/s11199-009-9586-8

Mashow, S. W., & Ahmed, G. (2007). Age at sexual assault and posttraumatic stress disorder among women: Prevalence, correlates, and implications for prevention. *Journal of Women’s Health, 16*(2), 262-271.

Mouilso, E. R., & Calhoun, K. S. (2016). Personality and perpetration: Narcissism among college sexual assault perpetrators. *Violence Against Women, 22*(10), 1228-1242. doi:10.1177/1077801215622575

Palm Reed, K. M., Hines, D. A., Armstrong, J. L., Cameron, A. Y. (2015). Experimental evaluation of a bystander prevention program for sexual assault and dating violence. *Psychology of Violence, 5*(1), 95-102. doi: http://dx.doi.org/10.1037/a0037557

Rape. (n.d.). In *The Free Dictionary.* Retrieved from http://legal-dictionary.thefreedictionary.com/rape

Rau, T. J., Merrill, L. L., McWhorter, S. K., Stander, V. A., Thomsen, C. J., Dyslin, C. W., ... & Milner, J.S. (2011). Evaluation of sexual assault eduction/prevention program for femal U.S. navy personnel. *Military Medicine, 176*(10), 1178-1183

Rothman, E., & Silverman, J. (2007). The effect of a college sexual assault prevention program on first year students' victimization rates. *Journal of American College Health, 55*(5), 283-290.

Smith, P. H., White, J. W., & Holland, L. J. (2003). A longitudinal perspective on dating violence among adolescent and college-age women. *American Journal of Public Health, 93*(7), 1104-1109.

Steward, A. L. (2014). The men's project: A sexual assault prevention program targeting college men. *Psychology of Men and Masculinity, 15*(4), 481-485.

Sutton, T. E., & Simons, L. G. (2015). Sexual assault among college students: Family of origin hostility, attachment, and the hook-up culture as risk factors. *Journal of Child and Family Studies, 24*, 2827-2840.

Testa, M., & Cleveland, M. J. (2017) Does alcohol contribute to college men's sexual assault perpetration? Between- and within-person effects over five semesters. *Journal of Studies on Alcohol and Drugs, 78,* 5-13.

Tuliao, A. P., & McChargue, D. (2014). Problematic alcohol use and sexual assault among male college students: The moderating and mediating roles of alcohol outcome expectancies. *The American Journal on Additions, 23*, 321-328. doi:10.1111/j.1521-0391.2014.12119.x

Psychological Well-Being and Hookup Behavior in College Students

Dylan A. John[1], Mia Comeaux[2], Eva Lieberman B.A.[3], and Amy L. Brown, PhD[4]

[1] University of Louisiana at Lafayette, Student, daj3931@louisiana.edu

[2] University of Louisiana at Lafayette, Student, mrc0199@louisiana.edu

[3] University of Louisiana at Lafayette, Graduate Student, c00301746@louisiana.edu

[4] University of Louisiana at Lafayette, Associate Professor, alb6095@louisiana.edu

ABSTRACT

Hooking up is a common phenomenon that occurs on college campuses. Hookups often involve behaviors ranging from fondling and kissing to penetrative sex. Extant research has shown that the effects of hookups vary by gender: men who hookup more frequently have higher psychological well-being (PWB) whereas women who hookup more frequently have lower PWB (Fielder & Carey, 2010; Grello et al., 2006; Owen, et al., 2010). The current study aimed to compare hookup frequencies and PWB by gender in a college sample. Analyses were conducted on a sample of 205 participants (80.9% Female). Students completed questionnaires to evaluate current PWB, including the Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995), the Rosenberg Self-esteem Scale (RSES; Rosenberg, 1965) the Satisfaction with Life Scale (SWL; Pavot & Diener, 1993) hookup frequency, perceptions of hookups. Of participants, 36% report hooking up at least once. Analyses show a significant positive association between hookup frequency and satisfaction with life and higher self-esteem among men, this is consistent with prior research. There was no statistically significant association between women's hookup frequency and PWB.

Key Words: Hookups, Psychological Well-Being; Sex Behavior; College Sample

1. INTRODUCTION

Hooking up is a phenomenon that has taken over traditional dating on college campuses in the modern age. In research, hookups are usually defined as a sexual encounter (ranging from kissing to intercourse) between two people who may or may not know each other and have no expectation for future relationships (Paul, McManus, & Hayes, 2000; Flack et al., 2016; Lewis, Atkins, Blayney, Dent & Kaysen, 2013).

Several studies suggest that amount and frequency of alcohol consumption is related to participation in hookup behavior (LaBrie et al., 2014; Lewis et al., 2012; Ross, Zeigler, Kolak, & Epstein, 2015). Fielder and Carey (2010) suggest that alcohol may aid in facilitation of hookups by lowering individuals' inhibitions, increasing confidence, and increasing perceived social pressure to hookup. In addition to influences such as alcohol, psychological health has also received some attention in association with hooking up. In the research examined, results seem to vary by gender: multiple studies suggest that men who hookup have better psychological health (Fielder & Carey, 2010; Owen, Rhoades, Stanley, & Fincham, 2010) while another study suggested that women who hookup experience lower psychological health (Grello, Welsh, & Harper, 2006). Because of the differences in the literature examined, this study seeks to

examine correlations among psychological health and hookup behavior and see if these correlations differ based on participants' gender.

The current analyses examined college students' frequency of alcohol consumption, psychological health, and frequency of hooking up.

2. METHODS

2.1 Participants

We collected responses from 296 undergraduate students from a Southern university using the university's SONA system. After removing participants who answered attention-check items incorrectly, analyses were run on 206 participants. Most participants identified as Caucasian/White (73.3%) females (80.6%). Most participants were freshmen (67%) with a mean age of 18.94 (SD: 2.16).

2.2 Measures

The survey included five measures in addition to the demographics survey. The Hookup Questionnaire (developed by the principle investigator) assessed participant perceptions of a hookup, frequency of their participation in hookups, and whether alcohol was involved in their most recent hookup experience. Participants were asked if they had previously participated in a hookup when the term was defined as "a sexual encounter (ranging from kissing to intercourse) between two people who may or may not know each other and have no expectation for a romantic relationship". In addition, participants were given The Depression**,** Anxiety & Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995), the Satisfaction with Life Scale (SWL; Pavot & Diener, 1993), and the Rosenberg Self-Esteem scale (RSES; Rosenberg, 1965).

3. RESULTS

Of participants, 36% reported hooking up at least once. To examine the relationship between hookup frequency and psychological well-being in both men and women, correlational analyses were conducted. Results for the correlational analyses are presented in Table 1.

Table 1. Correlations Among Variables by Gender

Variable	Descriptives[1]	SWL	RSES	DASS-D	DASS-A	DASS-S	Hookup Freq
SWL	4.74 (1.31)	--	.5687***	-.3506*	.0415	-.1486	.4379*
RSES	3.01 (0.66)	.6034***	--	-.4897***	-.1699	-.2285	.4214**
DASS-Depression	1.56 (0.67)	-.5215***	-.6611***	--	.6569***	.4728**	-.1671
DASS-Anxiety	1.57 (0.61)	-.3507***	-.5063***	.6900***	--	.5880***	.0012
DASS-Stress	1.87 (0.65)	-.4209***	-.5277***	.6987***	.7656***	--	-.1424
Hookup Freq	1.99 (1.49)	-.0424	0.0958	-.0312	-.0476	-.0455	--

Note. SWL=Satisfaction with Life Scale, range = 1-7; RSES=Rosenberg Self-Esteem Scale, range=1-4; DASS-D; Depression, Anxiety, and Stress Scale, range 1-4; Hookup Freq= Frequency of Participation in Hookups, range 1-4; Female correlations are below the diagonal, Male correlations are above the diagonal.
1- Descriptives represent means and standard deviations for continuous variables *p < .05; **p < .01; ***p < .001

Men who hookup more frequently tended to score higher on the SWL measure; there was no significant association for women.
Men who hookup more frequently tended to have better self-esteem as measured by the RSES; there was no significant association for women.

4. DISCUSSION

Consistent with prior research (e.g., Fielder & Carey, 2010; Owen et al., 2010), we found that male participants who hooked up more frequently had higher psychological well-being as measured by the SWL scale and the RSES. This may be due to social expectations that both encourage men to seek out more sexual partners and reward them for doing so. Fielder and Carey (2010) also suggest that those who don't participate in hookups are likely to experience lower PWB.

Our analyses did not reveal any significant associations between female participants' hookup frequency and psychological well-being. This is inconsistent with findings by Grello et al. (2006) who found that hookups were related to depressive symptoms in females. Fielder and Carey's (2010) results also suggest that, for females, hook-up behaviors may be correlated with/may increase depressive symptoms.

Our analyses revealed strong, statistically significant associations between depression, anxiety, stress, satisfaction with life, and self-esteem across genders.

Our study was limited by how we described a hookup. Participants were asked if they had hooked up based upon a broad definition of a hookup rather than specific types of hookup behaviors. Previous researchers (Fielder & Carey, 2010; Owen, Fincham, & Moore, 2010) have compared PWB in participants who participated in specific types of hookups (e.g., kissing, oral, or penetrative) to participants who participated in a different type of hookup.

A second limitation is that the majority of participants were white, female freshmen; the sample, then, may not be representative of all college students, thus limiting the generalizability of our findings.

REFERENCES

Fielder, R. L., & Carey, M. P. (2010). Predictors and consequences of sexual "hookups" among college students: A short-term prospective study. *Archives of Sex Behavior, 39*, 11051119. DOI: 10.1007/s10508-008-9448-4

Flack, W. F., Hansen, B. E., Hopper, A. B., Bryant, L. A., Lang, K. W., Massa, A. A., & Whalen, J. E. (2016). Some types of hookups may be riskier than others for campus sexual assault. *Psychological Trauma: Theory, Research, Practice and Policy, 8*(4), 413-420. DOI: http://dx.doi.org/10.1037/tra0000090

Grello, C. M., Welsh, D. P., & Harper, M. S. (2006). No strings attached: The nature of casual sex in college students. *The Journal of Sex Research, 43*(3), 255-267.

LaBrie, J. W., Hummer, J. F., Ghaidarov, T. M., Lac, A., & Kenney, S. R. (2014). Hooking up in the college context: The event-level effects of alcohol use and partner familiarity on hookup behaviors and contentment. *Journal of Sex Research, 51*(1), 62-73. DOI:10.1080/00224499.2012.714010

Lewis, M. A., Atkins, D. C., Blayney, J. A., Dent, D. V., & Kaysen, D. L. (2013). What is hooking up? Examining definitions of hooking up in relation to behavior and normative perceptions. *Journal of Sex Research, 50*(8), 757-766. DOI: 10.1080/00224499.2012.706333

Lovibond, S. H. & Lovibond, P. F. (1995). Manual for the depression, anxiety & stress scales. (2nd Ed.)Sydney: Psychology Foundation.

Owen, J. J., Rhoades, G. K., Stanley, S. M., & Fincham, F. D. (2010). "Hooking up" among college students: Demographics and psychosocial correlates. *Archives of Sex Behavior, 39*, 653-663. DOI: 10.1007/s10508-008-9414-1

Paul, E. L., McManus, B., & Hayes, A. (2000). "Hookups": Characteristics and correlates of college students' spontaneous and anonymous sexual experiences. *The Journal of Sex Research, 37*(1), 76-88.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological Assessment, 5*(2), 164-172.

Rosenberg, M. (1965). Society and the adolescent self-image. Princeton, NJ: Princeton University Press.

Ross, L. T., Zeigler, S., Kolak, A. M., & Epstein, D. (2015). Sexual hookups and alcohol consumption among african american and caucasian college students: A pilot study. *The Journal of Psychology, 149*(6), 582-600. DOI: 10.1080/00223980.2014.946461

Individuals' Perceptions of a Hypothetical Sexual Assault and Engagement in Prosocial Behavior

Dylan A. John[1], Haven J. Evans[2], Raven N. Douglas, B.S.[3], and Amy L. Brown, PhD[4]

[1]University of Louisiana at Lafayette, Student, daj3931@louisiana.edu
[2]University of Louisiana at Lafayette, Student, hje1649@louisiana.edu
[3]University of Louisiana at Lafayette, Graduate Student, rnd0727@louisiana.edu
[4]University of Louisiana at Lafayette, Associate Professor, alb6095@louisiana.edu

ABSTRACT

The current study examines how alcohol priming affects participant responses to a sexual assault scenario and the likelihood of participating in prosocial behaviors in the future. Participants (n=314) from a general population sample were randomly placed into either a food or alcohol priming condition. After answering several questions regarding the stimulus they were exposed to, participants were instructed to read a party scenario in which the reader walks in on a sexual assault. Participants were then asked to complete the Party Scenario Questionnaire (PSQ) which assessed the participants' perception of the scenario. Afterwards, participants completed the Bystander Intention to Help Scale (BIHS; Banyard, 2008). Factor analysis revealed four factors in the party scenario questionnaire: Unwillingness to Intervene, Concern/Responsibility, Lack of Confidence, and Others Responsibility. The means of the responses for these factors were compared to the BIHS means. Correlational analysis revealed significant relationships between the BIHS and three of the four factors on the party scenario questionnaire (Unwillingness to Intervene, Concern/ Responsibility, and Lack of Confidence). In addition to the PSQ and BIHS, participants were asked how frequently they consume alcohol and how frequently they attended parties/bars. Analyses were completed to determine if individuals who consumed more alcohol or attended parties/bars more frequently differed significantly from those who attended/drank less frequently. Results indicated that there were significant associations between frequency of alcohol consumption and the lack of confidence factor from the PSQ. There were also significant associations between frequency of party/bar attendance and BIHS means, the concern/responsibility factor from the PSQ, and the lack of confidence factor for the PSQ. There were no significant differences in individuals who were exposed to the food priming condition compared to those exposed to the alcohol priming condition.

Key Words: Bystander Intervention, Alcohol Priming, Sexual Assault, College Sample

1. INTRODUCTION

Bystander Intervention plays a key role in preventing sexual assault. There are many notable factors that affect a bystander's willingness to intervene. Leone, Haikalis, Parrott, and DiLillo (2017) provide a theoretical basis for the claim that alcohol consumption may impair bystanders'

willingness or ability to intervene. To date, little research has been conducted specifically examining the role of alcohol intoxication on the bystanders' willingness or ability to intervene.

Previous research has shown that alcohol priming has similar effects as alcohol consumption (Friedman, McCarthy, Forster, and Denzler, 2005). To the researchers' knowledge, Stepanova and Brown (2017) have been the only researchers to examine the association between alcohol priming relevant to sexual assault. Stepanova and Brown's study looked at the association between alcohol priming and the attribution of blame in two theoretical sexual assault scenarios. Two studies were conducted using two forms of alcohol priming, one being contextual, or exposure to alcohol involved acquaintance rape vignette, and noncontextual, exposure to alcohol advertisements. The results of this study imply that men exposed to the contextual and non-contextual alcohol primes attributed more blame to the victim than the control group, who were shown non-alcoholic related advertisements or a rape vignette with no mention of alcohol consumption. The aim of the current study is to further investigate the role of alcohol priming on bystanders' willingness to intervene in a sexual assault and to extend the findings by Stepanova and Brown (2017).

2. METHODS

The current study examined responses from 314 young adult Amazon MTurk workers were recruited for a survey on social perceptions (53% men, 44% women). Participants had a mean age of 28 years old [SD: .85]. Of participants, 72% identified as Caucasian/White, 9% identified as African American/Black, 7% identified as Hispanic/Latino, and 12% identified as 'other/multiple'.

Participants were randomly placed into either the experimental group or the control group. For the experimental group, participants were asked to select one of several alcoholic beverages and answer a few questions about consuming the chosen beverage. The control group were primed with food instead of alcohol. After answering the questions, participants were asked to read a Party Scenario which put the reader as a bystander walking into a sexual assault. After reading the scenario participants completed a measure of twenty-three items on a scale of 1 to 5 (1 being "Strongly Disagree" and 5 being "Strongly Agree") regarding their perception of the scenario.

Subjects were then asked to complete a modified version of the Bystander Intention to Help Scale (BIHS; Banyard, 2008), which is a measure of eighteen items where participants rate how likely they are to engage in specific prosocial behaviors that can aid in reducing the occurrence of sexual assault on a scale of 1 to 5 (1 being "Strongly Disagree" and 5 being "Strongly Agree"). In addition, participants were asked to report how frequently they consumed alcohol and how frequently they attended parties and bars.

3. RESULTS

Factor analysis was conducted on questions in the PSQ. Four factors were identified with all items loading .5 or higher on the factor the item was grouped with and less than .5 on all other factors. Factor 1 was labeled "Unwillingness to Intervene" and included items such as "Stepping in in this situation would probably be more trouble than it would be worth" and "I would probably not get involved if I were in this situation." Factor 2 was labeled "Concern/Responsibility" and involved items such as "This situation is pretty dangerous for the girl in the story" and "It is my responsibility to step in and do something to prevent something bad from happening." Factor 3 was labeled "Lack of Confidence" and included items such as "I would be comfortable stepping

in and doing something to prevent something bad from happening in this situation" and "I would be worried for my own safety if I stepped in in this situation." Factor 4 was labeled "Other's Responsibility" and included the items "They guy's other friends should step in and keep him from making a mistake" and "The girl's other friends should step in and do something to protect her."

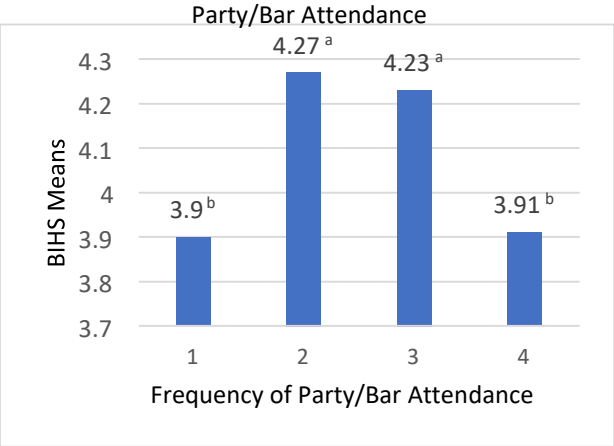
Internal reliabilities for the PSQ factors were calculated using Cronbach's alpha. Moderate to strong internal reliability scores were found for all factors (Factor 1: α = .8935; Factor 2: α = .7121; Factor 3: α = .7768; Factor 4: α = .7281).

No significant differences were found between the food priming group and the alcohol priming group.

Correlational analyses were conducted to identify relationships between the four factors from the PSQ and the general bystander intentions as measured by the BIHS. There was a negative correlation (r = -0.3890; p < .0001) between BIHS scores and unwillingness to help scores and a positive correlation (r = 0.4617; p < .0001) between BIHS scores and concern/responsibility scores. There was a negative correlation between BIHS scores and lack of confidence (r = -0.1841; p < 0.0010) scores. There was no significant relationship between BIHS scores and others responsibility (r = 0.0824; p=0.4099) scores.

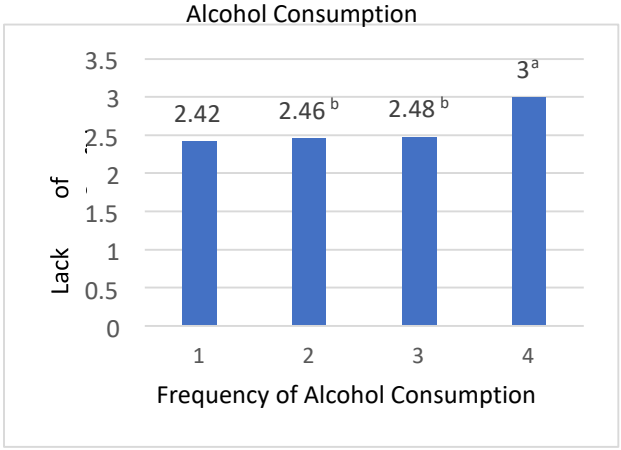
One-way ANOVAs were used to examine the associations between participants' frequency of alcohol consumption and responses on the PSQ and BIHS and between frequency of attendance of parties/bars and responses on the PSQ and BIHS. There was a significant difference in the BIHS scores based on reported frequency of party and bar attendance (*Figure 1; F*(3, 307) = 3.7034, p = .0121). There were also significant associations between lack of confidence and frequency of alcohol consumption (*Figure 2; F*(3, 305) = 4.0479, p = .0076), lack of confidence and party and bar attendance (*Figure 3; F*(3, 307) = 4.0323, p = .0078), and concern/responsibility and party and bar attendance (*Figure 4; F*(3, 307) = 2.7287, p = .0442). There were no significant differences based on frequency of alcohol consumption and BIHS means, Unwillingness means, Responsibility means, Others responsibility. There were also no significant associations between Unwillingness means and Others responsibility and frequency of party/bar attendance.

Figure 1. BIHS Means by Frequency of Party/Bar Attendance



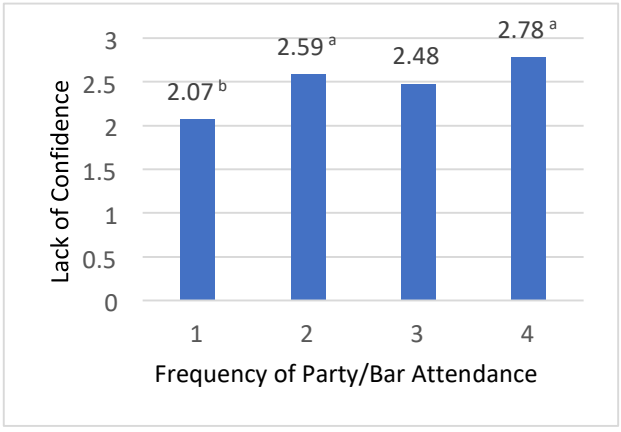
Note: 1 = Never, 2=One time per month or less, 3= Once every few weeks, 4= Weekly ; means with different superscripts are significantly different from one another, p<.05.

Figure 2 . Lack of Confidence by Frequency of Alcohol Consumption



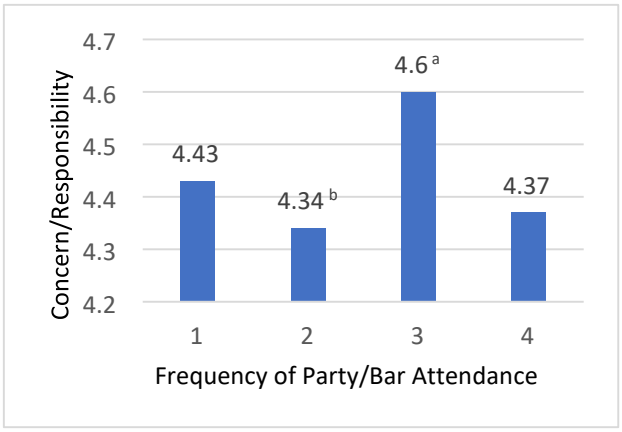
Note: 1 =Never, 2=1 time a week or less, 3=2 -4 times a week, 4= 5 or more times a week ; means with different superscripts are significantly different from one another, p<.05.

Figure 3. Lack of Confidence by Frequency of Party/Bar Attendance



Note: 1=Never, 2=One time per month or less, 3= Once every few weeks, 4= Weekly ; means with different superscripts are significantly different from one another, p<.05.

Figure 4 . Concern/Responsibility Scores by Frequency of Party/Bar Attendance



Note: 1= Never, 2= One time per month or less, 3= Once every few weeks, 4= Weekly ; means with different superscripts are significantly different from one another, p<.05.

4. DISCUSSION

The aim of the current study was to examine differences in perceptions of a hypothetical sexual assault and willingness to participate in prosocial behavior among individuals who were exposed to alcohol priming and a control group. We hypothesized that individuals who were exposed to alcohol priming would be less willing to intervene in a hypothetical sexual assault and in prosocial behavior based on findings from Stepanova and Brown (2017) that showed participants exposed to alcohol priming were more likely to engage in victim-blaming.

Three of the four factors of the PSQ were significantly correlated to the BIHS. This shows that participants were consistent in their willingness to act in a prosocial manner to reduce sexual assault.

There were significant differences in BIHS means based on frequency of party and bar attendance. Perhaps individuals who never attend parties and bars recognize that they do not have opportunities to engage in the prosocial behaviors listed in the BIHS. On the other hand, perhaps individuals who attend parties and bars most frequently are desensitized to the environment, so they may not be aware of the risks for sexual assault that may be present. Limitations of the current study include the fact that the majority of the sample (72%) identified as Caucasian/White thus underrepresenting other races/ethnic identities. In addition, the priming manipulation did not show significant differences from the control. In a study by Friedman et al. (2005), researchers administered a lexical decision task to surreptitiously expose participants to alcohol priming. Stepanova and Brown (2017) administered their alcohol priming through alcohol advertisements and exposure to an alcohol involved rape vignette. The method used for priming the current sample may have not sufficiently primed participants or it may suggest that exposure to visual alcohol cues does not have an effect on participants' willingness to act in a prosocial manner in a hypothetical sexual assault.

REFERENCES

Banyard, V. L. (2008). Measurement and correlates of prosocial behavior: The case of interpersonal violence. *Violence and Victims, 23*(1), 83-97. DOI: 10.1891/0886-6708.23.1.83

Friedman, R. S., McCarthy, D. M., Förster, J., & Denzler, M. (2005). Automatic effects of alcohol cues on sexual attraction. *Addiction, 100,* 672-681. DOI: 10.1111/j.1360-0443.2005.01056.x

Leone, R. M., Haikalis, M., Parrott, D. J., & DiLillo, D. (2017, October 19). Bystander intervention to prevent sexual violence: The overlooked role of bystander alcohol intoxication. *Psychology of Violence.* Advance online publication. DOI: http://dx.doi.org/10.1037/vio0000155

Stepanova, E. V., and Brown, A. L. (2017). Alcohol priming and attribution of blame in an acquaintance rape vignette. *Journal of Interpersonal Violence.* Advance online publication. DOI: 10.1177/0886260517744762

Making Glue from Algal Biomass Using Non-toxic Denaturants

Molly Key
University of Louisiana at Lafayette

ABSTRACT

Algal biomass, or algae cake, is a waste product that is made in abundance during the making of biofuel from algae. This waste is the reason that algal biofuel is not currently possible, so research is being done to find a use for this biomass. A glue can be made using this algae cake, water, and a denaturant. This glue, along with other waste materials has been used to make particle board, coasters, and paper. It has also been used to make biodegradable Mardi Gras beads, a children's glue, and paper mâché. During these experiments, sodium hydroxide has been used as a denaturant in the glue. The only problem is that sodium hydroxide is toxic. To solve this, a different denaturant must be found. A suitable denaturant for this purpose must be safe, non-toxic, eco-friendly, and sustainable. To start with, lemon juice, Coca-Cola, 1 M acetic acid, and 1.5 M acetic acid were chosen. The different denaturants were tested at different volumes and compared to the same volume of sodium hydroxide. These denaturants were tested to find their shear strength, which is the standard that most glues are normally held to. If a suitable way to market this glue could be found, everyone could be driving cars running on algae fuel. This research is a step towards this.

Key Words: Algal Biomass; Denaturant; Algae Glue

1. INTRODUCTION

When algal biofuel is made, oil is extracted from the algae. This algae is then processed and turned into a biofuel that can be used to make gasoline and diesel. Algae biofuels are non-toxic and biodegradable, which makes them a good alternative to fossil fuels (Marsh 2009). Algae could produce 60 times more oil per acre than land-based plants. Once this oil is extracted, an abundance of algal biomass is left over. Algae biofuel is not yet financially viable, because the extraction process is expensive, and there is nothing to do with all the leftover biomass. One suggested use of this biomass is using it to make a glue. This glue can be made using the biomass, water, and a denaturant. The denaturant splices the proteins of the algal biomass, which allows a suitable glue to be made. This glue can be used, along with other waste products such as sugarcane bagasse or sawdust to make things like Mardi Gras beads, paper, coasters, and particle board.

2. DENATURANT

Originally, the denaturant for this glue was sodium hydroxide, which is a base with a pH level of about 12. This denaturant produces a strong glue, but it is a strong base and hazardous, which makes commercial distribution difficult. A less harmful denaturant could make the glue easier to distribute and would make the glue suitable for use as a children's glue or for use in biodegradable Mardi Gras beads or other commercial uses. When looking for a new denaturant,

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

one must be found that is safe, non-toxic, formaldehyde free, and sustainable. Some suitable alternatives found for this denaturant are: lemon juice, Coca-Cola, 1M acetic acid, and 1.5M acetic acid. These substances all have a pH value of around 2.5. Although these are all acids, they are the same distance from neutral 7 on the pH scale as sodium hydroxide. The acids have the same effect on the proteins in the algal biomass that the sodium hydroxide does.

3. TESTING

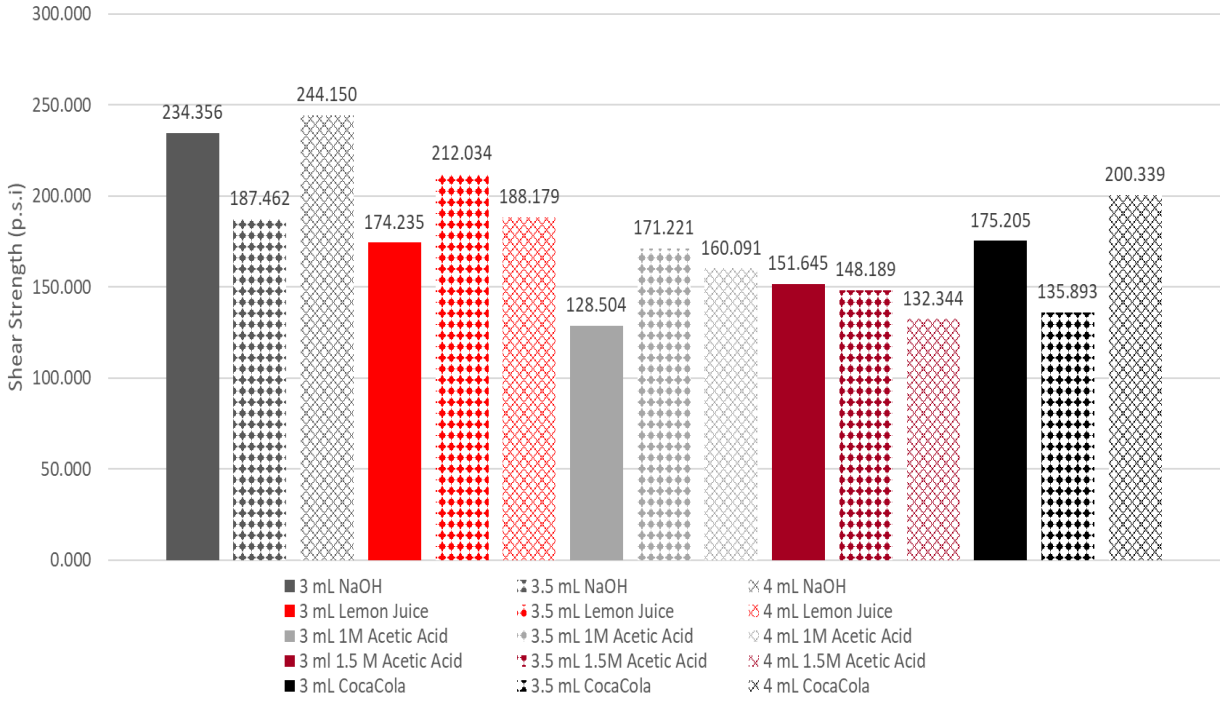
To determine which of these substances would make the strongest glue, a glue was made with varying amounts of denaturant, ranging from 3 mL to 4 mL in 0.5 mL increments. Each of the four alternative denaturants were used, along with sodium hydroxide as a control for comparison. The amount of water was kept constant at 20 mL and the amount of algae powder is kept constant at 10 grams. This is mixed together and left to cure for one hour. The glue was then measured out, and 0.5 grams of glue was applied to one wooden slat and glued to another identical wooden slat where they overlap. The glue was spread to an area of 1.125 square inches. They were clamped down and left in the oven overnight to dry. The samples were left to cool for one day, and at this point it was time to test them. The standard for glue strength is normally its shear strength. The Instron 3366 Series shear testing machine was used to test the amount of load that can be applied to the samples before the glue will break. This force was divided by the area that the glue was applied to, to get the shear strength, in pounds per square inch.

4. RESULTS

The glue with the highest average shear strength, out of five samples, is the strongest glue. Sodium hydroxide in the volume of 3.5 mL made the strongest glue, with an average shear strength of 244.2 psi. The glue made with 3.5 mL of lemon juice is the strongest glue that was made with an alternative denaturant, with a shear strength of 212.0 psi. For full results, see table 1.

4.1 Average Shear strength

Table 1



5. CONCLUSIONS

When looking for a non-hazardous alternative to sodium hydroxide as a denaturant, four acids were chosen: lemon juice, Coca-Cola, 1M acetic acid, and 1.5M acetic acid. These denaturants were all made into a glue and tested to find their shear strength. Although none of the glues made from the alternative denaturant were as strong as the glue made from sodium hydroxide, the lemon juice glue showed the most potential. The next step to finding a non-toxic alternative to sodium hydroxide is to alter the amount of water used to make the glue, while keeping the concentration of denaturant the same. This will be done to make the glue more viscous, and a more viscous glue is a stronger glue. Algae biofuel could be utilized, but it is not currently financially viable due to the amount of waste that is produced once the oil has been extracted. This glue could be a way to fix this problem by finding a use for this algal biomass.

REFERENCES

Energy 101: Algae-to-Fuel. (n.d.). Retrieved from https://www.energy.gov/eere/videos/energy-101-algae-fuel

Marsh, G. (2009, February 01). Biomass from algae. Retrieved from http://www.renewableenergyfocus.com/view/931/biomass-from-algae/

Difficulty in Emotion Regulation as a Moderator of the Relation between Adverse Childhood Experiences and Depressive Symptoms

Maddison Knott[1], Lauren LaHaye[2], Sarah Flynn[3], and Steven Stringfellow[4]
1 University of Louisiana at Lafayette, mkk6341@louisiana.edu
2 University of Louisiana at Lafayette, lll2159@louisiana.edu
3 University of Louisiana at Lafayette, c00423801@louisiana.edu
4 University of Louisiana at Lafayette, sxs4537@louisiana.edu

Hung-Chu Lin
Supervising Faculty, Psychology Department, University of Louisiana at Lafayette, hung-chu.lin@louisiana.edu

ABSTRACT

Prior research has documented the relation between adverse childhood experiences (ACEs) and negative outcomes in affective functioning. However, information is limited on the factors that may potentially affect the relation between ACEs and affective disorders. The purpose of this study was to examine the relation between adverse childhood experiences and depressive symptoms and how difficulty in emotion regulation moderated this relation. A sample of 482 college students responded to self-report measures, including the Adverse Childhood Experiences, the Depression and Anxiety subscales of the Depression Anxiety and Stress Scale, and the Difficulties in Emotion Regulation Scale for the assessment of adverse childhood experiences, depressive symptoms, and difficulty in emotion regulation, respectively. The results indicated that ACEs score positively predicted depressive symptoms, and that difficulty in emotion regulation exacerbated the relation between ACEs and depressive symptoms. The findings underscored a moderating role of difficulty in emotion regulation such that as difficulty in emotion regulation increased, the association between ACEs and depressive symptoms intensified. However, for those individuals who reported low levels of difficulty in emotion regulation (individuals with high competence in emotion regulation), their ACEs scores did not significantly predicted depressive symptoms. The findings have implications for targeting emotion regulation competence in individuals exposed to childhood adversity for ameliorating the vulnerability to depressive symptoms.

Key Words: Adverse Childhood Experiences, Depression, Difficulty In Emotion Regulation

1. INTRODUCTION

Adverse childhood experiences (ACEs) refer to traumatic experiences in the first 18 years of life or childhood, ranging in categories from physical abuse, emotional abuse, sexual abuse, emotional neglect, physical neglect, and witnessing violence against mother or intimate partner violence (IPV) exposure (Felitti et al., 1998). In a study done on Native American adolescents (aged 15-24), many of them indicated experience in each of these categories (Brockie et al. 2015). For example, when one ACE was reported, the odds of a participant indicating having experienced suicide attempt increased by 37%, poly-drug use by 51%, PTSD symptoms by 55%, and depression symptoms 57% (Brockie et al. 2015). In another study that was conducted

by Manyema et al. (2018) psychological distress was directly correlated with adverse childhood experiences. Participants that indicated one ACE were 1-2 times more likely to have symptoms of psychological distress, and participants who experienced six or more ACEs were eight times more likely to experience psychological distress.

Indeed, much research has documented the relation between ACEs and depression that lasts throughout adulthood (Chapman et al., 2004). According to the National Institute of Mental Health (NIMH), symptoms of depression include: Chronic sad mood, hopelessness, irritability, loss of interest in hobbies, persistent somatic symptoms, suicidal thoughts, and difficulty sleeping or concentrating (NIMH, 2018). Prior research has shown that 23.9% of people that have experienced four or more ACEs are 23.9% more likely to be diagnosed with depression (Font & Maguire-Jack, 2016). A lifetime prevalence rate of depression was found in 28.9% of women, and 19.4% of men that with ACEs (Chapman et al., 2006). Abusive experiences and living with a person with mental illness or substance use problems were found to be directly associated with depression (Font & Maguire-Jack, 2016). Given the association between ACEs and depression, recognizing potential moderators in this relation is important to ameliorate the effects of early trauma on mental health outcomes.

One possible moderator for the relation between ACEs and depression may be related to maladaptive emotion regulation because early life stressors are associated with impairments in affective functioning (Pechtel & Pizzagalli, 2011), resulting in increased vulnerability to a range of affective disorders. Emotion regulation involves conscious and nonconscious processes modulating our emotions to reach the optimal levels so that an individual can execute appropriate behaviors in response to specific events (Bargh & Williams, 2007; Gratz & Roemer, 2004; Rottenberg & Gross, 2003). Maladaptive emotion regulation may result in biased processing of emotional stimuli, which, in turn, elevates the sensitivity and vulnerability to depression and anxiety-related thoughts and symptoms (Wegner & Zanakos, 1994; Wenzlaff & Wegner, 2000). Thus, this study examined the association of adverse childhood experiences with adult depressive symptoms and how difficulty in emotional regulation exacerbated this relation.

2. METHOD

2.1. Participants and Procedure

This study included 482 college students (361 females, M_{age} = 20.6, SD_{age} = 4.0) recruited via the SONA participant recruitment system of the Psychology Department at the University of Louisiana at Lafayette. Participation was voluntary, but participants were rewarded credits to partially fulfill research requirements for the courses in which they were enrolled. The study was approved by the Institutional Review Board at the University. The participants responded to questionnaires using the computers in the Psychology Department Computer Laboratory.

2.2. Measures

Demographic Information Sheet. This checklist solicits participants' demographic background (e.g., age, gender, race, etc.) and information on general health (e.g., past and current diagnosis of physical or mental issues). In addition, participants respond to family history of illnesses and at-risk life styles items.

Adverse Childhood Experience. The Adverse Childhood Experiences (ACEs; Dong et al., 2003; Felitti et al., 1998) scale is a 10-item self-report questionnaire used to examine an

individual's recall of adverse experiences which occurred prior to his/her eighteenth birthday. These adverse early events pertain to an individual's personal history of emotional abuse, physical abuse, sexual abuse, emotional neglect, physical maltreatment and/or neglect, parental separation/divorce, family substance use, mental illness with the household, and/or parental incarceration. Each of the items are structured as a 'Yes' or 'No' question in regard to the individual's adverse childhood experiences. For instance, an item direct towards a history of physical neglect states "*Did you often or very often feel that (1) no one in your family loved you or thought you were important or special or (2) your family did not look out for each other, feel close to each other, or support each other?*" An exemplar item pertaining to mental illness within the immediate family states "*Was a household member depressed or mentally ill, or did a household member attempt suicide?*" For each item, a 'Yes' response signifies an individual item score of one. The scoring process of ACE is conducted by compositing all the 'Yes' responses from the 10-items; therefore, an individual's ACE score can range from 0 to 10. A score of '0' indicates that the individual experienced no adversities during childhood. According to Dong et al. (2004), an ACE score from 1 to 3 is considered as a low occurrence of adverse events. An ACE score of 4 indicates a moderate level of traumatic events, and an ACE score of 5 or more is considered high level of occurrence of adverse events.

Depression Anxiety and Stress Scale. The Depression and Anxiety subscales of the Depression Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) were used to assess depressive and anxiety symptoms. The DASS-21 is a 21-item scale that measures levels of emotional distress along three dimensions, including depression, anxiety, and stress. The items are rated utilizing a 4-point Likert scale, ranging from 0 (*never*), 1 (*sometimes*), 2 (*often*), and 3 (*almost always*). The DASS-21 contains three 7-item subscales, including the Anxiety, Depression, and Stress subscales. This assessment is defined as a useful tool in determining the severity levels of one's depression, anxiety, and stress as well as how these three variables relate to one another. An exemplar item of the Depression subscale is "*I was unable to become enthusiastic about anything*."

Difficulties in Emotion Regulation Scale. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a self-report scale used to evaluate the adult individual's emotion regulation within several facets. The DERS is comprised of 36 items rating emotional regulation on a 5-point Likert scale. The 5-point Likert scale ranges from 1 (*almost never, 0-10%*) to 5 (*almost always, 91-100%*). The DERS contains six subscales, which include Non-acceptance of Emotional Responses (NONACCEPT); Difficulties Engaging in Goal Directed Behavior (GOALS); Impulse Control Difficulties (IMPULSE); Lack of Emotional Awareness (AWARE); Limited Access to Emotion Regulation Strategies (STRATEGIES); and Lack of Emotional Clarity (CLARITY) (Gratz & Roemer, 2004). An exemplar item of the DERS includes "*I experience my emotions as overwhelming and out of control."*

3. RESULTS

3.1. Correlations

The results indicated that both ACEs (M = 1.80, SD = 1.96) and DERS (M = 96.45, SD = 21.72) positively correlated with depressive symptoms (M = 11.81, SD = 9.08), r = .30, p < .0001, and r = .58, p < .0001, respectively. Also, ACEs and DERS were positively correlated with each other, r = .24, p < .0001.

3.2. Moderation Analysis

In a regression model with ACEs and DERS as the predictors, depressive symptoms as the criterion variable, and gender as a covariate, both ACEs and DERS showed significant main effects on depressive symptoms, b = .17, SE = .04, t = 4.08, p < .0001, and b = .54, SE = .04, t = 13.46, p < .0001, respectively. Further regression analysis adding the cross-product of ACEs and DERS indicated a significant interaction effect on depressive symptoms, b = .08, SE = .04, t = 2.22, p = .03. Figure 1 summarizes this interaction, showing the prediction of depressive symptoms from three levels of ACEs (-1*SD*, mean, +1*SD*) at three levels of DERS (-1*SD*, mean, +1*SD*). Subsequent simple slope tests indicated that ACEs predicted depressive symptoms only at or above the mean level of DERS, slope = .14, t = 3.47, p = .0006 (mean level), and slope = .22, t = 4.64, p < .0001 (+1*SD*), respectively. When difficulty in emotion regulation is low (-1*SD*), ACEs did not predict depressive symptoms, slope = .06, t = 1.04, p = .30. The findings revealed a moderating role of DERS in the association of ACEs with depressive symptoms, such that greater difficulty in emotion regulation was associated with stronger relation between ACEs and depressive symptoms; however, when difficulty in emotion regulation was low, there was no association between ACEs and depressive symptoms.

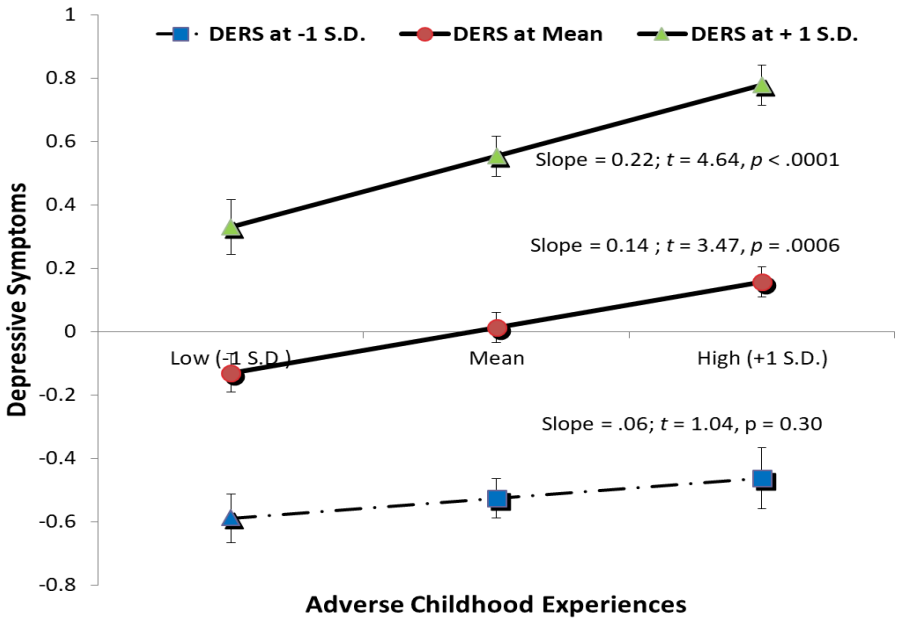


Figure 1. Interaction between adverse childhood experiences (ACEs) and difficulty in emotional regulation (measured by the Difficulty in Emotion Regulation Scale, DERS) predicting depressive symptoms. All variables were standardized. Gender was controlled.

4. DISCUSSION

This study examined the relation between ACEs and depressive symptoms and how difficulty in emotion regulation moderated this relation. The results indicated that there was a positive association between early adverse experiences and adult depressive symptoms, but the strength of this association varied by difficulty in emotion regulation. Specifically, as difficulty in

emotion increased, the strength of the association between ACEs and depressive symptoms increased; however, when difficulty level in emotion regulation was low, ACEs did not predict depressive symptoms. The findings underscored how difficulty in emotion regulation intensified the impact of ACEs on depressive symptoms in adulthood and the potential utility of interventions targeting emotion regulation among those with depressive symptoms associated with adverse childhood experiences.

REFERENCES

Anda. R.F., Whitfield, C.L., Felitti, V.J. Chapman, D. P. Edwards, V.J. Dube, S.R. Williamson, D.F. (2002). Adverse childhood experiences, alcoholic parents, and later risk of alcoholism and depression. *Psychiatric Services*, (8), 1001.

Bargh, J. A., & Williams, L. E. (2007). On the nonconscious of emotion regulation. In J. Gross (Ed.), *Handbook of emotion regulation*, 429−445. New York: Guilford Press.

Brockie, T. N., Dana-Sacco, G., Wallen, G. R., Wilcox, H. C., & Campbell, J. C. (2015). The Relationship of Adverse Childhood Experiences to PTSD, Depression, Poly-Drug Use and Suicide Attempt in Reservation-Based Native American Adolescents and Young Adults. *American Journal of Community Psychology, 55*(3-4), 411-421.

Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, (2), 217.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine*, *14*(4), 245-258.

Font, S.A., Maguire-Jack, K., (2016). Pathways from childhood abuse and other adversities to adult health risks: the role of adult socioeconomic conditions. *Child Abuse Neglect, 51*,390-399.

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 41–54.

Pechtel, P., & Pizzagalli, D. A. (2010). Effects of early life stress on cognitive and affective function: An integrated review of human literature*. Psychopharmacology*, 214(1), 55-70.

Wegner, D. M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of Personality*, *62*, 615−640.

Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology*, *51*, 59−91.

Robust Resource Allocation Model Using Edge Computing for Delay Sensitive Tasks in Vehicle to Infrastructure (V2I) Networks

Anna Kovalenko[1], Razin Farhan Hussain[2], Mohsen Amini Salehi[3], Omid Semiari[4]
1 High Performance Cloud Computing (HPCC) Lab. School of Computing and Informatics, University of Louisiana at Lafayette Louisiana, USA. aok8889@louisiana.edu
2 High Performance Cloud Computing (HPCC) Lab. School of Computing and Informatics, University of Louisiana at Lafayette Louisiana, USA. razinfarhan.hussain1@louisiana.edu
3 High Performance Cloud Computing (HPCC) Lab. School of Computing and Informatics, University of Louisiana at Lafayette Louisiana, USA. amini@louisiana.edu
4 Department of Electrical and Computer Engineering, Georgia Southern University Georgia, USA. osemiari@georgiasouthern.edu

ABSTRACT

Development of autonomous vehicles is one of the most ambitious and promising projects in human history. Such vehicles require agile and reliable services to manage hazardous road situations. Vehicular Networks is the technology that can provide high-quality services for selfdriving vehicles. A large percentage of service requests in these networks have an urgent nature (*e.g.*, disaster updates, hazard alerts, etc.) In other words, these requests are delay intolerant and require immediate service. Therefore, Vehicular Networks, and particularly, Vehicleto-Infrastructure (V2I) systems must provide a consistent real-time response to autonomous vehicles. During increased traffic congestion or even natural disasters, it can be particularly tricky for V2I systems to maintain an optimal performance level. In such situations, a surge of requests arriving at a Base Station (a network edge device with computing capabilities) can drastically decrease V2I system response time. The consequences of even a millisecond delay for an urgent request can be dangerous, sometimes fatal. Hence, the goal of our research is to increase robustness (*i.e.*, ability to maintain optimal performance) of the V2I systems. To achieve this goal, we offer a resource allocation model that can load balance (*i.e.*, dynamically utilize resources from neighboring Base Stations), when the system is oversubscribed (experiencing an unusually dense service requests arrival). We propose an allocation algorithm based on a calculated probability of the arriving request to be served in time on several neighboring Base Stations. We introduce a Load Balancer component which assigns the request to the Base Station with a maximum precomputed probability. After all, we evaluate our model under various oversubscription levels and urgent requests percentages. Simulation results demonstrate that the proposed model decreases overall service miss rate by up to 20 % and urgent requests miss rate by up to 50 %.

Key Words: Vehicular Networks, V2I, Edge Computing, High Performance.

1. INTRODUCTION

Recent advancements in communication and computation technologies have stimulated a rapid development of vehicular networks. Federal Communications Commission (FCC) has reserved 5.850 to 5.925 GHz frequency band for Vehicle-to-Everything (V2X) communications [Ali and

Chan, 2011]. Vehicle-to-Infrastructure (V2I) communications is one prominent form of V2X that draws the majority of work to itself. In V2I, infrastructure refers to all edge and core technologies that facilitate communications and computations for vehicular requests.

As shown in Figure 1, autonomous vehicles send their service requests (tasks) to Base Stations while operating on the road. A Base Station is capable of communicating with vehicles and processing vehicular tasks [Bok et al., 2016]. Upon the completion of the processing, the results sent back to the requesting vehicle. Examples of such vehicular tasks can be a Wrong Way Driver warning [Bonte and Owen, 2013], Cooperative Forward Collision warning [ElBatt et al., 2006], and Lane Change warning [Bonte and Owen, 2013]. This type of tasks can only tolerate a short end-to-end delay [Ali and Chan, 2011]. For such delay-sensitive requests, there is no value in executing them after a tolerable delay.

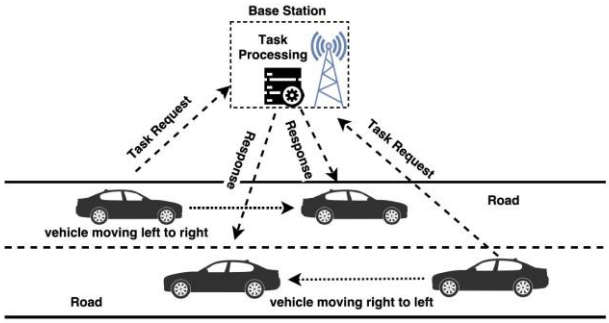


Figure 1. A Vehicle to Infrastructure (V2I) scenario where vehicles send requests to a Base Station and receive the response. A Base Station is a roadside unit with communicational and computational abilities.

Significant problems arise during road emergencies (*e.g.*, road accidents and disasters) when a rapid increase in service requests to Base Stations significantly affects the tasks' service time. In fact, in this situation, Base Station resources become oversubscribed, and it cannot provide enough computational power for all the arriving tasks to meet their deadlines. Accordingly, our goal, in this research, was to design the V2I system to be robust against uncertain task arrival. In the literature, *robustness* is defined as the degree to which a system can maintain a certain level of performance even with given uncertainties [Ali et al., 2004, Smith et al., 2009, Canon and Jeannot, 2010]. In our research, we evaluate robustness of the V2I system according to the number of tasks that can meet their deadlines. The main question we try to answer is how to allocate arriving tasks among the Base Stations so that the system stays robust? Or, in other words, we try to find a way to maximize the number of tasks meeting their deadlines.

Previous research works either discard these uncertainties [Bok et al., 2016] or focus on the uncertainty introduced by communication [Ali and Chan, 2011]. Alternatively, to assure robustness of the V2I system, we propose a probabilistic resource allocation model that copes with uncertainties introduced by both communication and computation. Our proposed model is aware of the connectivity amongst Base Stations (*i.e.*, edge nodes) and their heterogeneity. In the face of oversubscription, we devise a Load Balancer at the Base Station level that can leverage the computational capabilities of other Base Stations to improve robustness of the V2I system.

According to our model, when the task arrives to a Base Station it enters the Load Balancer (Figure 2). The Load Balancer works in an immediate mode to allocate arriving tasks to the Base Stations. It can allocate the task to the receiving Base Station or to the one-hop distance neighboring Base Station. When the task is allocated, it enters the batch queue of the Base Station to be scheduled for processing.

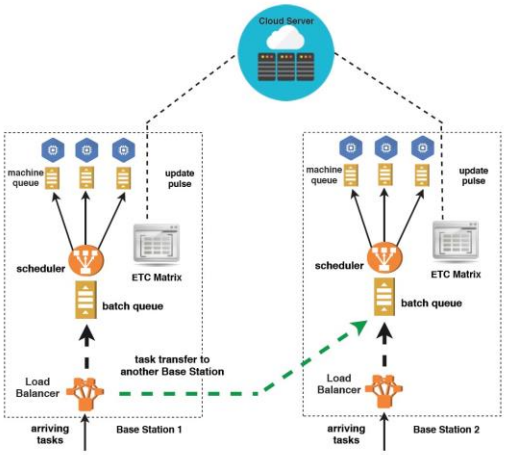


Figure 2. A proposed model where the task gets efficiently allocated by the Load Balancer between receiving and neighboring Base Stations.

Every Base Station stores two matrices (ETC Matrix component in Figure 2) to enable probability computation proposed in our model. One matrix is the Estimated Task Completion time (ETC) matrix [Ali et al., 2000]. Another one is the Estimated Task Transfer time (ETT) matrix. These two matrices contain estimated task completion and task transfer time normal distributions ($X \sim N(\mu, \sigma^2)$) respectively. These distributions are based on historical execution and transfer times of different task types (delay tolerant and intolerant). Matrices are updated periodically through the cloud.

For each task t_i of task type "i," Load Balancer calculates the probability (P_i^j) of this task to meet its deadline δ_i across the receiving and neighboring Base Stations. For the receiving Base Station "j", the probability can be defined as $P_i^j(\gamma_i^j < \delta_i) = P_i^j(Z < z)$ where "z" is $(\delta_i - \mu_i^j) / \sigma_i^j$. We standardize the distribution with $\mu_i = 0$ and $\sigma_i = 1$. For all of the neighboring Base Stations, to calculate the probability, Load Balancer convolves the ETC distribution with respective ETT distribution. The convolution is necessary to account for the transfer time to a neighboring Base Station. The resulting distribution ($W \sim N(\mu, \sigma^2)$) is used to calculate the probability of the task meeting the deadline in a specific Base Station. If a neighboring Base Station is "k" and task type is "i" then the probability can be defined as "P_i^k" where $z = (\delta_i - \mu^k{}_i) / \sigma_i^k$. When the probability of the received task in all of the Base Stations (receiving and neighboring) is calculated, the task gets allocated to the Base Station that offers the highest probability. When the task's probability to meet its deadline is zero (0), the task is dropped (it will not enter any batch queue for scheduling). Task dropping procedure during the oversubscription situation implicitly increases the probability of the other tasks to meet their deadlines.

The results of our research prove that the proposed model offers a better, more robust allocation algorithm. We evaluate our model using EdgeCloudSim simulation [Sonmez et al., 2017]. Our resource allocation model is tested against the Baseline model. The Baseline model always allocates arriving task to a receiving Base Station. Figure 3 represents simulation results of overall system performance for medium and high system oversubscription levels. Our model provides noticeably better results when the number of vehicles is less than or equal to 100. Otherwise, it's performance decreases as well as the Baseline's performance. Regardless, our system consistently performs 2-5 % better than the Baseline.

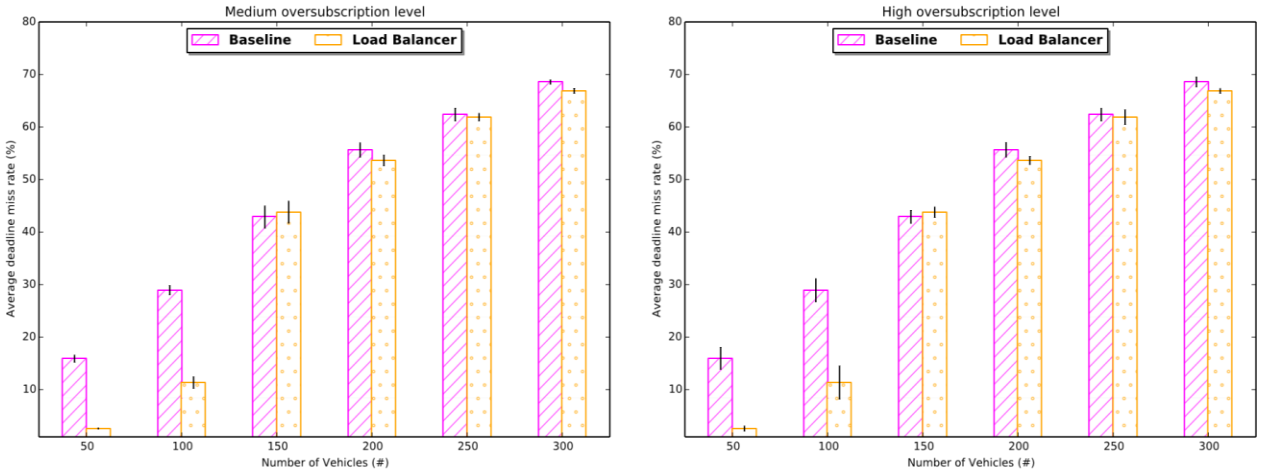


Figure 3. Load Balancer overall service miss rate compared to the Baseline

.

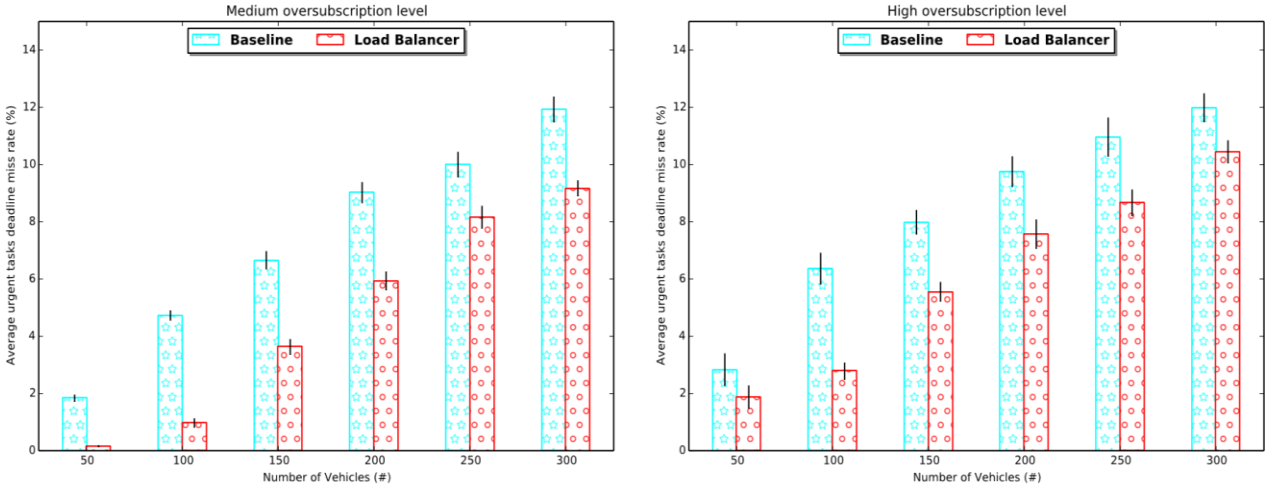


Figure 4. Load Balancer urgent service miss rate compared to the Baseline.

Nevertheless, the most crucial improvement our system presented in Figure 4. Our research aimed to provide a resource allocation model that would be robust against computational and communicational uncertainties, especially for the service requests that have an urgent nature. Figure 4 shows the deadline miss rates for urgent tasks both for our model and the Baseline. The left caption represents the performance for the medium level of oversubscription and the right one for the high. We can notice, that our proposed model consistently performs better than the Baseline. When the number of vehicles is low, Load Balancer allows for up to 80 % improvement. With a more significant amount of vehicles up to 50 % performance improvement is present.

Finally, I can conclude our research results to be successful. We proposed a model that encompasses the uncertainties exist in communication and computation. We developed a load balancing heuristic that increases the robustness of the V2I system. The analysis of the results confirms the success and allows to continue expanding our model, and possibly introducing a real-world implementation in the future.

REFERENCES

Ali, G. M. N. and Chan, E. (2011). Co-operative data access in multiple Road Side Units (RSUs)-based VehicularAd Hoc Networks (VANETs). In *Telecommunication Networks and Applications Conference (ATNAC), 2011 Australasian*, pages 1–6. IEEE.

Ali, S., Maciejewski, A. A., Siegel, H. J., and Kim, J.-K. (2004). Measuring the Robustness of a Resource Allocation. *IEEE Transactions on Parallel and Distributed Systems*, 15(7):630–641.

Ali, S., Siegel, H. J., Maheswaran, M., Hensgen, D., and Ali, S. (2000). Representing Task and Machine Heterogeneities for Heterogeneous Computing Systems. *Tamkang Journal of Science and Engineering*, 3(3):195–207.

Bok, K., Hong, S., Lim, J., and Yoo, J. (2016). A multiple RSU scheduling for V2I-based data services. In *Big Data and Smart Computing (BigComp), 2016 International Conference on*, pages 163–168. IEEE.

Bonte, D. and Owen, G. (2013). Allied Business Intelligenc Inc. https://www.abiresearch.com/ market-research/product/ 1016485-v2v-and-v2i-applications-and-use-cases/.

Canon, L.-C. and Jeannot, E. (2010). Evaluation and Optimization of the Robustness of DAG Schedules in Heterogeneous Environments. *IEEE Transactions on Parallel and Distributed Systems*, 21(4):532–546.

ElBatt, T., Goel, S. K., Holland, G., Krishnan, H., and Parikh, J. (2006). Cooperative Collision Warning Using Dedicated Short Range Wireless Communications. In *Proceedings of the 3rd International Workshop on Vehicular Ad Hoc Networks*, VANET '06, pages 1–9, New York, NY, USA. ACM.

Smith, J., Shestak, V., Siegel, H. J., Price, S., Teklits, L., and Sugavanam, P. (2009). Robust resource allocation in a cluster based imaging system. *Parallel Computing*, 35(7):389–400.

Sonmez, C., Ozgovde, A., and Ersoy, C. (2017). EdgeCloudsim: An environment for performance evaluation of Edge Computing systems. *2017 Second International Conference on Fog and Mobile Edge Computing (FMEC)*, pages 39–44.

Lights, Camera, Fracture: A New Way to Characterize Hydraulic Fracturing

Anh Le[1], Archie Metoyer Jr.[2], Fatick Nath[3], Dr. Mehdi Mokhtari[4]
1 Undergraduate Research Assistant, anhtle1994@gmail.com
2 Undergraduate Research Assistant, agm3519@louisiana.edu
3 Graduate Student, fatick102@gmail.com
4 Advisor, PI of Tuscaloosa Marine Shale Laboratory, mxm4487@louisiana.edu

ABSTRACT

Digital image correlation (DIC) is a unique technique to measure strain development on a surface of interest. This method is widely used in many industries. With Material Test System along with Vic 2D software, we were able to apply DIC for the process of measuring strain on the surface of the rock and studying the fracture propagation in Shale. This solution can be applied in different industry areas to replace the normal method, and it gives more efficient values.

1. BACKGROUND OF THE SUBJECT

The conventional method of strain measurement with strain gauges are not efficient and cannot provide neither the complex process of strain accumulation nor fracture propagation. We apply a unique optical technique along with image processing to obtain the strain measurement on a surface of a sample.
This method is known as digital image correlation (DIC), with the use of Material Test System machine, a high-resolution camera, and Vic 2D software.
This method could be used in general for different application such as computing and information science, materials science, nanodevices and microsystems, geoscience, bioscience, and radiation effects and high energy density science

2. ANALYSIS/RESULTS

$$x^* = x + u + \frac{\partial u}{\partial x}\Delta x + \frac{\partial u}{\partial y}\Delta y \qquad \varepsilon_{xx} = \frac{\partial u}{\partial x} + \frac{1}{2}\left[\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial v}{\partial x}\right)^2\right]$$

$$y^* = y + v + \frac{\partial v}{\partial x}\Delta x + \frac{\partial v}{\partial y}\Delta y \qquad \varepsilon_{yy} = \frac{\partial u}{\partial y} + \frac{1}{2}\left[\left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial v}{\partial y}\right)^2\right]$$

$$\mathrm{COF} = \frac{\sum_{i=1}^{m}\sum_{j=1}^{m}\left[f(x_i,y_j)-\overline{f}\right]\cdot\left[f(x_i^*,y_j^*)-\overline{g}\right]}{\sqrt{\sum_{i=1}^{m}\sum_{j=1}^{m}\left[f(x_i,y_j)-\overline{f}\right]^2\cdot\sum_{i=1}^{m}\sum_{j=1}^{m}\left[f\left(x_i^*,y_j^*\right)-\overline{g}\right]^2}}$$

Figure 1. Equations behind DIC

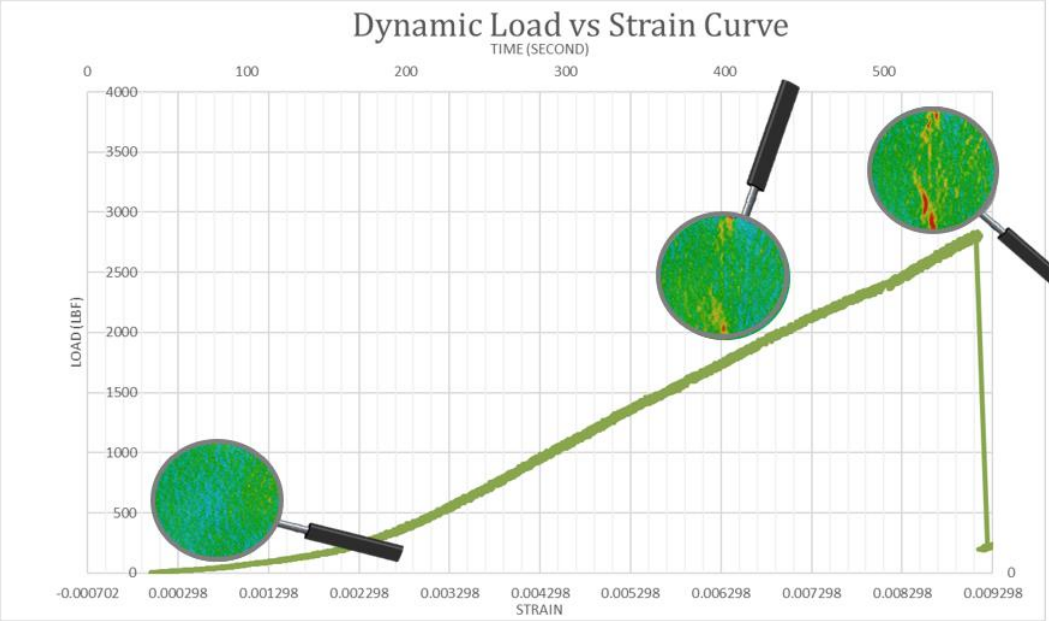
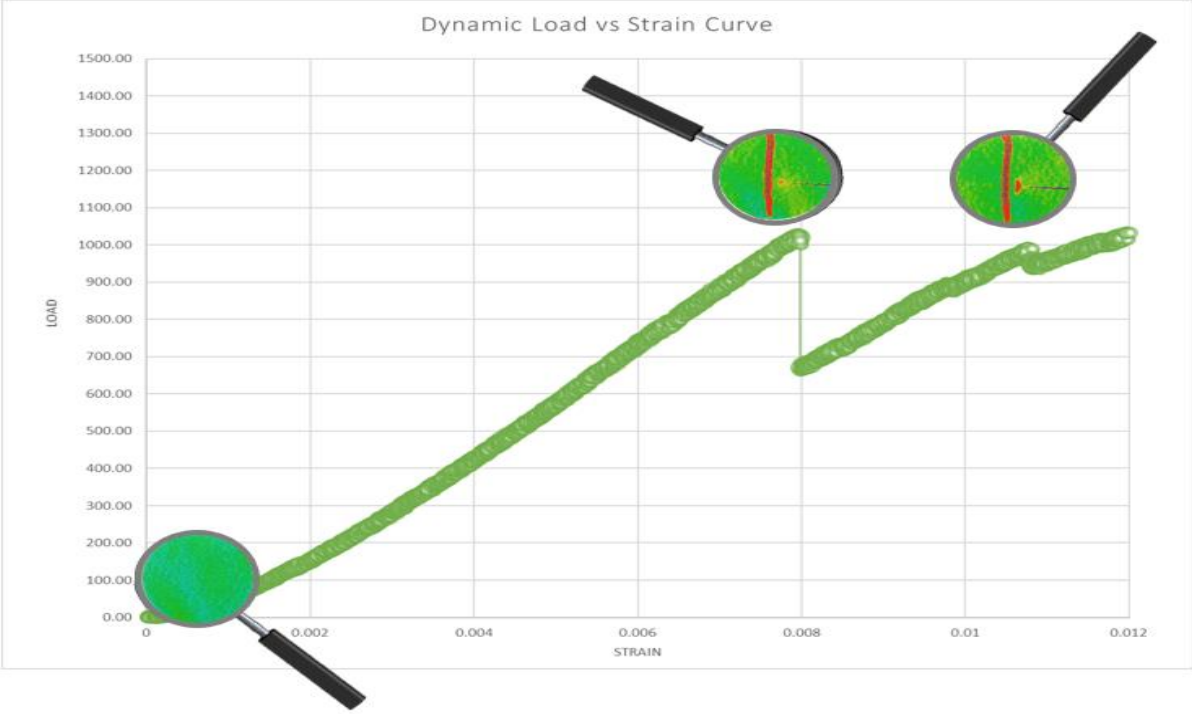


Figure 2. Silurian Dolomite



:

Figure 3. Parker Sandstone

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

3. METHODS

Coring Machine:
Cutting rock sample to desired size in order to test (usually 2 inches in diameter)
White and Black Paint:
Creating speckled pattern on sample so displacement can be measured
Materials Testing System:
Used to apply a stroke (load) to fracture the sample
Nikkon:
Used to capture the images and show the deformation of the sample
Vic 2D Software:
Used to process the images taken and show the initiation and propagation of strain within the sample

4. DISCUSSION

DIC gives us a different method to measure the stress and strain development.
The data results can be used to plot the relationship between stress and strain
The prediction of fracture propagation is easier to obtain.
DIC could be used in other applications in which DIC is not commonly used.

REFERENCES

Mokhtari, M., Hayatdavoudi, A., Nizamutdinov, R., Rizvi, H., & Nath, F. (2017). Characterization of Complex Fracture Propagation in Naturally Fractured Formations Using Digital Image Correlation Technique. Society of Petroleum Engineers. doi:10.2118/184826-MS.

Nath, F., Salvati, P. E., Mokhtari, M., Seibi, A., and Hayatdavoudi, A., 2017. Observation of Fracture Growth in Laminated Sandstone and Carbonate Rock Samples under Brazilian Testing Conditions Using Digital Image Correlation Technique. Society of Petroleum Engineers. https://doi.org/10.2118/187515-MS.

Strategies to Increase Biohydrogen Production from Lignocellulosic Biomass through Dark Fermentation

Shayla LeBoeuf[1], Remil Aguda[1], Donald Blue[1], Emmanuel Revellame [2,3*]
[1]Department of Chemical Engineering, [2] Energy Institute of Louisiana, [3] Department of Industrial Technology, University of Louisiana at Lafayette, * Correspondence: erevellame@louisiana.edu

ABSTRACT

To meet growing domestic energy demands, research on biohydrogen production from lignocellulosic biomass as an alternative source of fuel has been explored. Acid pretreatment of biomass produces sugars for the production of biohydrogen by dark fermentation, but also produces compounds that inhibit, or prevent, microbial biohydrogen production. To increase the yield, the inhibitors need to be removed or minimized. Among the strategies, removal of the inhibitors by adsorption or minimization of inhibitor production by alkaline pretreatment of biomass have been experimentally demonstrated. Previous studies have shown that different types of inhibitors are detrimental to biohydrogen production. Removal of the inhibitors and employing alkali pretreatment seem to be promising strategies to remove or minimize their effects on biohydrogen production.

1. INTRODUCTION

Among the sources being considered for the production of biohydrogen is lignocellulosic biomass. Lignocellulosic biomass has an estimated global production rate of 220 billion dry tons annually while the United States accounts for approximately 1.3 billion tons per year. Biomass can be crop residues, forest residues, primary and secondary mill residues, as well as urban wood residues (Figure 1.1). Lignocellulosic biomass can be converted into biohydrogen through dark fermentation. Dark fermentation is carried out anaerobically using species of bacteria, usually those that belong to the *Clostridia* and *Enterobacter* genera. The biomass undergoes a pretreatment to produce sugars that are fed into dark fermentation to produce biohydrogen (Figure 1.2). When lignocellulosic biomass undergoes acid pretreatment, the most economically feasible form of pretreatment, it produces many compounds that inhibit microbial biohydrogen production. Common inhibitors include carboxylic acids (e.g., acetic, formic acids), furans (e.g., furfural, hydroxymethylfurfural), and phenylic compounds (Figure 1.3). They inhibit microbial growth and metabolisms which in turn reduces the amount of biohydrogen produced from the sugars. They can have an inhibitory threshold from 0-500 mg/L and can reduce the biohydrogen yield by as much as 97% depending on the inhibitors present (Figure 1.4). The inhibition caused by carboxylic acids can be easily mitigated by adjusting the pH of the mixture near neutral. Furans and phenolic compounds, on the other hand, have effects on the process that are not as easily alleviated. Recommendations from previous studies show strategies to remove or minimize the inhibitors formed following pretreatment.

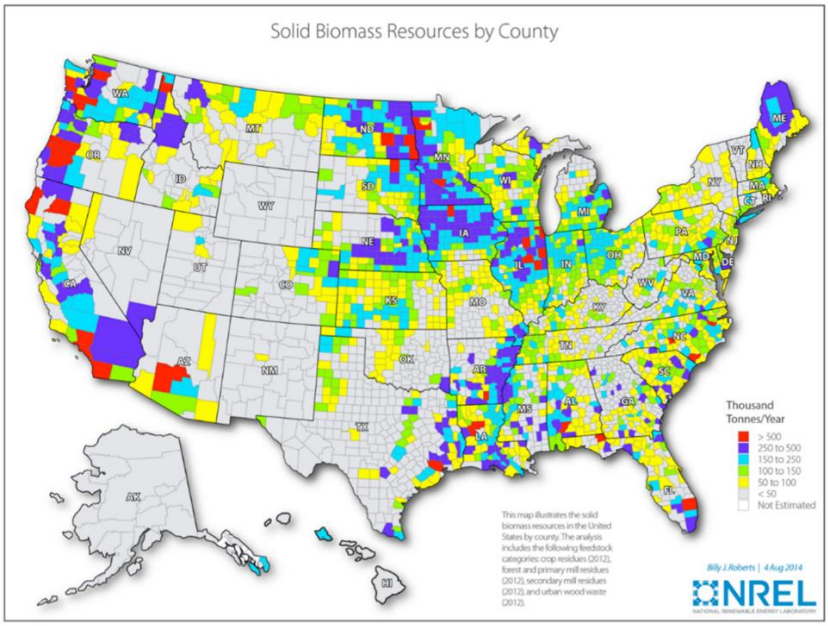


Figure 1.1. Biomass resources in the United States of America (NREL, 2017).

Figure 1.2 Biohydrogen from lignocellulosic biomass through dark fermentation.

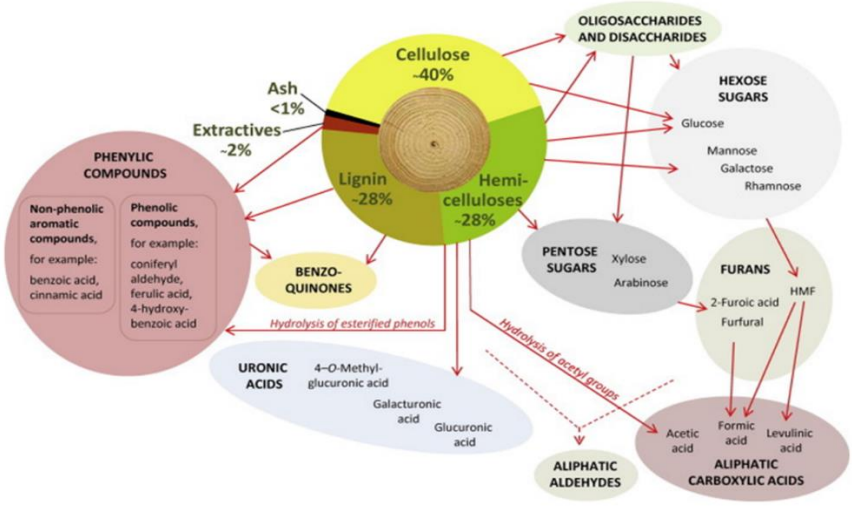


Figure 1.3. Inhibitors produced by acid pretreatment of biomass (Jönsson, 2017).

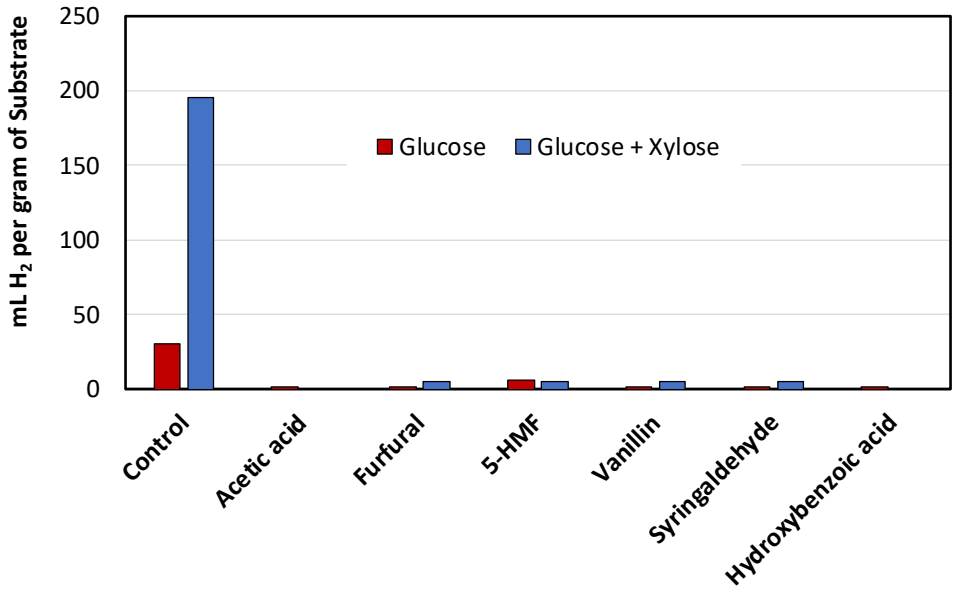


Figure 1.4. Inhibition of biohydrogen production due to inhibitory compounds from biomass pretreatment (Lin, 2015, Siqueira, 2015).

2. DISCUSSION

2.1 Physical Adsorption

Experimental research studies showed that inhibitors can be removed by physical adsorption using activated carbons. Adsorption removed up to 70% of the furfural using commercial activated carbon and steam activated pinewood biochar, as shown in Figure 2.1. However, it may also remove sugars such as glucose and hydrolysates resulting in a decrease in biohydrogen production.

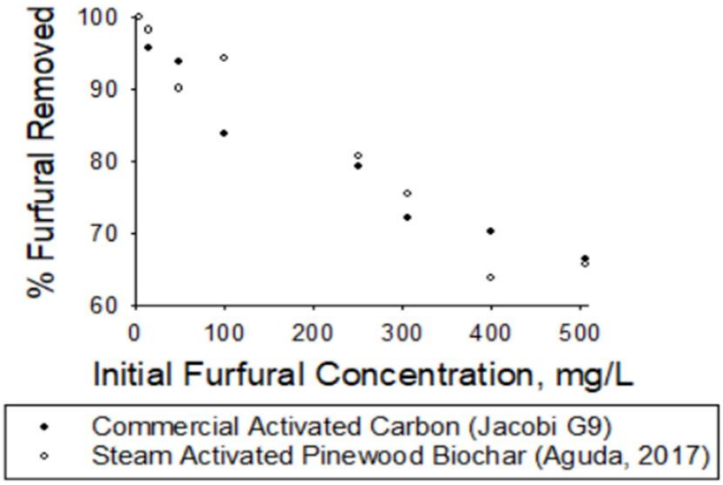


Figure 2.1. Adsorption of furfural using activated carbon (Aguda, 2017).

2.2 Liquid-Liquid Extraction

Liquid-liquid extraction is the removal of inhibitors by use of an immiscible solution/solvent after biomass pretreatment. This process can possibly be used to selectively solubilize or remove the inhibitory compounds produced during pretreatment. The solvents can be separated by decantation and recovered by distillation, but these solvents often have poor selectivity and limited solubility for the inhibitory compounds.

2.3 Alkaline Pretreatment

Alkaline pretreatment of biomass, instead of acidic pretreatment prior to dark-fermentation, has been experimentally proven to produce less inhibitors. As shown in Table 2.1, alkaline pretreatment resulted in the production of fewer inhibitory compounds and the production of more sugars available for biohydrogen production. Compared to acidic pretreatment, the quantity of inhibitors produced during pretreatment can be minimized by using an alkaline pretreatment. However, this process takes longer which might affect its economic viability, and there are also few studies that consistently showed alkaline pretreatment as the most suitable process for biomass pretreatment.

Table 2.1. Acid and alkaline pretreatment of biomass (Blue, 2018).

Components	Concentration (g/L)	
	Acid Pretreatment*	Alkali Pretreatment*
Glucose	14.17	38.14
Xylose	12.53	12.17
Arabinose	8.60	5.26
Carboxylic acids*	15.37	66.35
5-HMF	0.30	None detected
Furfural	1.96	None detected

*inherently present in the original biomass (vegetable wastes)
Pretreatments were conducted at the same temperature and acid/alkali loading

2.4 Photo fermentation

Pairing dark fermentation with photo fermentation can be used as a strategy to convert the inhibitors (particularly the carboxylic acids) to hydrogen. Photo fermentation utilizes nonoxygenic photosynthetic bacteria (e.g., *Rhodobacter spheroids*, *Chlorobium vibrioforme*) that requires light and biomass (as carbon source) to produce biohydrogen. This process could result to higher biohydrogen yield compared to the previous strategies due to conversion rather

than removal of the inhibitors. However, the other class of inhibitors (i.e., furans and phenolic compounds) could also affect or inhibit the microbes involved with photo fermentation and further studies are needed to prove otherwise.

3. SUMMARY

Biohydrogen can be produced through dark fermentation of sugars. For sugar production, the commonly used acidic pretreatment process of lignocellulosic biomass yields chemical compounds that inhibit biohydrogen production. The removal or minimization of these inhibitory compounds can increase the production of biohydrogen from dark fermentation. Promising strategies to remove or minimize inhibitors include adsorption using activated carbons and alkaline pretreatment of biomass.

REFERENCES

Aguda, Remil. Master of Science Thesis 2017 North Carolina State University

Blue, Donald. Master of Science Thesis 2018 University of Louisiana at Lafayette

Bundhoo, M. A. Z., & Mohee, R. (2016). Inhibition of dark fermentative bio-hydrogen production: A review. *International Journal of Hydrogen Energy, 41* (2016), 6713-6733. https://doi.org/10.1016/j.ijhydene.2016.03.057

Elbeshbishy, E., Dhar, B. R., Nakhla, G., & Lee, H. S. (2017). A critical review on inhibition of dark biohydrogen fermentation. *Renewable and Sustainable Energy Reviews, 79* (2017), 656-668. https://doi.org/10.1016/j.rser.2017.05.075

Kosa, Matyas, and Arthur J. Ragauskas. (2011). Lipids from heterotrophic microbes: Advances in metabolism research. *REVIEW SPECIAL ISSUE- Applied Microbiology, 29* (2), 53-61. https://doi.org/10.1016/j.tibtech.2010.11.002

L.J. Jönsson, C. Martín. (2016). Pretreatment of lignocellulose: Formation of inhibitory by-products and strategies for minimizing their effects. *Bioresource Technology, 199* (2016), 103-112. https://doi.org/10.1016/j.biortech.2015.10.009

Lin, R., Cheng, J., Ding, L., Song, W., Zhou, J., Cen, K. (2015). Sodium borohydride removes aldehyde inhibitors for enhancing biohydrogen fermentation. *Bioresource Technology, 197* (2015), 323-328. https://doi.org/10.1016/j.biortech.2015.08.105

Robert, B. J., (2014). Biomass Maps. *The National Renewable Energy Company.* Retrieved from https://www.nrel.gov/gis/biomass.html

Rafieenia, R., Lavagnolo, M. C., & Pivato, A. (2017). Pre-treatment technologies for dark fermentative hydrogen production: Current advances and future directions. *Waste Management, 71* (2018), 734-748. https://doi.org/10.1016/j.wasman.2017.05.024

Ren, N., Guo, W., Liu, B., Cao, G., & Ding, J. (2011). Biological hydrogen production by dark fermentation: Challenges and prospects towards scaled-up production. *Current Opinion in Biotechnology, 22* (3), 365-370. https://doi.org/10.1016/j.copbio.2011.04.022

Rosillo-Calle, F., de Groot, P., Hemstock, S. L., Woods, J. (2015). The biomass assessment handbook*: Energy for a sustainable environment*. Routledge. ISBN:1317527461,9781317527466

Siqueira, M.R., Reginatto, V. (2015). Inhibition of fermentative hydrogen production by hydrolysis byproducts of lignocellulosic substrates. Renewable Energy, 80 (2015), 109-116. https://doi.org/10.1016/j.renene.2015.01.070

Determinants of Games Missed Following Concussions in the NFL

Abigail Lewis[1], Jeremy J. Foreman[2]
1 School of Kinesiology, University of Louisiana at Lafayette
2 School of Kinesiology and Center for Sports Success, University of Louisiana at Lafayette

ABSTRACT

Concussions in the National Football League (NFL) have become a rising topic for decades because of the active research that has been conducted regarding them. The NFL has protocols in place to alleviate the severity of concussions on their players. Among these protocols is rest time following concussions, which varies among players. The purpose of this study is to analyze determinants of games missed following concussions sustained in the NFL. Regression analysis is used to examine NFL data from 2012 through 2015. More valuable players, such as quarterbacks, have more time off following concussions than other players. However, more used players are rushed back into games quicker. Other factors such as previous concussions sustained and how recent the concussion occurred in the sample period also determine how much time off players receive following concussions.

Key Words: Concussions, NFL, Protocol, Football

1. INTRODUCTION

Concussions in the National Football League (NFL) have become a rising topic for decades because of the active research that has been conducted regarding them. Head trauma occurs in the sport of football at a dangerously high rate and results in players and their families with questions regarding the safety of the sport. The NFL adopted concussion protocols and rule changes to reduce the frequency and harm of concussions ("Protecting Players," 2018). High velocity NFL players can experience up to 1000-1500 collisions which converts to approximately 30-35gs of force. Even though numerous rules and protocols have been established by the NFL to mitigate damages associated with head trauma, the amount of time (and number of games) players miss following a concussion varies widely. The purpose of this study is to analyze determinants of games missed following concussions sustained in the NFL.

2. LITERATURE REVIEW

The symptoms that concussions bring about can be observed and experienced on a day to day basis by numerous NFL players. The severity, however, is often only fully understood after they have passed away and their brain can be extensively studied (Stone, 2017). Chronic Traumatic Encephalopathy (CTE) is a brain disease found in nearly 99% of NFL players who suffered explosive blows to their head. The NFL does not cover CTE in their concussion settlement, which would be extremely costly if indeed enforced (Stone, 2017).

When a player suffers an intense hit on the field and shows signs of instability or loss of consciousness, they are to be removed from the game immediately. They are assessed by sideline officials, in-booth officials, and various physicians to look for any observable symptoms (Stites, 2018). Concussed athletes are to follow a five-step protocol as set forth by the NFL's

Head, Neck, and Spine Committee. Players are expected to be assessed throughout multiple phases to be eligible to earn the pass back on the field, if need be. However, not all players progress through concussion protocols at the same speed.

From 2012 through 2015, 643 concussions were reported on *PBS Frontline's Concussion Watch*. Following these concussions, the average number of games missed after a concussion for quarterbacks is about 0.8, for offensive linemen is about 0.6, and for defensive backs is about 0.4. Given that, on average, quarterbacks take more games off after a concussion than offensive linemen, and offensive linemen take more games off than defensive backs, it is possible that the value of the player may determine how many games a player will miss following a concussion–not the player's health. To demonstrate the value of these players: since 1997, 68% of NFL first overall draft picks were quarterbacks, 14% of the first overall draft picks were offensive linemen, and none of the first overall draft picks were defensive backs. Thus, more valuable players may be more likely to rest additional games relative to less valuable players.

3. METHODS

To analyze determinants of games missed following concussions sustained in the NFL, data regarding NFL player concussions from 2012 through 2015 is collected from *PBS Frontline's Concussion Watch*. The dependent variable is the number of games missed following a concussion. The independent variables of interest in this study are (a) the salary measured in millions of dollars, (b) whether the player is a quarterback, and (c) the average number of plays per game the player played in prior to the concussion. Control variables include the number of concussions previously sustained in the sample period, the season in which the concussion was sustained, and the week of the season in which the concussion was sustained. Ordinary least squares (OLS) regression analysis is used to examine the effects of the independent and control variables on the dependent variable.

4. RESULTS

Based on the regression results, salary does not have a statistically significant effect on games missed following a concussion. However, other indicators of player value (i.e., playing position and the average number of plays a player played in per game) were statistically significant. More specifically, quarterbacks are given more games off after concussions than non-quarterbacks. According to the regression coefficient estimates, quarterbacks receive about 0.91 extra games off. Additionally, the more plays a player played in per game prior to a concussion, the more likely they were rushed back on the field following a concussion. For example, a player who averaged 70 plays per game can expect to receive 0.49 games fewer games off, whereas a player who only averaged 30 plays per game can expect to receive 0.21 fewer games off following a concussion.

Table 1. Regression estimates for games missed following a concussion.

Variable	Coefficient	Standard Error	p-Value
Salary (M)	-0.003	0.023	0.897
Quarterback	0.908***	0.284	0.003
Previous Concussions	0.252*	0.129	0.059
Avg Plays per Game	-0.007**	0.003	0.033

Season Count	0.163*	0.080	0.050
Week	-0.011	0.016	0.470
Constant	0.945***	0.313	0.005

Other issues, such as player health and season also appear to play a role in determining how many games a player will rest following a concussion. The regression estimates indicate players may receive about 0.25 extra games off for every previous concussion sustained. Therefore, player health may be a factor in player rest following concussions. Also, as time goes on, players are more likely to get more time off following a concussion. More specifically, for every year in the sample, an additional 0.16 games off are awarded to players. This may be occurring for several reasons, such as increased awareness about brain injuries or public relations efforts by the NFL to decrease negative attention regarding brain injuries.

5. CONCLUSION

More valuable players, such as quarterbacks, have more time off following concussions than other players. However, more used players are rushed back into games quicker. Other factors such as previous concussions sustained and how recent the concussion occurred in the sample period also determine how much time off players receive following concussions. Though salary was not a significant predictor of games missed, salaries can be affected with the occurrence of a concussion during a game (Navarro et al., 2017).

The results of this study could be useful for league administrators, medical personnel, team owners/managers, coaches, and players. For instance, league administrators and medical personnel need to be aware of factors other than the players' health that are determining their treatment plans and how the concussion protocols are being implemented. Further, administrators can implement policies that ensure all players are provided fair and equal treatment. Team owners, managers, and coaches need to protect all of their investments (not just the most valuable ones) by ensuring proper procedures are in place. Finally, players have an interest in knowing the determinants of games missed to ensure they are treated fairly, and can voice their concerns through various outlets (e.g., mediation and collective bargaining).

REFERENCES

Navarro, S. M., Sokunbi, O. F., Haeberle, H. S., Schickendantz, M. S., Mont, M. A., Figler, R. A., & Ramkumar, P. N. (2017) Short-term outcomes following concussion in the NFL: A study of player longevity, performance, and financial loss. *Orthopaedic Journal of Sports Medicine.* Advance online publication. doi: 10.1177/2325967117740847

Protecting players: NFL head, neck, and spine committee's concussion protocol overview. (2018, June 22). Retrieved from https://www.playsmartplaysafe.com/newsroom/videos/nfl-head-neck-spine-committees-concussion-protocol-overview/

Stone, E. S. (2017). The NFL concussion settlement, traumatic brain injury, and CTE: Fact, fiction, and spin doctoring. *Journal of Legal Nurse Consulting, 28*(3), 8-11.

Stites, A. (2017, January 8). How does the NFL's concussion protocol work? Retrieved from https://www.sbnation.com/nfl/2016/9/18/12940926/nfl-concussion-protocol-explained

Using Forensic Psycholinguistics to Explore the Thoughts of a Mass Murderer: A Preliminary Analysis

Hope A. Marceaux[1], Brooke O. Breaux[2], Robine Gonzalez[3], and Sara Kujawski[4]
1 University of Louisiana at Lafayette, ham9965@louisiana.edu
2 University of Louisiana at Lafayette, brookebreaux@louisiana.edu
3 University of Louisiana at Lafayette, rdg2920@louisiana.edu
4 University of Louisiana at Lafayette, sara.kujawski@yahoo.com

ABSTRACT

During the summer of 2015 in Lafayette, Louisiana, John Russell Houser committed a public mass shooting. Based on Knoll's (2012) interpretation of mass murderers, Houser's outward behaviors were most aligned with the adversarial homicide-suicide subtype. Following the crime, police officers recovered a forty-page notebook in his hotel room that contained what is presumed to be his handwritten thoughts. By conducting a preliminary content analysis of the phrases contained in Houser's journal, we sought to determine whether Houser's inner thoughts also aligned with adversarial homicide-suicide subtype. To accomplish this task, we formulated operational definitions for each homicide-suicide subtype characteristic. This preliminary analysis suggests that the phrases in Houser's journal are consistent with the adversarial homicide-suicide subtype; however, the results of this analysis raise further questions about the nature of thought. We argue that what might really matter are not the thoughts themselves but, rather, the degree to which these thoughts influence our behavior.

Key Words: Forensics, Psychology, Linguistics, Mass Murder

1. INTRODUCTION

On July 23rd of 2015 John Russell Houser at the age of 59 walked into the Grand 16 movie theater in Lafayette, Louisiana. He injured eleven and killed three, one being himself. Before arriving in Louisiana, Houser was diagnosed with bipolar disorder and was admitted into a mental institution in 2008. He was considered unstable and a threat to others by the judge on his case, but he was still given the right to buy a gun in 2014 (Associated Press, 2016). Before arriving in Lafayette, he destroyed his house, located in Phoenix City, Alabama, leaving it in complete disarray. Following the shooting, the Lafayette Sheriff's Department obtained access to Houser's journal, which was left behind in his hotel room, and made it a public record (Crochet, 2016). Reporting on this event ranges from stories focusing on the victims and families to stories focusing on the perpetrator. Although there is much reliable reporting of this event, there are also less reliable reports. Of particular interest is the story posted online at the dailymail.co.uk in which they chose to highlight portions of Houser's journal (Associated Press, 2016). The reporters focused on only sensational portions of the journal. For example, they published Houser's approval of Dylann Roof, the man who shot and killed nine African Americans in a South Carolina church. The reporters did not, however, publish Houser's list of favorite movies. There seems to be this tendency to want to see our own thinking as distinct

from those who commit heinous acts, such as murder; however, we argue that this tendency biases us to focus on differences. We ask, then, whether the language used in Housers' journal can provide insight into his "abnormal" nature.

Knoll (2012) explains that there are different types of mass murderers. Houser's outward behaviors make him a prime candidate for the adversarial homicide-suicide classification. Knoll (2012) describes an adversarial homicide-suicide mass murderer as someone who exhibits the following characteristics: "externalizing blame onto others, feeling wrong in some way, very likely to have depression and paranoid or narcissistic traits. Actual persecutory delusions may sometimes be seen. Other variants of this type include disgruntled litigants or clients. This perpetrator often uses a powerful arsenal of weapons, and has no escape planned" (Knoll, 2012, p. 763). Houser was armed with a gun, and despite having different disguises in his hotel room, chose to show up as himself. Although he may have had a plan to escape at one point in time, an article from July 24, 2015 posted on theadvertiser.com states that police officers saw Houser run out of the movie theater after shooting several individuals (The Advertiser, 2015). Upon seeing the police cars and sirens, he immediately ran back inside and fired his gun several more times. Houser's last shot resulted in his own death.

Even though these outward signs are consistent with the adversarial homicide-suicide classification, we wondered whether additional evidence for this classification could be found in Houser's journal. Forensic psycholinguistics allows researchers and investigators to use language analysis in order to better understand criminal offenders (Smith & Shuy, 2002). Many forensic psycholinguistic researchers look for subtle patterns in language that can predict particular behaviors and psychological tendencies, such as the use of absolutist words being closely associated with anxiety, depression, and suicidal ideation (Al-Mosaiwi & Johnstone, 2018). For the current study, we conducted a preliminary content analysis in which we looked for linguistic evidence in support of the hypothesis that Houser's internal state before committing mass murder was consistent with Knoll's (2012) description of the adversarial homicide-suicide subtype.

2. METHOD

2.1 Materials

This journal was found by police in John Russell Houser's Lafayette, Louisiana hotel room. The journal consists of a composition notebook with exactly 40 pages of content.

2.2 Procedure

Sara Kujawski transcribed the journal using Microsoft Word. Hope Marceaux and Robine Gonzalez then conducted a preliminary content analysis by reviewing each statement in Houser's journal and classifying them whenever possible into one or more of the following adversarial homicide-suicide trait categories: anger/aggression, externalizing blame, depression, feeling wrong in some way, paranoia, narcissism, and persecutory delusions. Operationalized definitions were used during the classification process and included symptoms provided in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM–5*; American Psychiatric Association [APA], 2013) for depression, persecutory delusions, paranoia, and

narcissism. For example, the operationalized definition for depression included feelings of hopelessness, guilt, worthlessness; thoughts of death; suicide ideation; delusional thoughts; and blame toward others with overemphasis on minor situations (APA, 2013). The operationalized definition for persecutory delusions included "the belief that one is going to be harmed, harassed, and so forth by an individual, organization, or other group" as well as the individual believing they are being obstructed in the pursuit of long-term goals, followed, spied on, or conspired against (APA, 2013, p. 87). Individuals with persecutory delusions are most likely angry and resort to violence toward the people they think are trying to hurt them (APA, 2013). The operationalized definition for paranoia was based on the DSM-5's description of paranoid personality disorder, in which a person with the disorder holds grudges, has doubts about trusting others because of loyalty issues, and believes that others are deceiving or harming them (APA, 2013). Lastly, the operationalized definition for narcissism involved looking for evidence that the author of the journal experienced fantasies, lacked empathy towards certain situations, felt special compared to others, had a sense of entitlement, and was arrogant (APA, 2013).

3. RESULTS

During this preliminary analysis, we were able to sort 66 out of 181 phrases that appeared in Houser's journal into categories that represent the traits of adversarial homicide-suicide mass murderers. In terms of frequency, we found the most evidence for the trait of anger/aggression; however, it seems that Houser was also quite likely to externalize blame onto others, experience persecutory delusions, and show signs of narcissism (see Table 1).

Table 1. Evidence of Adversarial Homicide-Suicide Traits

Trait	**Phrase Frequency**	**Example Phrases**
Anger/Aggression	27	"Great effort went into not killing my favorites, or their children" (p. 29) "It's quitin time" (p. 24)
Externalizing Blame Onto Others	15	"If the founders of this nation cold [sic] be raised from the dead they would spit on the face of them decendents [sic] for allowing evil to gain hold in the US, without objection" (p. 16) "How absurd and pervented [sic] to Cause innocents to pay for Political objectives…. Like the atom bomb" (p. 19)
Persecutory Delusions	11	"The US and Europe will explode" (p. 9) "Billions will starve" (p. 9) "In what was formerly the US & Europe common sence [sic] or logic will reemerge" (p. 9) "The Future -The US & Europe will implode" (p. 9)

Narcissism	10	"I have been exactly the same for at least forty years" (p. 15) "The US cannot afford 100 of me, and I know that many" (p. 27)
Paranoia	8	"Nowhere in the US is it safe" (p. 22) "America as a whole is now the enemy. All soft targets included" (p. 22)
Depression	7	"I am greatly ashamed of almost every memory o my life" (p. 19) "I said 'I'd kill myself, does that answer your question?'" (p. 25)
Feeling Wrong in Some Way	6	"My mother did not give me a sewing machine or urge me to play with dolls… but I do 'dare greatly'" (p. 14)

4. DISCUSSION

Through this preliminary content analysis, we encountered sufficient linguistic evidence in support of the hypothesis that Houser's internal state at the time when he wrote the journal is consistent with Knoll's (2012) characterization of an adversarial homicide-suicide mass murderer. In fact, we were able to categorize 36% of the phrases in Houser's journal as being indicative of at least one characteristic associated with this subtype. Even though this outcome is not surprising and could have very well been due to expectancy bias, one thing that really surprised us was just how many of Houser's statements we were easily able to classify into at least one of the adversarial homicide-suicide trait categories. Another surprising finding was that many of these statements, when considered individually, are not really so different from what we hear many people saying about the world today. This observation makes us question whether the thoughts of mass murderers are really so different from the thoughts of "everyday people".

Our plan for future research is to continue analyzing Houser's journal using the tools of forensic psycholinguistics. We are especially interested in looking for subtle patterns within Houser's language, such as the use of absolutist language, which might provide additional information about Houser's internal state. We plan on using programs such as WordSmith Tools (Smith, 2016) and Linguistic Inquiry and Word Count (Pennebaker, Booth, Boyd, & Francis, 2015) to conduct these analyses.

5. CONCLUSION

We conclude that there is sufficient evidence to characterize John Russell Houser as an adversarial homicide-suicide mass murderer; however, we question how much this label actually matters. Many of the phrases contained in Houser's journal sound like statements we might hear from "everyday people." That leaves us with many questions. Where is the line between a "normal" and an "abnormal" thought? Is there even such a dividing line? If there is no dividing line, does that mean that we live in a world of mass murderers? We argue that such a binary way of viewing thoughts is unlikely to be useful. It seems that what really matters are not

the thoughts themselves but, rather, the degree to which these thoughts influence our behavior. This type of position aligns with the principles underlying Acceptance and Commitment Therapy (ACT), a therapeutic approach to behavioral change in which language is considered a normal byproduct of human thoughts. DiTomasso and Gosch (2002) argue that it is the acting out on heinous thoughts, not having the heinous thoughts, that draws the dividing line between an "everyday person" and a psychopath.

REFERENCES

Al-Mosaiwi, M. & Johnstone, T. (2018). In an absolute state: Elevated use of absolutist words is a marker specific to anxiety, depression, and suicidal ideation. *Association for Psychological Science, 6*, 529-542. https://doi.org/10.1177/2167702617747074

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed). Arlington, VA: American Psychiatric Association.

Associated Press. (2016, January 13). *Trainwreck* shooter who murdered two left journal thanking 21-year old white supremacist Dylann Roof for "killing nine black people at a Charleston church." *Daily Mail.* Retrieved from https://www.dailymail.co.uk

Crochet, D. (2016, January 13). Police release grand theatre shooter's journal. *KLFY News.* Retrieved from https://www.klfy.com

DiTomasso, R. A. & Gosch, E. A. (2002). *Anxiety disorders: A practitioner's guide to comparative treatments.* New York, New York: Springer Publisher.

Knoll, J. (2012). Mass murder: Causes, classification, and prevention*. Psychiatric Clinics of North America, 35*, 757-780. https://doi.org/10.1016/j.psc.2012.08.001

Pennebaker, J. W., Booth, R. J., Boyd, R. L., & Francis, M. E. (2015). Linguistic Inquiry and Word Count: LIWC2015. Austin, TX: Pennebaker Conglomerates (www.LIWC.net).

Smith, M. (2016). WordSmith Tools version 7. Stroud: Lexical Analysis Software.

Smith, S. & Shuy, R. (2002). Forensic psycholinguistics: Using language analysis for identifying and assessing offenders. *FBI Law Enforcement Bulletin, 71*, 16-21.

The Advertiser. (2015, July 24). "That was a horrific scene." *Daily Advertiser.* Retrieved from www.theadvertiser.com

Micro-Pixe Analysis of a Chondrite

Sarah McCleskey[1], Kaitlin Boudreaux[1], Henry Udeogu[1], Armin B. De Vera[1], Naresh Deoli[1], Harry J. Whitlow[1], and Manavi Jadhav[1]

[1]Louisiana Accelerator Center, Department of Physics, University of Louisiana at Lafayette, LA 70504, C00419550@louisiana.edu

ABSTRACT

Particle-Induced X-ray Emission (PIXE) is a form of spectroscopy in which a beam of MeV-ions bombards an object to create an electron state change. Each element, even at the trace level, has a characteristic X-ray emission that can be detected and quantified. PIXE analysis can analyze a sample with minimal damage and is more sensitive than traditional energy dispersive X-ray analysis.

The present study uses quantitative Micro-PIXE elemental analysis at the Louisiana Accelerator Center, to classify and sub-classify an unknown chondritic meteorite into one of the four chondrite classes (enstatite, carbonaceous, ordinary, R, and, K-chondrites). Most chondrites remain largely unaltered since their formation in the early Solar System and this provides insight into the chemistry of its formation stages. We present some preliminary data and results from this study.

Key Words: Meteorite(s), Micro-PIXE, Chondrite(s), Spectroscopy

1. INTRODUCTION

Meteorites are pieces of asteroids, comets, meteoroids, or other planets that fall to the surface of the Earth. A meteorite can provide information on the "parent" body it originated from and its environment as it made its way to Earth. Chondrites are primitive meteorites that have remained largely unchanged for 4.56 billion years. Some of their components are amongst the oldest condensed form of matter in our Solar System (Bouvier and Wadhwa, 2010). Such meteorites are called chondrites due to the presence of spheroidal components called chondrules that are droplets of silicates. The meteorite being analyzed in this study is evidently a chondrite due to the presence of chondrules under visual inspection; the aim is to further classify this meteorite into one of the chondrite classes: enstatite, carbonaceous, ordinary, R-, and, K-chondrites and then subclassify them based on the amount of shock, thermal, and aqueous metamorphism recorded (Krot et al. 2014). When classifying a meteorite, it is essential to obtain a quantitative elemental composition of the whole meteorite and the individual minerals in it. The Micro-PIXE technique is used to obtain the elemental composition of the meteorite (e.g., Noun et al. 2013). This method is preferred because it is more sensitive to the detection of trace elements in samples compared to traditional analysis methods that use energy dispersive x-ray spectroscopy. The PIXE method is based on measuring the characteristic X-rays from the sample when a MeV-ion beam strikes it, exciting electrons in the inner shells; x-rays are emitted when these vacancies are filled. Micro-PIXE measures the X-ray signal, with an X-ray detector, at characteristic energies for all the elements present in the sample (Instrumentation for PIXE and RBS).

2. METHOD

The sample meteorite was found in Northwest Africa and obtained from a meteorite hunter. A thick section of the meteorite was mounted on an analysis mount by using carbon tape. PIXE analysis is most accurate if the sample is a thin section; however, the first analysis of the chondrite was made with a thick section. Meaning, future analyses will be done on a thin-section to produce the most accurate results. However, analyzing this preliminary data provides a good set of observations that can aid future experiments on this meteorite.

A proton beam was obtained from the 1.7 MV Pelletron accelerator at the Louisiana Accelerator Center (LAC) and focused to a spot 20 μm x 20 μm using quadrupole magnetic lenses in a so-called Oxford triplet configuration. Figure 1 shows the Micro-PIXE beamline at LAC. As the beam is scanned over the sample, the intensity and energy of X-rays emitted at the different positions of the beam allows an elemental map to be produced. The analysis of the data uses a software called GeoPIXE that uses mathematical processing to isolate the characteristic X-rays in the spectrum from each other and the background and use this to produce maps of the different elements in the sample. The spectrum calibration was done by using gold as a standard and the fitting process involves peak identification. Once the spectrum has been calibrated and fitted, an average chemical composition of the sample area can be deduced.

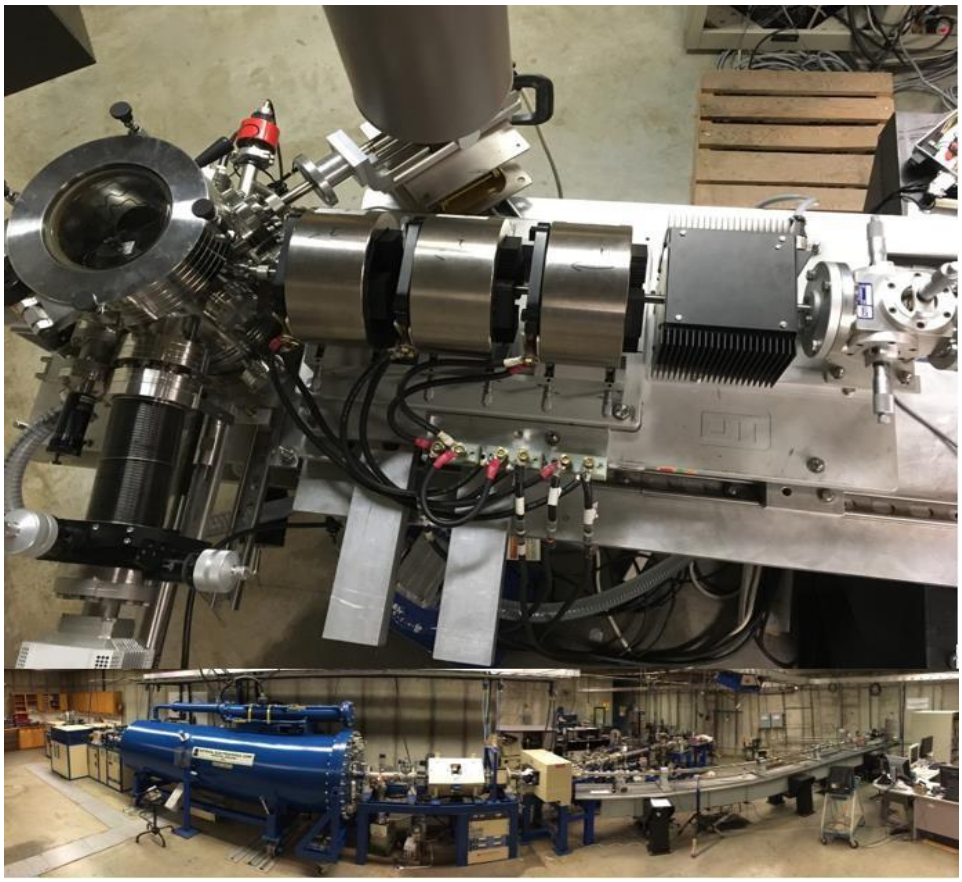


Figure 1.
A picture of the beam line at LAC.

Pictures by:
Harry J. Whitlow

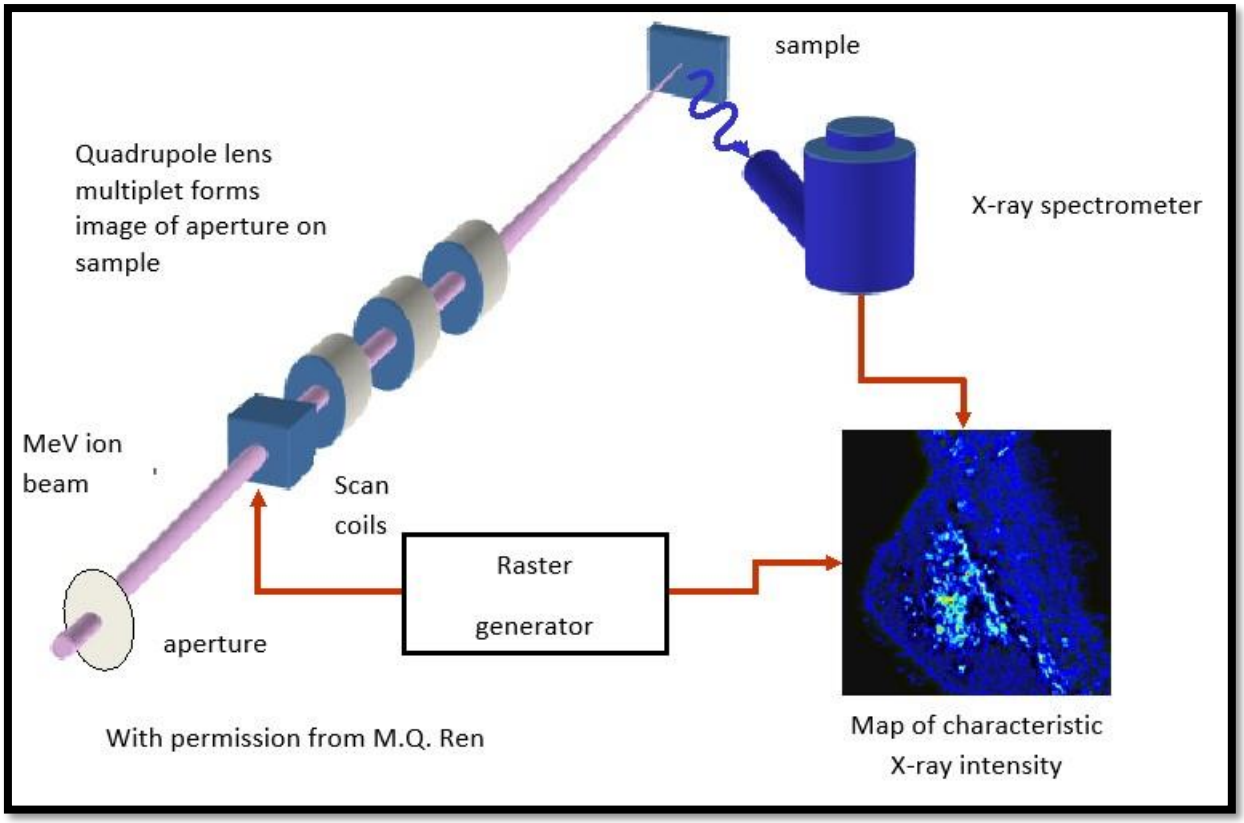


Figure 2. A schematic of the experiment.

3. RESULTS

In Figure 3, we present a preliminary x-ray spectrum displaying all the elements detected in the thick section of the meteorite sample. The spectrum was calibrated with gold and fitted to find the presence of iron, calcium, sulfur, chromium, manganese, nickel, titanium, and silicon. The red line indicates manual fitting in place of previous green lines; all remaining green lines above the purple line are recognized as background. The silicon peak needed extra adjustment and a better fitting might have been possible if the sample had been a thin section. From the preliminary data presented here, we conclude that the chondrite is iron-nickel rich and contains minerals rich in silicates.

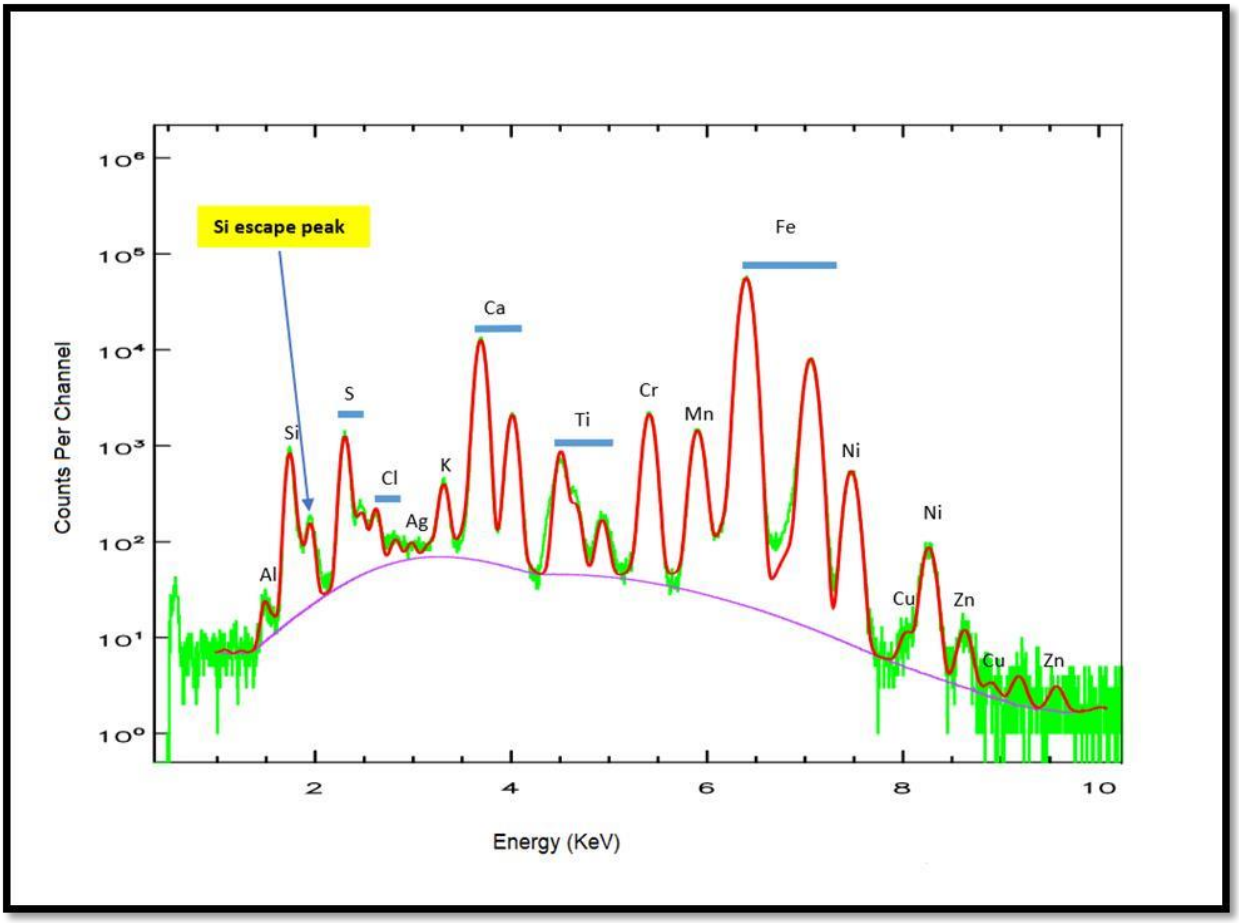


Figure 3.
A Micro-PIXE spectrum obtained on a chondritic meteorite.

REFERENCES

Bouvier, A.; Wadhwa, M. (2010). "The age of the Solar System redefined by the oldest Pb–Pb age of a meteoritic inclusion". Nature Geoscience. 3 (9): 637–641. doi:10.1038/NGEO9

Krot A. N., Keil K., Scott E. R. D., Goodrich G. A., and Weisberg M. K. (2014) Classification of meteorites and their genetic relationships. In Treatise of Geochemistry (2nd ed.) Vol. 1, 1-63

Maia GeoPIXE Software: The Standards Wizard, CSIRO Report EP155327

Noun M., Roumie M., Calligaro T., Nsouli B., Brunetto R., Baklouti D., d b L. d'Hendecourt , Della-Negra S. (2013) On the characterization of the ''Paris'' meteorite using PIXE, RBS and micro-PIXE, Nuclear Instruments and Methods in Physics Research B, 306, 261–264. http://dx.doi.org/10.1016/j.nimb.2012.12.063

International Atomic Energy Agency, "Instrumentation for PIXE and RBS", IAEATECDOC-1190, Retrieved (October 26, 2018).

Rapid Setting Cement Based Mortars Using Nano Silica

Blake McHugh[1], Jordan Perez[2], Benjamin Boyett[3], Mohamed Zeidan[4]
[1] Student, Southeastern Louisiana University, blake.mchugh@selu.edu
[2] Student, Southeastern Louisiana University, jordan.perez@selu.edu
[3] Student, Southeastern Louisiana University, Benjamin.boyett@selu.edu
[4] Assistant Professor, Southeastern Louisiana University, mzeidan@selu.edu

ABSTRACT

The research team is attempting to develop a mortar than can be used for 3D printing or automated brick laying applications. The improved performance of this mortar may be achieved by adding varying amounts of nano silica to the mixtures. The goal of the study is to obtain a mortar that has reduced set time, increased compressive strength while maintain acceptable level of viscosity/rheology. Recent studies obtained indicated that adding nano-silica to cement based mortars or concrete accelerate early crystallization of Calcium Silica Hydrate (CSH) sites, which are primarily responsible for determining mortar compressive strength and setting time. However, previous studies are also showing that nano-silica may impact the flowability and workability of these mortars. To investigate these effects, mortar and paste mixtures were prepared with varying addition rates and particle sizes of nano-silica. Flowability of mortars was evaluated using flow table test. Compressive strength of mortar cube specimens were also determined ad different ages. Moreover, cement pastes with nano-silica was tested to determine initial and final setting times using Vicat needle apparatus. In effort to improve flow, super plasticizers have been added to some mixtures containing higher rates of nano-silica particles. Compressive strength results for mixtures containing one to five percent nano silica by weight have proven to have higher compressive strengths compared to the control mixture with five percent being the highest average. However, this improvement did not continue for mixture containing higher than five percent silica. This may possibly attributed to the inability to effectively compact the mortar effectively because of low workability. Flow table results indicted decrease in workability with addition of nano-silica. However, the reduced workability was relatively lower for mixture with up to 5% nano silica. Furthermore, addition of nano-silica resulted in reduction of both initial and final setting time of cement pastes.

Key Words: Nano Silica, Colloidal Silica, Mortar

1. INTRODUCTION

Evolving technology such as robotic brick layers and 3D printing have introduced a need for faster setting mortars with relatively higher flowability for pumping. Traditional mortars are ineffective in new technology due to ranging viscosities, long setting-times, and low earlycompressive strengths. Preliminary research shows that adding colloidal silica particles to various cementitious materials typically decreases set-time and increases early compressive strength of concretes and mortars (Deamer, 2017). This study involves researching and testing viscosities, set-times, and compressive strengths of mortar mixes containing colloidal silica particles.

Colloidal silica consists of nanoscopic silicone dioxide (SiO_2) particles that have been presuspended in liquid using ultrasonic mixing techniques. When added to a cement-based mixture, silicone dioxide particles react with calcium hydroxide (pozzolanic reaction) in cement matrix to produce Calcium Silicate Hydrate gel (CSH). CSH gel sites are active crystalline structures that ultimately determine the strength of the mix. As cementitious mixtures harden, CSH gel sites expand and multiply, which leads to direct correlation between compressive strength and time. Additionally, previous studies reported that the small particle size of nano-silica provides a larger surface area, which speeds up the rate of both cement hydration and pozzolanic reactions (Belkowitz and Armentrout, 2009). The improvement in the hydration combined with the filler effect of nano-silica resulted in improved early strength and micro structure of concrete (Said et al., 2012)

2. RESEARCH DESIGN

All tests performed in this study follows ASTM standard testing practices for hydraulic mortars to ensure consistency in the mixes, and comparability to other research studies. All mixtures composed of water, sand and cement with a fixed water to cement of 0.49. However, the mixing water was reduced for mixtures incorporating nano-silica to compensate the water in the colloidal silica suspended solution. Nano-silica was added with the rates of 1%, 2%, 5% and 8% of cement by mass. A commercially available nano-silica labeled as Cembinder 8 (C8) was used in this study. The suspended solution is composed of 50% solid nano-silica by weight with an average particle size of 35 nm. Table 1 shows the proportions for the used mixtures.

For each mix, at least 9 cubes (2″×2″×2″) were prepared and cured to determine compressive stress. Compressive strengths of each mixture were measured at 1, 7, and 28day intervals according to ASTM C109. Workability of the mixture were determined just after mixing using the flow table test (ASTM C 230). Cement pastes were also prepared to include similar rates of nano-silica as those shown in Table 1. These pastes were used to determine the initial and final setting times for cement using the Vicat needle test, ASTM C 807.

Table 1. Mixtures proportions

Mix	Cement (g)	Sand (g)	Water (g)	NS_C8 (g)
Control	826	2,273	401	0
1%NS	818	2,273	393	16.53
2%NS	810	2,273	384	33.06
5%NS	787	2,273	362	78.50
8%NS	765	2,273	340	122.56

3. RESULTS

At each testing age, the average compressive strength of at least 3 cubes were calculated for each mixture. The results of the average compressive strengths are shown in Figure 1 and Table 2. The percentage average flow diameter as determined from flow table test for all the mixture is shown in Table 3. The results of setting time for all the mixtures except the 8%NS are presented in Table 3 as well.

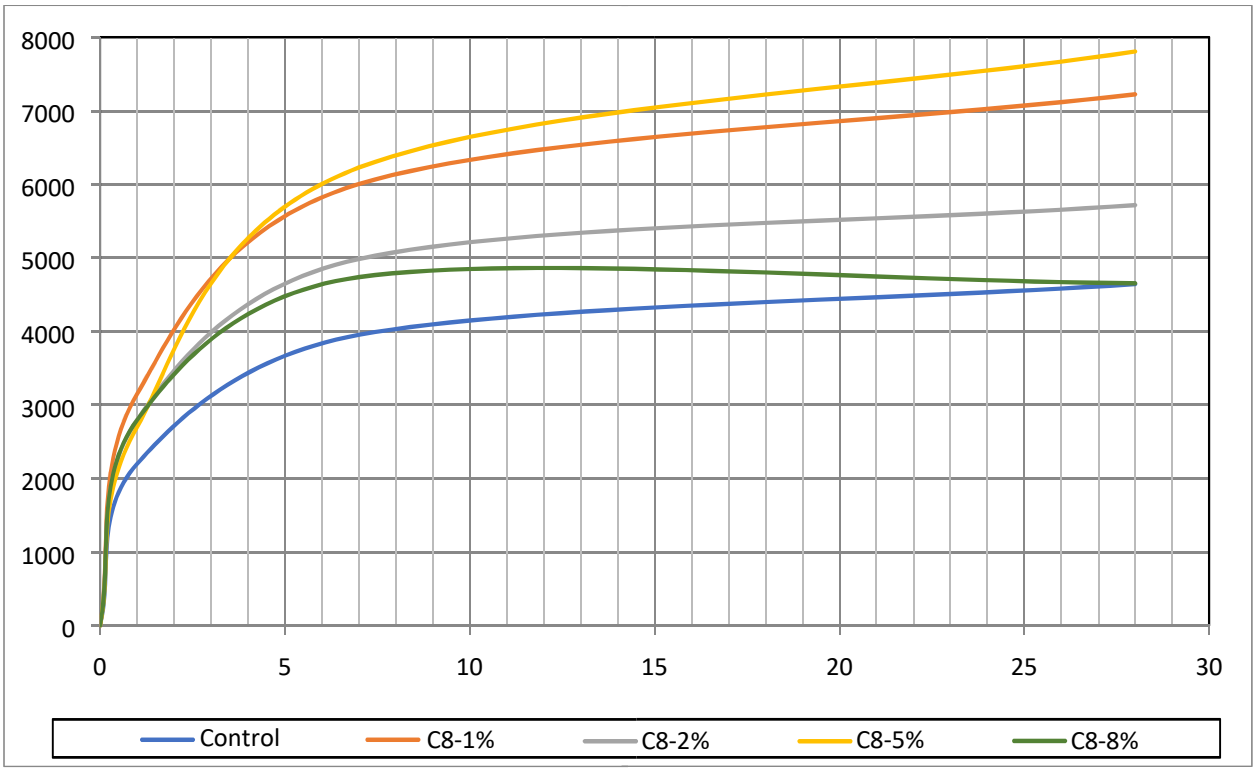


Figure 1. Compressive strength along the curing time.

Table 2. Average compressive strength at different ages.

	1 Day	7 Days	28 Days
Control	2,198 psi	3,953 psi	4,642 psi
1% NS	3,147 psi	6,002 psi	7,222 psi
2% NS	2,794 psi	4,984 psi	5,716 psi
5% NS	2,701 psi	6,226 psi	7,805 psi
8% NS	2,793psi	4,738 psi	4,653 psi

Table 3. Setting times and Flowability

	Initial Set	Final Set	Flowability
Control	125 min	170 min	126.6%
1% NS	115 min	155 min	114.1%
2% NS	107 min	152 min	117.2%
5% NS	84 min	134 min	91.4%
8% NS	N/A	N/A	66.4%

4. CONCLUSION

Results from this study agree with similar findings. The addition of SiO_2 particles in cementitious mixtures increase compressive strengths up to a certain percentage. This research shows that mixtures containing greater than five percent silica by weight of cement have an adverse effect on the mix's compressive strength. This is possibly due to the low workability of the mortar causing large air gaps in the molds. Flowability continues to decrease from zero to 8 percent silica, and setting times are still being determined. The most promising results in the study have been with the five percent mix. Additional research is currently being gathered with that mixture with super plasticizing agents in effort to increase the flowability.

REFERENCES

American Society for Testing and Materials, ASTM C 109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars, Annual Book of ASTM Standards, V. 04.01, 2008.

American Society for Testing and Materials, ASTM C 230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement, Annual Book of ASTM Standards, V. 04.01, 2014.

American Society for Testing and Materials, ASTM C 807, Standard Test Method for Time of Setting of Hydraulic Cement Mortar by Modified Vicat Needle, Annual Book of ASTM Standards, V. 04.01, 2018.

Belkowitz J, Armentrout DL. The Investigation of Nano Silica in the Cement Hydration Process. ACI Special Publication. 2009;SP267-08:87-100.

Deamer, K. (2017, March 7). This House was 3D Printed in Less Than 24 Hours. Retrieved February 19, 2018, from https://www.livescience.com/58156-3d-printed-house-built-in lessthan-a-day.html.

Said, A. M., Zeidan, M. S., Bassuoni, M. T., & Tian, Y. (2012). Properties of concrete incorporating nano-silica. Construction and Building Materials, 36, 838-844.

Effects of Stereoscopic 3D on Video Game Performance

Seth P. Miley[1], Matthew S. Boudreaux [2], and Arun K. Kulshreshth[3]
1 School of Computing and Informatics, University of Louisiana at Lafayette, sethpaynemiley@gmail.com
2 School of Computing and Informatics, University of Louisiana at Lafayette, matthew.s.boudreaux@gmail.com
3 School of Computing and Informatics, University of Louisiana at Lafayette, arunkul@louisiana.edu

ABSTRACT

It has been shown that playing games in 3D stereo does not provide any significant performance benefits than with using 2D display. However, most previous studies used games that were not designed with stereoscopic 3D viewing in mind. In addition, the past studies used self-reported data (excitement level, sense of engagement, etc.) to measure user experience. We studied several games that were optimized for stereoscopic 3D viewing and used EEG and heart rate sensors to better gauge the user's experience with these games. Using a stereoscopic 3D display and a pair of shutter glasses, we examined five games, each representing a specific game genre and each having been designed for stereoscopic viewing. We measure quantitative and qualitative data for each game to determine if the experimental group (using stereoscopic 3D display) had a better gaming experience compared to the control group (using monoscopic display). Our preliminary results indicate that Stereoscopic 3D does provide benefits in tasks where depth information is useful for the game task at hand.
Key Words: Stereoscopic 3D, Video Games, Human Computer Interaction, User Study

1. INTRODUCTION

Stereoscopic 3D technology has been around for decades and been found to be beneficial depending on the task involved. Much of the research to date has focused on simple, isolated tasks in virtual environments, and there has been very little research involving more complex tasks and richer graphical environments, such as games. Thus, it is still unclear whether playing games in stereoscopic 3D has any effect on user performance or experience. Do users gain a performance advantage when using stereoscopic vision? We hope that by understanding these performance benefits we can gain some insight into how to make games more enjoyable and help users play them more effectively.

Litwiller and LaViola [1] explored benefits of 3D stereo in modern PC based games using the Nvidia 3D Vision Kit. No significant advantage was found in user performance over a 2D display. Another study [2] showed that interacting with a spatial 3D interaction device in 3D tasks can lead to a better user experience. We hypothesize that the task at hand is what determines the benefits rather than the interaction device used; therefore, we chose games with varying tasks as part of our research study. In addition, the past studies were using selfreported data (excitement level, sense of engagement, etc.) to measure user experience. We used EEG and heart rate sensors (see Figure 2) to better gauge the user's experience with stereoscopic 3D

games. The EEG device translates brain activity to level of stress and the heart rate will tell us the level of excitement according to their BPM (beats per minute).

2. SELECTING GAMES FOR THE STUDY

For this study, we needed a gaming environment that was optimized for stereoscopic 3D viewing. For this task, we chose the Nvidia 3D vision system, which consists of a computer with a Nvidia graphics card, a supported 3D display, and Nvidia 3D vision shutter glasses.

Selection of game candidates began with cross selecting from Nvidia's official list of 3D Vision supported games and highly recommended games from related Nvidia forums. Our list of prospective games initially contained 48 candidates which had either a high community rating, or a Nvidia rating of "Excellent". After rigorous testing, we rejected games with undesirable performance with stereoscopic 3D and games which had similar game tasks. We ended up with five suitable games (see Figure 1) with different interactions tasks: Batman Arkham City, Dishonored, Left 4 Dead, Microsoft Flight Sim X, and Portal 2.

(a) Batman Arkham City

(b) Dishonored

(c) Left 4 Dead 2

(d) Microsoft Flight

(e) Portal 2

Figure 1(a-d). Screenshots of the games used in this research study

3. USER STUDY DESIGN

We conducted a usability experiment with the previously stated five PC games, where participants played each game in either 2D or 3D viewing mode, using a wireless Xbox One game controller. We examined both quantitative metrics based on each games' goals and tasks and qualitative metrics based on participant enjoyment and whether they felt they perceived any benefits. We also collected additional data using an EEG device and heart rate monitor. We chose a between-subjects design, to avoid any effects of learning on user performance, where the independent variable is the display mode (2D or 3D) and the dependent variables are the various scoring metrics used in each game (see Table 1). To group the participants into expertise levels (beginner and expert), we scored them on a gaming experience questionnaire [3] given before the experiment.

For each game, the participants has to play through a preselected level and the data recorded for each game is summarized in Table 1 below.

Table 1. Game Scoring Metric

Game	Metric
Batman Arkham City	Number of flights Number of Deaths Number of checkpoints
Dishonored	Number of times spotted Number of enemies incapacitated Number of deaths
Left 4 Dead 2	Number of enemies killed Number of deaths
Microsoft Flight	Number of gates passed Number of crashes
Portal 2	Number of Portals Number of deaths

The experiment begins with the participant seated in front of the display and the moderator seated aside. Participants are given a standard consent form explaining the study and a questionnaire on gaming experience. The moderator puts the EEG device and heart rate tracker on the participant and presents the games in random order. Half the participants play the games in 2D (control group) and the other half play in 3D (experimental group), each divided between beginner and expert skill level. The moderator presents the games and gives instructions on what goals must be accomplished, as well as of the controls and mechanics. During the experiment, the moderator records quantitative data using scores from the games. After each game the participant fills out a post-questionnaire with information about their experiences with the game. If the participants played the five games in the 2D display group, they then select one game to play in 3D stereo. All participants are given a final postquestionnaire about their experiences.

Figure 2. Experimental setup with 3D display, 3D glasses, Xbox game controller, Emotive EEG Device and a heart rate tracker.

4. RESULTS AND DISCUSSION

To analyze the performance data, a two-way ANOVA was conducted that examined the effect of game-play expertise (EXP), beginner or expert, and the display mode (DM) on the user performance. We did a post-hoc analysis using independent sample t-tests. To analyze this Likert scale data, we used the Mann-Whitney test. For all our statistical measures we use $\alpha = 0.05$.

This work is under progress. We still need to run the user study with about 50 participants (25 in 3D group and 25 in 2D group). So far, our pilot study with five participants show promising results. Overall, we noticed that participants in the 3D group performed better in Batman Arkham City, Left4Dead 2 and Portal 2 game, and the performance for the other two games was similar to 2D group. Participants preferred playing games in 3D over 2D. We found that, on average, participants in the 3D group had lower levels for stress (based on EEG data) and higher pulse rates (based on heart rate tracker data). This indicates that playing games with stereoscopic 3D was less stressful than 2D. Higher pulse rates show higher levels of excitement with stereoscopic 3D games.

5. CONCLUSIONS

We studied five stereoscopic 3D games, each representing a specific game genre, and each having been designed for stereoscopic viewing. We measured quantitative and qualitative data for each game to determine if the experimental group (using stereoscopic 3D display) had a better gaming experience compared to the control group (using monoscopic display). We also used an EEG and a heart rate sensor to better gauge the user's experience with these games. Our preliminary results indicate that Stereoscopic 3D does provide benefits in tasks where depth information is useful for the game task at hand. Participants in the stereoscopic 3D group were more exited and less stressful compared to the 2D group.

REFERENCES

[1] Joseph J. LaViola, Jr. and Tad Litwiller (2011). Evaluating the benefits of 3d stereo in modern video games. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '11). ACM, New York, NY, USA, 2345-2354.

[2] A. Kulshreshth, J. Schild, and J. J. LaViola Jr (2012). Evaluating user performance in 3D stereo motion enabled video games. In *Proceedings of and the International Conference on the Foundations of Digital Games*, New York, NY, 33-40

[3] C. Jennett, A. L. Cox, P. Cairns, S. Dhoparee, A. Epps, T. Tijs, and A. Walton (2008) Measuring and defining the experience of immersion in games, *International Journal of Human-Computer Studies* 66, 9, 641-661.

Morphology Effects of Nanoparticle Structure on Nanohybrid Shish-Kebab Architecture of PE-b-PEG Interfacial Crystallization

Padma N. Pellegrin[1], Nina Collazos[1], Tuan Lee[1], Arafat Noor[1], Ramalingam Subramaniam[1], Dilip Depan[1]*

*1 Chemical Engineering Department, University of Louisiana at Lafayette, *ddepan@lousiana.edu*

ABSTRACT

Crystallization of co-polymers on various nanoparticles has resulted in the development of novel nanohybrids with improved thermos-mechanical properties. The ultimate structure of the nanohybrid and its properties largely depends on the shape/size and geometry of the nucleating agent. Moreover, the chemical structure of the nucleating agents can affect the interactions with the polymer. Herein we report a simple, rapid, yet facile method to fabricate nanohybrids using various nanoparticles. Organic nanoparticles such as carbon nanotubes, graphene, and carbon nanofibers were used to crystallize a copolymer of poly (ethylene-b-polyethylene glycol). Clay, organo-modified clay, and tubular halloysite was also used to induce heterogeneous crystallization of this copolymer. Carbon nanotubes (CNTs) and carbon nanofibers (CNFs) primarily give a unique nanohybrid shish-kebab (NHSK) architecture, due to their tubular structure and favorable chemical structure. On the other hand, inorganic clay-based nanoparticles generated a globular stacked and intercalated structure. The final morphology of crystallized polymer was found to result from the competition between geometrical confinement and favorable chemical structure of the nucleating agent. This work shows a promising approach towards generating polymer crystals of tunable properties.

1. INTRODUCTION

When block copolymer (polyethylene-b-polyethylene glycol) (PE-b-PEG) is crystallized directly onto nanoparticles, it possesses the potential to form a variety of structures which depend on a multitude factors, such as structure of the nanoparticles, crystallization time, undercooling temperature, polymer concentration, solvent selection, etc. The study of polymers and filler nanocomposites has gained much attention in recent years, having applications ranging from industrial to biomedical. Once functionalized, nanoparticles provide an optimal surface which copolymers can crystallize on and around, leaving a rough nanoscale surface behind. The structural morphology of polymer crystals can be engineered in numerous ways via parameter manipulation; however, the most basic characteristics of the finalized product depend primarily on the original structure of the nucleation surface provided. Studying the physical and chemical morphology of different polymer and filler combinations yields indication that, even though the products are structurally similar, crystallization architecture varies even with forms of nanostructured carbon such as carbon nanotubes (2nm), graphene, and carbon nanofibers (100nm). The use of clay, modified clay, and halloysite clay as nucleation templates yields an entirely separate transfiguration of co-polymer crystallization, while still exhibiting some form of the desired product structure. Each nanoparticle promotes and alters polymer crystallization in a

unique way dependent upon physical structure of the nanocomposite and the dispersion forces involved.

2. METHOD

The process for developing the shish-kebab structure begins with sonication of the nanoparticles being utilized. The nanoparticles are sonicated in toluene; the volume of this solvent is varied depending upon the desired solution concentration. Several nanoparticle types have been used for the surface on which crystallization occurs with the PE-b-PEG copolymer, including Carbon Nanotubes (2 nm), Carbon Nanofibers (100 nm), Graphene, Clay, and Modified Clay. The shape and composition of each nanoparticle uniquely affects the crystallization process. While the nanoparticles are being sonicated, the PE-b-PEG copolymer is melted by heating for 60 minutes at 120°C in toluene. The sonicated nanoparticles and melted co-polymer are then combined in one flask which is heated at 80°C for sixty minutes, during which time crystallization takes place. The one-hour time interval ensures that the desired shish-kebab structure will have ample time to develop fully, while ensuring that the structure will not be overdeveloped. During the crystallization process, the copolymer coats the nanoparticle strands to form the desired crystallized structure. The large surface area of the nanoparticles serves as a structured template for co-polymer crystallization. This process transforms the copolymer and nanoparticles into a stable nanocomposite material than can be used in biomedical applications.

The shish-kebab structure will form differently depending on the nanoparticle being used. The tubular structure, curved surface, and large surface area of carbon nanotubes provide a suitable surface for polymer crystallization into the NHSK structure. Carbon nanofibers have the same advantages as carbon nanotubes but are much larger. Graphene, while similar in chemical composition to the carbon nanotubes and nanofibers, possesses a sheet-like structure. Other nanoparticles used are modified clay and clay, both of which have a stacked structure which allows for several layers of crystallization. The crystallization mechanism on these various surfaces is vastly different, yet each finished product still presents as a shish-kebab structure of some kind.

3. CONCLUSION

The overall purpose of this research is to develop a steady product that can actively be used in biomedical applications to promote cell growth. While varied application of nanoparticles and polymer crystallization yield different tunable structures, nanoparticles with a tubular microstructure tend to yield the best crystallized product for use in various biomedical applications. Further research must continue in order to find the best possible combination of polymer and nanoparticle to one day use in biomedical applications.

Use of Plant Growth-Promoting Rhizobacteria (PGPR) as Biofertilizers on Common Garden Plants of Southeast Louisiana

Claire Pierce and Raj Boopathy
Department of Biological Sciences, Nicholls State University, Thibodaux, LA 70310

Plant Growth Promoting Rhizobacteria (PGPRs) are bacteria that colonize the root system of plants and enhance plants' growth. This enhancement is attributed to the bacteria's participation in a symbiotic relationship with the plant in which the bacteria provides nutrients to the plant, and the plant provides a suitable environment for the bacteria to reside in the root nodule and in rhizoshpheric soil. PGPR's influence on the rhizosphere can affect the nutrient availability, nutrient uptake, and presence of other, potentially harmful, microbes.

There is presently an emerging global demand for higher crop yields to maintain a growing population (Pii et al. 2015). This, in turn, produces a demand for more efficient and sustainable methods of facilitating plant growth. Though not yet economically viable, use of PGPRs as biofertilizers holds potential to have significant effects on plant growth and yield with fewer attributed environmental repercussions than the alternatives. An example of this is the overuse of commercial fertilizers. Though the use of commercial fertilizers has increased throughout the years, plant growth has not increased proportionally (Zhang et al. 2010). The release of these nutrients into the environment without a present means of uptake leads to substantial environmental consequences. Further development and implementation of PGPR biofertilizer techniques may someday contribute to a reduction in the harmful byproducts of monoculture farming by offering an alternative, less environmentally taxing means of increasing plant yield.

In this study, we implement a method of isolating potential PGPRs and assessing their biofertilizer potential. This process could produce PGPRs that are specialized to the environment in which they are collected from and could therefore work more efficiently if implemented in that same environment.

Table 1. Identification of isolated cultures by Biolog GEN III Protocol A

Isolate Number	Identification by Biolog GEN III Protocol A	Probability	Type
1	*Alcaligenes faecalis ss faecalis*	0.887	GN-NEnt
2	*Providencia rettergi*	0.996	GN-Ent
3	*Citrobacter werkmanii*	0.726	GN-Ent
4	*Citrobacter freundii*	0.946	GN-Ent
5	*Citrobacter werkmanii*	0.660	GN-Ent

Four unique rhizobacteria (Table 1) were isolated from soil originating from an established garden in Southeast Louisiana and identified using BIOLOG protocol A. The

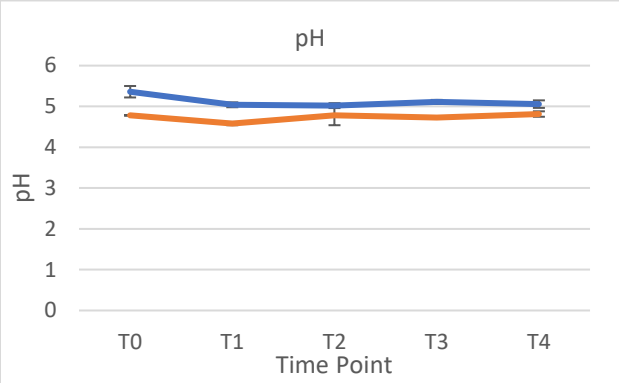
Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

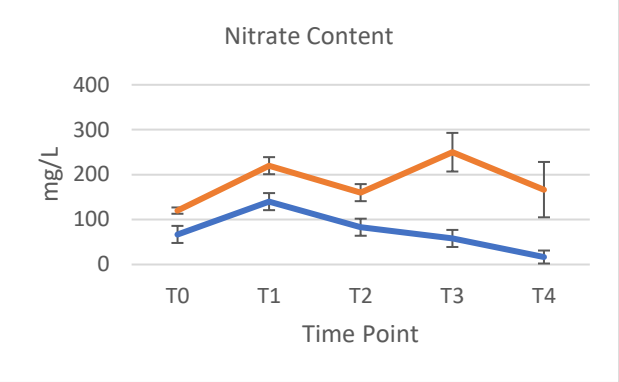
collected soil was incubated for 7 days in TSB media. The inoculant was then streaked onto a TSA plate and incubated for 24 hours. Single bacterial colonies were transferred to individual aliquots of TSB. After incubation, these pure cultures were each streaked onto a Biolog universal growth (BUG) agar with 5% sheep blood plate and incubated to form distinct colonies. Colonies were added to a tubes of inoculating fluid (IF-A) to a 95% turbidity. Biolog GEN III MicroPlates were inoculated with the IF-A, incubated, and read using the Microbial Identification Systems software (Biolog, 2016). Each species was researched to assess their potential to have plant growth promoting effects. Aliquots of each isolate were added to TSB to create a bacterial consortium.

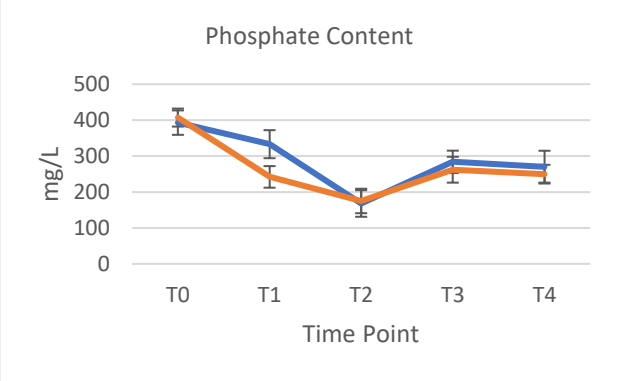
A four week-long greenhouse trial was initiated to assess the extent of the PGPR abilities of the consortium. Bush green bean plants (*Phaseolus vulgaris*) were grown in soil inoculated with the consortium. The pots of soil were grouped into the bacterial consortium inoculated soil test group (BCT), the non-autoclaved soil control group (NASC), the autoclaved soil control group (ASC), and the TSB media inoculated soil group (TC). Each group was made in triplicate. Upon initiation of the trial (T0), the first treatment was administered. This first treatment consisted of inoculation of BCT with the consortium, TC with the TSB media, and ASC and NASC with DI water. Subsequent treatments were administered on a bi-weekly basis and consisted of only DI water being added to all groups. Samples of soil were collected on a weekly basis. Through the analysis of these soil samples, the soil pH, nitrate, phosphate, and ammonia content were determined (Fig 1). After the 4 weeks of growth, the plants were removed from the soil, and the root length and shoot length were measured. The plants were dried to measure the total biomass (Fig 1).

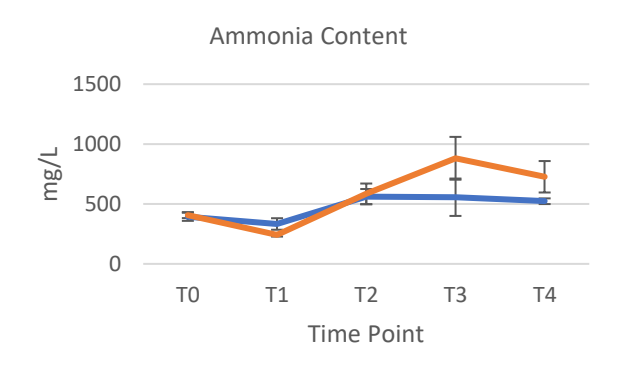
The soil analysis showed the PGPR treated soil contained significantly higher amounts of ammonia, nitrate, and total heterotrophic bacterial counts compared to the controls (Fig 1). This will have significant impact on plant growth and biomass. The root length, shoot length, and total biomass were also significantly higher in in the PGPR treated soil as compared to the controls, which affirms that there was a significant impact on plant growth. These results support the biofertilizer potential of the consortium of isolated bacteria and, to some extent, the efficacy of the method of isolation and inoculation.

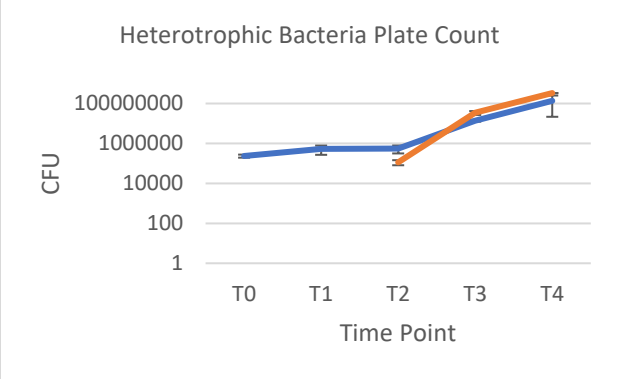
Key Words: PGPR, Rhizobacteria, Biofertilizer, Biolog

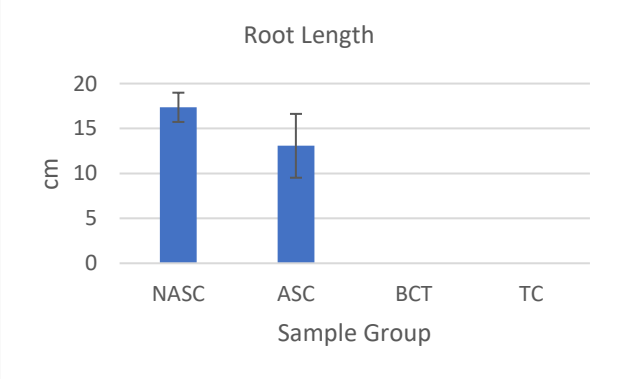












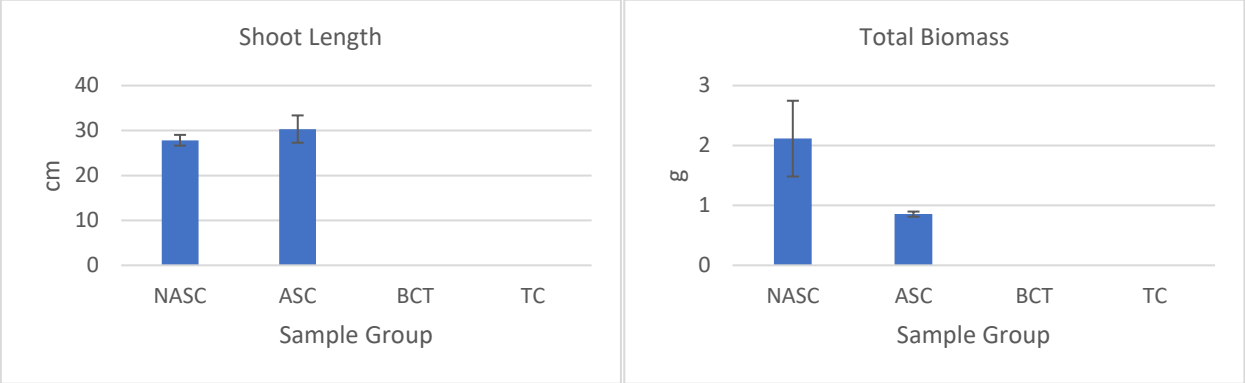


Figure 1. Graphs of pH, nitrate content, phosphate content, ammonia content, and heterotrophic bacteria plate count are composed of data collected from weekly soil analyses. Blue lines depict NASC; orange, ASC; gray, BCT; yellow, TC. Graphs of root length, shoot length, and total biomass are composed of data collected from plants at T4.

REFERENCES

Biolog. (2016). GEN III MicroPlate: Instructions for use. Hayward, CA: Biolog. Retrieved from http://208.106.130.253/pdf/milit/00P_185_GEN_III_MicroPlate_IFU.pdf

Pii Y, Mimmo T, Tomasi N, Terzano R, Cesco S, Crecchio C (2015) Microbial interactions in the rhizosphere: beneficial influences of plant growth-promoting rhizobacteria on nutrient acquisition process. A review. Biol Fertil Soils 51:403–415

Zhang F, Shen J, Zhang J, Zuo Y, Li L, Chen X (2010) Rhizosphere processes and management for improving nutrient use efficiency and crop productivity: implications for China, 1st ed. Adv Agron 107:1–32

Measuring Moral Panic: Is Fear Based News Shaping our Behavior?

Hannah Pipes[1], Kaitlyn Thompson[2], Dr. Michelle Jeanis[3]
1 University of Louisiana at Lafayette, SPRUCE Lab, C00268278@Louisiana.edu
2 University of Louisiana at Lafayette, SPRUCE Lab, kst5607@louisiana.edu
3 Criminal Justice Department, Supervising Faculty, University of Louisiana at Lafayette, mjeanis@louisiana.edu

ABSTRACT

The media has a tendency to shape the behavior of the general public. The content of media coverage is a key variable in resulting behaviors of media followers. Media coverage on serial killers, referred to as fear-based media, has the power to inspire moral panic and shape the behavior of viewers. The details presented, length of media coverage and the amount of exposure the public has to the coverage are influential factors of public behavior. This study is designed to measure how serial killers are talked about in the media and if the content of media coverage has changed over time. This study also measures the connection between fear based media and google trends of fear related terms. Preliminary results of the study suggest that not every serial killer receives the same amount of media coverage as a result of the characteristics of the killer and the case.

Key Words: Serial Killer, Moral Panic, Trends, Fear- Based News

1. INTRODUCTION

The media holds potential for a vast impact on the current climate of the public and related human behaviors (Lyon, 2009). When serial killers are portrayed to the public, the media's goal is to incite mass interest (Haggerty, 2009). Coverage of serial killers have historically sparked moral panic which is defined by Jewkes (2015) as occurring when the media incites panic through the coverage of a somewhat ordinary event and turns it into an extremely rare and extraordinary event. Tactics utilized to achieve this are achieved through magnification of fear and connecting unlinked crimes to the current crime, demonizing offenders or groups of individuals, and offering little reassurances to the public (Picart, 2003).In the 1990s, serial killers were a hot topic in the media, often framed as moral panics (Jewkes, 2015; however, recent news media is dominated by terrorism and mass shootings. A primary goal of this study is to identify how news media discusses serial killers and if this has changed over time.

This study also aims to examine the potential effects of social media on human behavior. Primarily, this research project aims to identify a correlation between media coverage of serial killers and internet searching behavior. In order to achieve this goal, Google trends data is examined to identify trends in searching behavior over time. Security searches are examined to identify variation in relation to the amount of serial killer news coverage in an area at the time.

2. METHOD

Through the use of NewsBank, this study is analyzing how serial killers are viewed in the media. Approximately 140 serial killer cases (US only) from 2004-2013 are included in this search for

media articles. With each case, the offenders name, race, number of victims, birthplace, job, and other factors are documented and organized to create a comprehensive database. Each news article related to the case is also collected and coded on a host of variables related to news framing, moral panic components (demonization of the offender(s) or places), and fear based media (magnification of fear, linking to other cases) This allows for the characteristics and terminology of newsworthiness articles to be examined in-depth. Phase two of this project analyzes Google trends related to security based search terms (home defense, self-defense, gun ownership) in each city/state the offender was active in, in order to determine how that contributes to the public's fear of these cases as well as how high profile cases exacerbate this relationship.

3. OUTLOOK

Preliminary results suggest that all serial killer cases do not receive the same amount of coverage. This relationship may vary by the characteristics of the case, as well as the offender. Terminology used to discuss the offender varies greatly case by case. Although additional analyses are still being conducted, this study seeks to find a relationship between exposure and searching behavior on the internet.

4. DISCUSSION

The results will reveal which characteristics in serial killer cases receive more media attention and how news media attention of serial killer cases varies over time. This study examines characteristics of moral panic framing, terminology, and phrases used, such as “evil” when talking about serial killers, as well as magnification of fear and case linkage. It also examines the depth of coverage and frequency of coverage for each case, thus allowing for analysis of characteristics that shape framing methods and exposures. The idea that media has the potential to shape our behavior is an understudied topic; especially in regards to high profile cases such as serial killers. This study has the potential to identify correlational relationships between media coverage and internet searching behavior, thus furthering the discussion on the role of news media in human behavior. At its conclusion, this project will allow for a continued examination of the power of the news to shape human behavior.

REFERENCES

Haggerty, K.D. (2009). Modern serial killers. *Crime, Media, Culture,5.* doi: 10.1177/1741659009335714

Jewkes, Y. (2015). *Media & Crime* (3rd ed.).Thousand Oaks, CA: SAGE

Lyon, R. (2009). Media, race, crime and the punishment: Reframing stereotypes in crime and human rights issues. *Media, Race, and the Death Penalty, 58.* Retrieved from https://via.library.depaul.edu/cgi/viewcontent.cgi?referer=https://scholar.google.com/&httpsredir=1&article=1230&context=law-review

Picart, C.J. (2003). The compulsion of real/reel serial killers and vampires: Toward a gothic criminology. *Journal of Criminal Justice and Popular Crime, 10.* Retrived from https://www.albany.edu/scj/jcjpc/vol10is1/picart.html

Can Mental Health Labels Change the Way People Think About Someone with Anorexia Nervosa?

April Pruitt[1], Kelsey Mayes[2], Ainsley Ellis[3], and Brooke O. Breaux[4]
1 University of Louisiana at Lafayette, anp8183@louisiana.edu
2 University of Louisiana at Lafayette, kxm9358@louisiana.edu
3 University of Louisiana at Lafayette, ace6772@louisiana.edu
4 University of Louisiana at Lafayette, brookebreaux@louisiana.edu

ABSTRACT

Previous research suggests that the ways in which we describe people experiencing mental health issues can affect the way that others think, feel, and behave toward that person. Although mental disorders, such as schizophrenia, have been well explored (e.g., Read, Haslam, Sayce, & Davies, 2006), we were interested in investigating the mental health labels that are often associated with anorexia nervosa. More specifically, we ask whether the label selected to describe someone who meets the DSM-5 criteria for anorexia nervosa really affects how others perceive that person. We selected the labels *mental illness*, *mental disorder*, *anorexia*, and *issue* and conducted an online experiment in which college students were asked to read a story written by a female college student about her female roommate. Participants were then asked to answer questions posed by the female college student, and their answers to each question were analyzed using a between-subjects ANOVA. Even though the evidence suggests that not all perceptions were influenced by the particular label, there were several questions in which responses differed systematically depending on the label being used. Based on this data, we argue that a simple difference in label can change the way people think or feel about a person being described by that label; however, these difference are sometimes subtle and were not found in response to every question.

Key Words: Mental Health, Psychology, Linguistics, Anorexia

1. INTRODUCTION

Researchers have observed that anti-stigma programs tend to focus on describing mental health issues as *disorders*, *illnesses*, or *diseases* and tend to promote the idea that their causes are primarily biological in nature (Read, Haslam, Sayce, & Davies, 2006). Although these programs are designed to reduce negative attitudes, a survey of the relevant peer-reviewed literature found that labeling schizophrenia as a mental illness and promoting a bio-genetic causal explanation were consistently tied to negative attitudes, such as perceptions of the person with schizophrenia being dangerous and unpredictable and the participants responding with fear and a desire to increase their social distance (Read et al., 2006). We wondered whether similar patterns might be found for people diagnosed with anorexia nervosa (AN). Geerling and Saunders (2015) evaluated college students' perceptions of people with anorexia nervosa and major depressive disorder (MDD) as well as the stigma associated with these mental illnesses. Participants in this study were all female. They were randomly assigned to read one of four vignettes describing a female exhibiting symptoms of mild MDD, severe MDD, mild AN, or severe AN and answer questions about their cognitive attributions, emotional

reactions, and behavioral dispositions. Participants were more likely to attribute AN to vanity and self-responsibility. Furthermore, the mild AN target was most admired while the severe AN target generated the most anger. Across both MDD and AN participants were most likely to attribute the disorder to biological factors when severe symptoms were described. Overall, sympathy was the most endorsed emotional response. Our contribution to this area of research, then, is to determine whether a simple difference in the way someone labels the behaviors associated with AN can change the way people think about a person when all the information they are given about the person indicates that they meet the DSM-5 criteria for AN.

2. METHOD

2.1 Participants

A total of 99 students enrolled in at least one psychology course at the University of Louisiana at Lafayette completed this study via SurveyMonkey.com. Of those 99, six were eliminated from further analysis because they were either non-native English speakers (n = 4), they did not consent to the study (n = 1), or they did not list three characteristics from the story to show that they read the story (n = 1). This left 93 participants. The average age of participants was 19.9. Approximately 67% of our sample were females. The majority of our participants were freshman (62%). In terms of colleges, 29% were in the College of Liberal Arts and 71% were in other colleges. Within the College of Liberal Arts, 56% were psychology majors.

2.2 Method

Each participant read a short vignette about a fictional female, whose behavior meets the DSM5 criteria for anorexia nervosa, as described by her roommate. Participants then responded to a series of questions posed by the roommate. The experiment was administered as a betweensubjects design with four conditions. The only thing that differed across conditions was the label used by the female college student to describe her roommate in the first question following the blog post: “Do you think she has a(n) X?” such that “X” was replaced with the term *mental illness*, *mental disorder*, *anorexia*, or *issue.* There were two types of questions: ones in which participants responded with a point along a continuum that ranged from “0 (Probably not)” to “100 (Probably so)” and ones in which participants responded by selecting choices from the options provided and/or generating their own answers.

3. RESULTS

3.1 Ratings Data

To address our original hypothesis, we conducted a one-way ANOVA for each question with a continuous response rating to determine if a simple difference in label was able to change the way our participants thought about a person. Of the eleven continuous response ratings questions, only three produced statistically significant results.

3.1.1 Do you think she has a(n) X?

The overall ANOVA was not significant, but pairwise post-hoc contrasts showed a significant difference between *issue* and *mental disorder*, $F(1, 89) = 6.46$, $p = 0.013$, such that participants were more confident that the roommate had an issue and less confident that she had a mental disorder (see Figure 1).

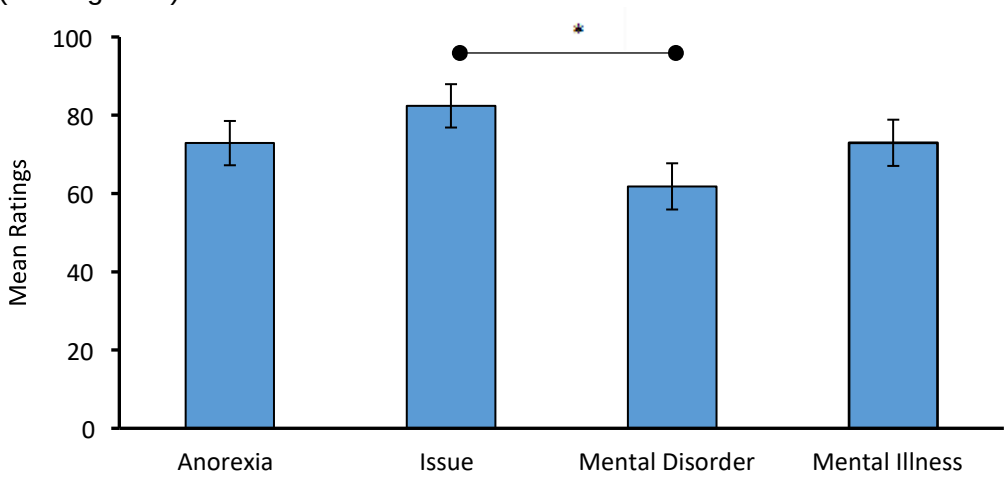


Figure 1. Mean ratings in response to the question "Do you think she has a(n) X?" separated by label. Ratings ranged from "0 (Probably not)" to "100 (Probably so)". Bars represent standard errors. * p < .05. ** p < .01. *** p < .001.

3.1.2 Can this sort of thing be fixed?

The overall ANOVA was not significant, but a post-hoc contrast comparing *anorexia* and *issue* to *mental disorder* and *mental illness* was: $F(1, 89) = 5.12$, $p = 0.026$. Participants were more confident that someone described as having anorexia or an issue could find resolution and less confident that someone described as having a mental disorder or mental illness could find resolution (see Figure 2).

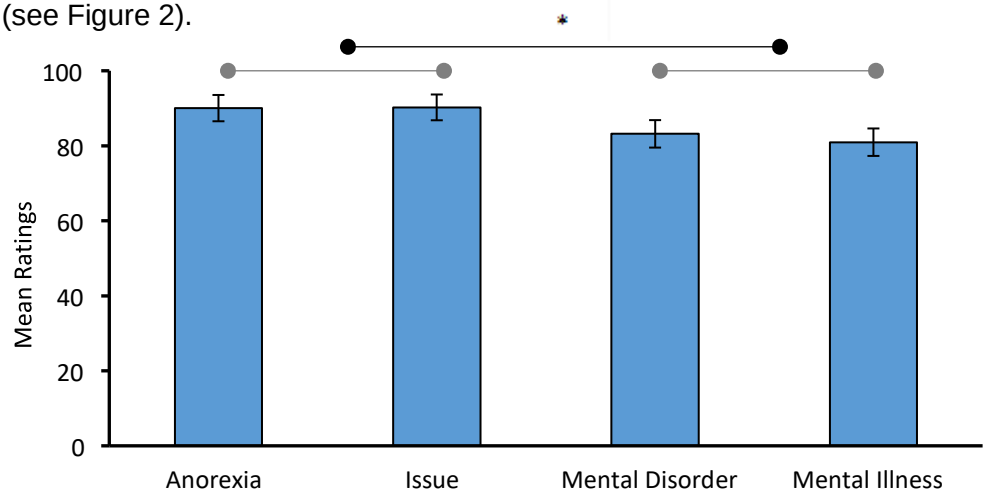


Figure 2. Mean ratings in response to the question "Can this sort of thing be fixed?" separated by label. Ratings ranged from "0 (Probably not)" to "100 (Probably so)". Bars represent standard errors. * p < .05. ** p < .01. *** p < .001.

3.1.3 Am I wrong for being angry with her?

The overall ANOVA was significant: $F(3, 89) = 2.75$, $p = 0.047$. Pairwise post-hoc contrasts only showed significant differences between *anorexia* and *issue*, $F(1, 89) = 4.64$, $p = 0.034$, and *anorexia* and *mental disorder*, $F(1, 89) = 4.45$, $p = 0.038$, as well as a marginally significant difference between *issue* and *mental illness*, $F(1, 89) = 3.74$, $p = 0.056$. Participants were more confident that the negative reactions of the person seeking answers about their roommate were unwarranted when the roommate was described as having anorexia or mental illness and more unsure about the situation when the roommate was described as having an issue or mental disorder (see Figure 3).

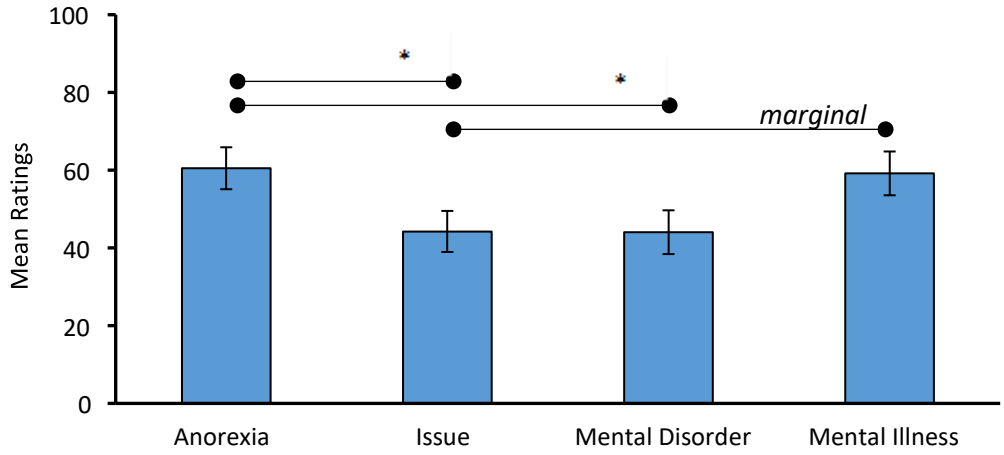


Figure 3. Mean ratings in response to the question "Am I wrong for being angry with her?" separated by label. Ratings ranged from "0 (Probably not)" to "100 (Probably so)". Bars represent standard errors. * p < .05. ** p < .01. *** p < .001.

3.2 Choice Data

We also wanted to determine how these labels might influence people's thoughts about appropriate treatments and potential causes. To address our original hypothesis, we conducted a one-way ANOVA for each potential treatment or cause that participants could have selected.

3.2.1 Treatments

In terms of treatment suggestions (see Figure 4), one general trend in the data was for more participants to select "therapy" as a treatment option (92%). The only label for which this pattern did not hold was *issue* because "talking it over" (88%) was selected just as often as "therapy" (84%). Interestingly, *issue* was also the only label for which someone suggested the possibility of just ignoring the abnormal behaviors. Participants also showed generally low support for medication as a treatment option (28%); however, they were more accepting of medication when the labels *mental disorder* and *mental illness* were used as compared to the labels *issue* and *anorexia*, $F(1, 89) = 4.77$, $p = .032$.

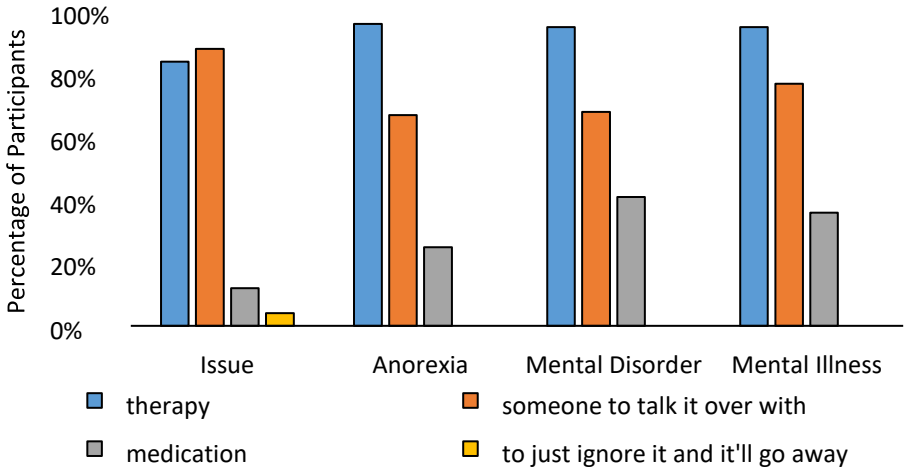


Figure 4. Percentage of participants selecting each treatment option separated by label.

3.2.3 Causes

In terms of potential causes (see Figure 5), there was highest overall support for "societal pressure" (80%). This was especially true when participants received the label *anorexia*, $F(1, 89) = 5.31$, $p = 0.024$. "Stress or trauma" was a close second (73%), followed by "the environment she was raised in" (47%), "chemical imbalance" (26%), and "genetics" (16%).

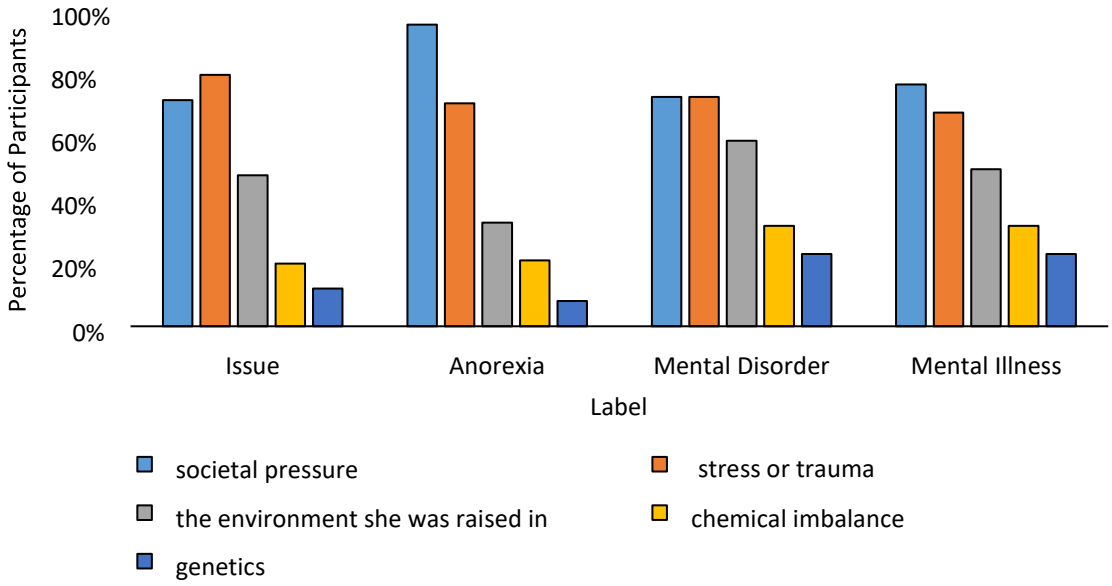


Figure 5. Percentage of participants selecting each potential cause option separated by label.

4. DISCUSSION

Based on this data, we argue that a simple difference in label can change the way people think or feel about a person being described by that label; however, these differences are sometimes

subtle and were not found in response to every question. In fact, it seems that people's responses were most affected by the labels in the following ways. First, labels affected how confident participants were that the label they received actually applied to the situation: Participants were more confident when the term *issue* was used and less confident when term *mental disorder* was used. Second, labels affected how confident participants were that the person labelled in the scenario could experience a remission of symptoms: Participants were more confident in recovery for the person described as having an issue or anorexia and less confident in recovery for the person described as having a *mental disorder* or *mental illness*. Third, labels affected the extent to which participants thought the roommate was wrong for being angry with the person being labelled: Participants thought that the female college student might not be justified in her anger toward her roommate when the roommate was described as having *anorexia* and, to some extent, *mental illness* but was more justified in her anger when the person was described as having an *issue* or *mental disorder*. Fourth, labels affected how participants viewed treatment options: Participants were more likely to include medicine as a potential treatment for those labelled as having a *mental disorder* or *mental illness*. Fifth, labels affected how participants thought about the potential causes of the behaviors: Societal pressure was selected by the highest percentage of participants when *anorexia* was used as the label.

Before generalizing our results too broadly, it is important to recognize that our sample consisted of college students who were mostly liberal arts majors. More specifically, 16% of our sample consisted of psychology majors and everyone in our sample was enrolled in a psychology course; therefore, it is possible that our sample might have a tendency to be less biased toward people who are described as having symptoms of AN. This means that our findings may not generalize to other populations of interest.

REFERENCES

Geerling, D. M., & Saunders, S. M. (2015). College students' perceptions of individuals with anorexia nervosa: Irritation and admiration. *Journal of Mental Health*, *24*, 83-87. doi:10.3109/09638237.2014.998807

Read, J., Haslam, N., Sayce, L., & Davies, E. (2006). Prejudice and schizophrenia: A review of the 'mental illness is an illness like any other' approach. *Acta Psychiatrica Scandinavica*, *114*, 303-318. doi:10.1111/j.1600-0447.2006.00824.x

Effects of the Chemotherapy Drug Cisplatin on Density of Hair Bundles in *Nematostella vectensis*

Alyce Puckett[1], Patricia Mire-Watson, PhD.[2]
1 University of Louisiana at Lafayette, Department of Biology, ajp9679@louisiana.edu
2 University of Louisiana at Lafayette, Department of Biology, pmire@louisiana.edu

ABSTRACT

Chemotherapy drugs are commonly known to treat cancer, but most also cause undesirable side effects. In humans, chemotherapy treatments such as Cisplatin are linked to hearing loss as well as problems with balance and coordination (Schact et al, 2012). Hearing and balance depend on sensory cells in the inner ear known as hair cells. Sea anemones also possess hair cells in their tentacles that function in the detection of prey (Mire-Watson and Watson, 2010). hair cells of sea anemones are extremely similar in function and chemical composition to those of mammals (Slattery and Warchol, 2010). This study seeks to investigate the effects of Cisplatin on the density of hair bundles in the sea anemone, Nematostella vectensis. For this study, it is hypothesized that Cisplatin will cause the density of hair bundles to decrease with the increase in dose of the drug. Groups of 6 anemones were incubated in three doses of Cisplatin, 1.50. 15.0. And 150 mM, for 24hours and compared to groups of 6 anemones incubated in seawater alone. It was found that all doses of Cisplatin significantly decrease the density of hair bundles on the anemone tentacles. Higher concentrations of Cisplatin resulted in a greater decrease in hair bundle density. This data support the initial hypothesis that Cisplatin damages anemone hair bundles in anemone tentacles and may indicate that it affects the hair bundles of hair cells in the human inner ear in a similar way.

1. INTRODUCTION

Nematostella vectensis is known as the model sea anemone, due to its fully sequenced genome and ease of culture in a laboratory setting. Anemones possess tentacles which contain hair cells. These hair cells have stereocilia which form a hair bundle; this bundle responds to mechanical stimuli, such as vibrations, similar to the hair cells of the mammalian inner ear. Ototoxicity, the property of being toxic to the inner ear, is an extremely relevant topic in research because there are several different drugs and chemicals that have ototoxic properties, including aminoglycoside antibiotics and chemotherapy treatments. This study investigates ototoxicity of the chemical, Cisplatin, a commonly used chemotherapy drug. Cisplatin is known to cause hearing loss and balance impairment in humans. Because the hair cells of *Nematostella vectensis* are similar in structure and function to those in mammalian inner ears, it is used as a model to explore hair cell damage and hearing loss. This study examines the effects of particular doses of Cisplatin on the density of hair bundles in the starlet sea anemone.

2. MATERIALS AND METHODS

The protocol from Slattery and Warhol (2010) was used as a guide for creating the protocol for this experiment. Six different groups of animals were established: Experimental Group 1, Experimental Group 2, Experimental Group 3, and 3 respective control groups. Each group consisted of six animals. Experimental Group 1 was treated with 150 µM Cisplatin dissolved in

16 ppt (parts per thousand) seawater, Experimental Group 2 was treated with 15.0 µM Cisplatin in 16 ppt seawater, and Experimental Group 3 was treated with 1.50 µM Cisplatin in 16 ppt seawater. Control groups 1, 2, and 3 were treated only with 16 ppt seawater. Each group received 15 mL of their respective solutions and was treated for 24 hours. After each treatment, the animals were anesthetized with 1x potassium seawater for one hour, and oral disks were excised and placed into fixative for at least one hour. After fixing, wet mounts were created, and the tentacles were imaged at 100x magnification using phase contrast microscopy. Hair bundle densities were calculated by dividing the number of hair bundles visible in profile along the tentacle surface by the linear distance of the tentacle. Each group was statistically compared to its respective controls and to each other, and control groups were also compared to each other. Statistical software used for determining statistical significance included Students' t-tests and ANOVA with post-hoc analysis.

3. RESULTS

The t-test analysis indicated a highly significant difference in hair bundle density between Experimental Group 1 and Control Group 1 ($p=5.13x10^{-5}$, Figure 1).

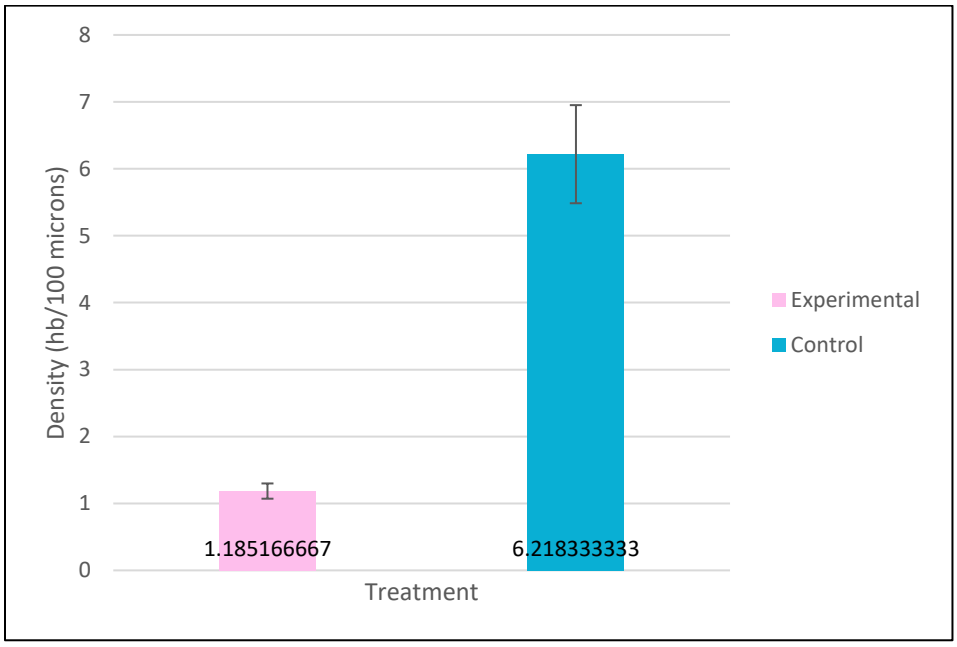


Figure 1a. Hair Bundle Densities on Anemone Tentacles of Experimental 1 (150 µM Cisplatin) and Control 1.

Proceedings of the 2018 Undergraduate Research Conference,
The University of Louisiana at Lafayette, Volume 2, November 16-17, 2018.

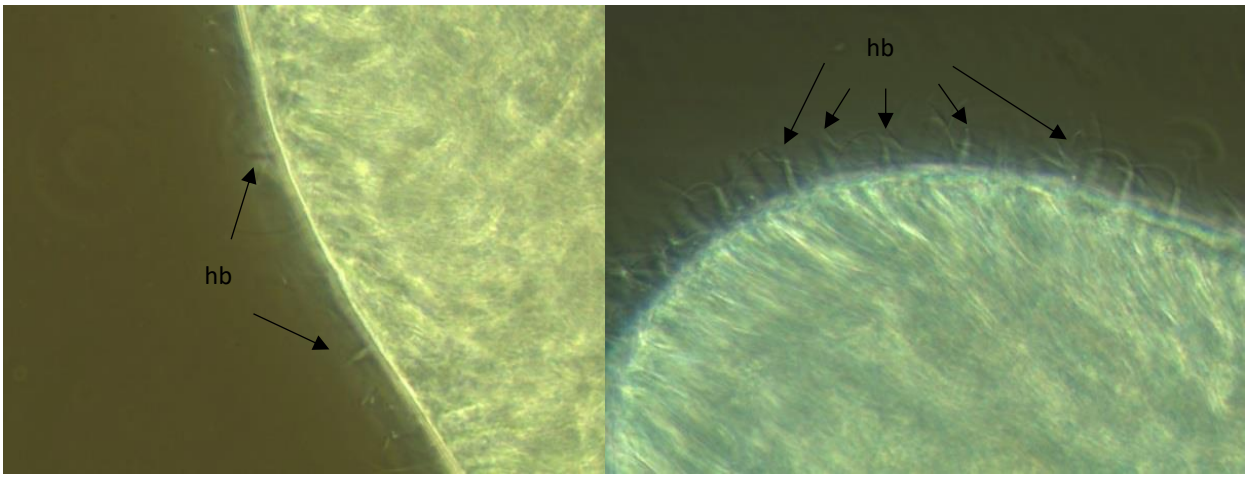


Figure 1b. Representative Images of Experimental 1 (left) and Control 1 (right). Arrows indicate hair bundles (hb) protruding in profile from the tentacle surface.

The t-test comparing the Experimental 2 to the Control 2 indicated a significant difference in hair bundle density ($p=2.52x10^{-8,}$ Figure 2).

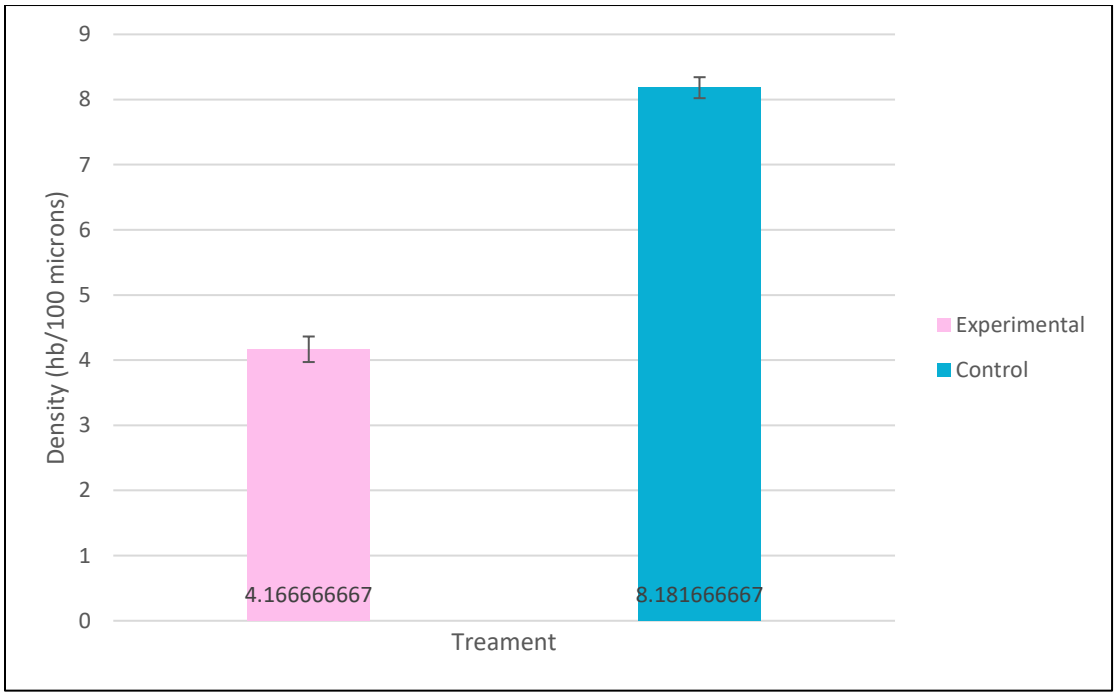


Figure 2a. Hair Bundle Densities on Anemone Tentacles of Experimental 2 (15.0 µM Cisplatin) and Control 2.

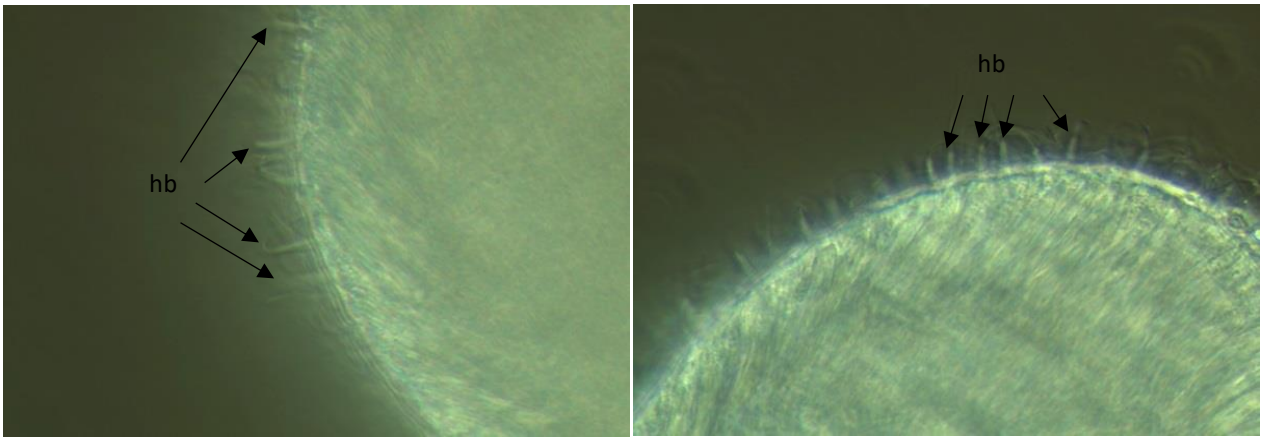


Figure 2b. Representative Images of Experimental 2 (left) and Control 2 (right). Arrows indicate hair bundles (hb) protruding in profile from the tentacle surface.

The t-test indicated a significant decrease in hair bundle density between the Experimental 3 and Control 3 groups ($p= 2.52 \times 10^{-8}$, Figure 3).

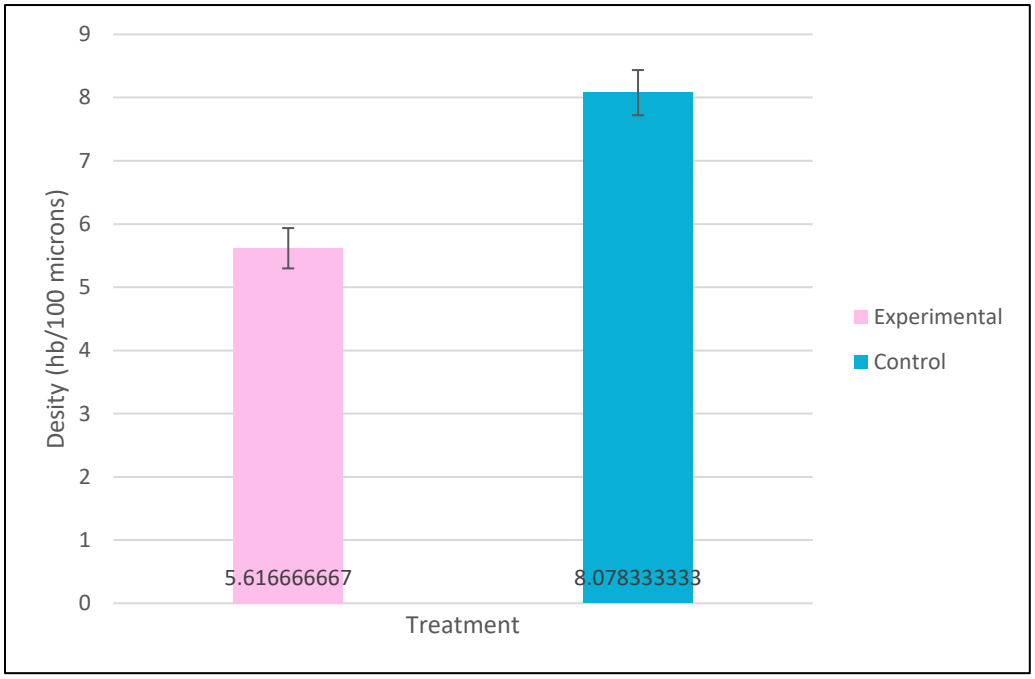


Figure 3a. Hair Bundle Densities on Anemone Tentacles of Experimental 3 (1.50 µM Cisplatin) and Control 3.

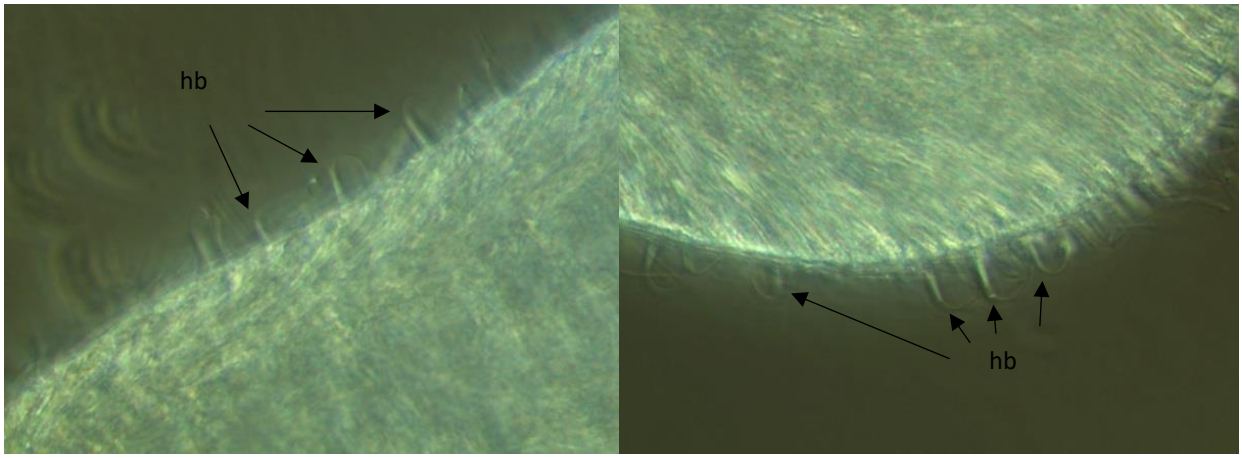


Figure 3b. Representative Images of Experimental 3 (left) and Control 3 (right). Arrows indicate hair bundles (hb) protruding in profile from the tentacle surface.

Densities of hair bundles were compared across the three experimental groups using One way ANOVA followed by Tukey's Post-Hoc analysis, (Figure 4 and Table 1). Significant difference was found between each of the experimental groups (Figure 4 and Table 1).

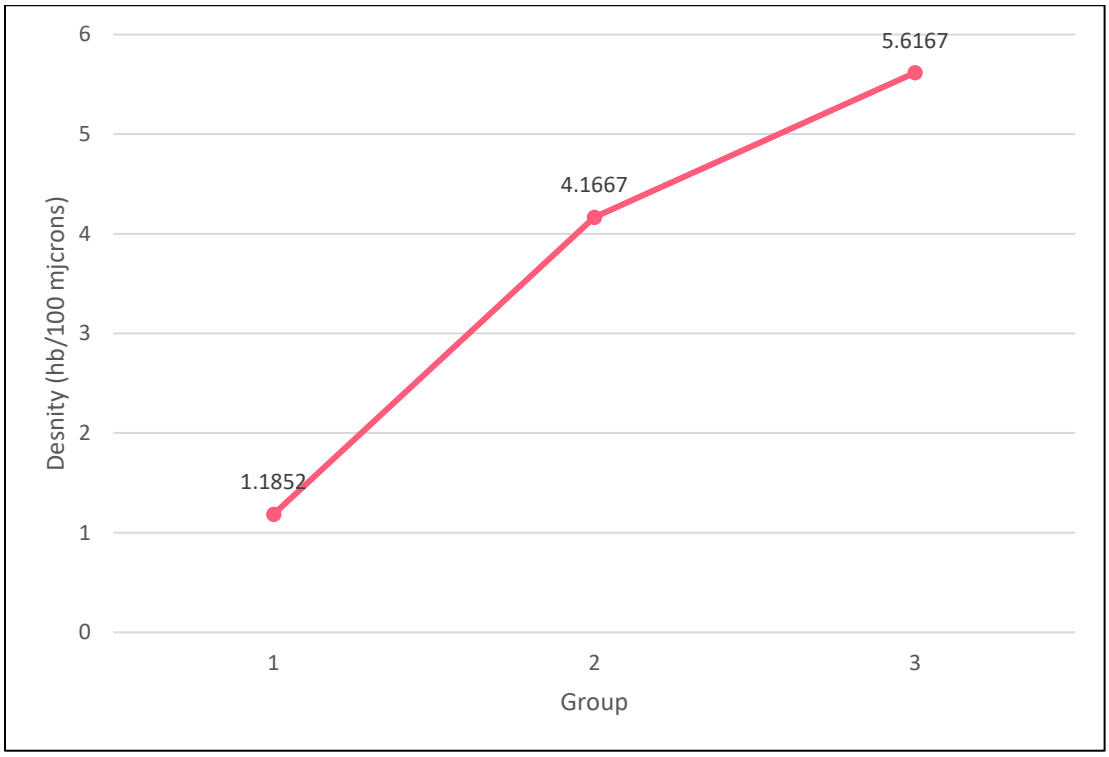


Figure 4a. Average Hair Bundle Densities on Anemone Tentacles of Experimental Groups 1, 2, and 3.

Table 1. P-values Comparing Each of the Three Experimental Groups to Each Other.

Cell No.	**Var2**	{1} 1.1852	{2} 4.1667	{3} 5.6167
1	1		0.000178	0.000178
2	2	0.000178		0.002477
3	3	0.000178	0.002477	

Densities of hair bundles were compared across the three control groups using One way ANOVA followed by Tukey's Post-Hoc analysis, (Figure 4 and Table 2). Significant difference was found between each of the experimental groups(Figure 4 and Table 2).

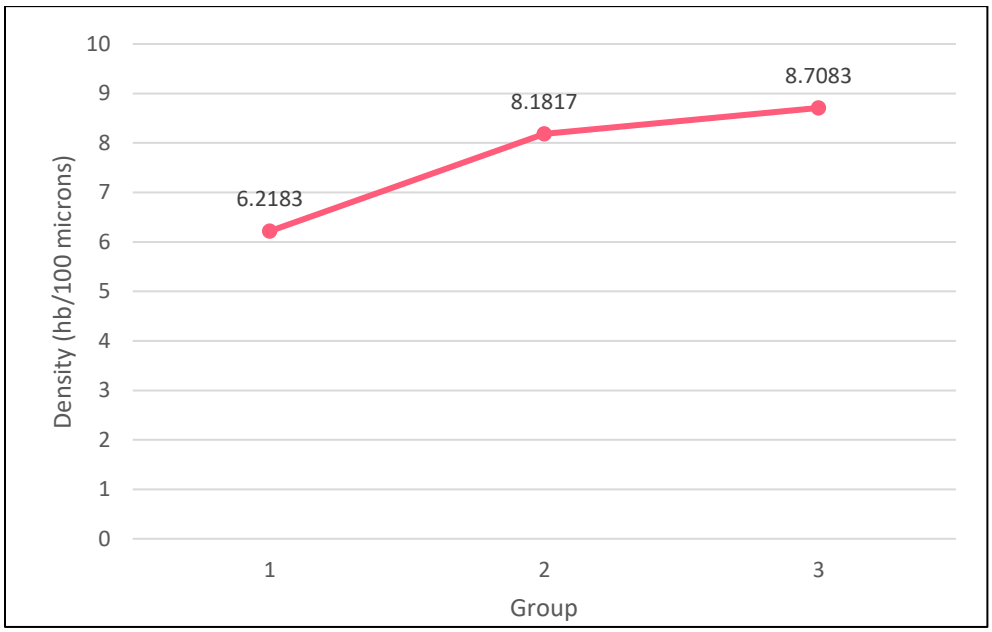


Figure 4b. Average Hair Bundle Densities on Anemone Tentacles of Controls 1, 2, and 3.

Table 2. P-values Comparing Each of the Three Control Groups to Each Other.

Cell No.	**Var2**	{1} 6.2183	{2} 8.1817	{3} 8.0783
1	4		0.046183	0.059949
2	5	0.046183		0.989498
3	6	0.059949	0.989498	

4. CONCLUSIONS

From the results and analyses discussed above, it can be concluded that Cisplatin significantly traumatizes hair bundles in anemones. The hypothesis is supported because Cisplatin significantly decreased the hair bundle densities at each concentration. It is also evident that the trauma is dose-dependent; the highest dose caused the most trauma, the lowest dose caused the least trauma, and the middle dose induced intermediate damage. It is important to note that because Control 1 and Control 2 were found to be statistically different, it is necessary to provide a control for each respective experimental group instead of one global control. The findings of this study are relevant because it agrees with previous findings by Slattery and Warchol (2010) with respect to the avian inner ear which showed that Cisplatin damages mammalian hair bundles and ultimately kills hair cells. The results add to the existing known similarities between anemone hair bundles and hair bundles in vertebrate animals. Furthermore, the results provide support to the notion that anemone hair cells may serve as a viable model for hair cells in the mammalian inner ear.

5. FURTHER DIRECTIONS

This research has provoked a further investigation of the effects of Cisplatin on hair bundles. Morphology (dimensions) of the hair bundles after treatment with Cisplatin are currently being investigated.

REFERENCES

Mire-Watson, P., Ph.D, & Watson, G. M., Ph.D. (2010). Laboratory for Investigating the Sensory Biology of Sea Anemones. Retrieved July 27, 2017, from http://www.anemoneresearch.org/Current-Projects.html

Schacht, J., Talaska, A. E., & Rybak, L. P. (2012). Cisplatin and Aminoglycoside Antibiotics: Hearing Loss and Its Prevention. The Anatomical Record: Advances in Integrative Anatomy and Evolutionary Biology, 295(11), 1837-1850.

Slattery, E. L., & Warchol, M. E. (2010). Cisplatin Ototoxicity Blocks Sensory Regeneration in the Avian Inner Ear. Journal of Neuroscience,30(9), 3473-3481.

Watson, G. M., Mire, P., & Kinler, K. M. (2009). Mechanosensitivity in the model sea anemone Nematostella vectensis. Marine Biology, 156(10), 2129-2137.

Perceived Parenting, Psychological Flexibility, and Perspective Taking as Predictors of Altruism

Patrick Rappold[1], Caleb Fogle[2], Emily Sandoz[3]
1 University of Louisiana at Lafayette, pjr3903@louisiana.edu
2 M.S., University of Louisiana at Lafayette, calebfogle7@gmail.com
3 Ph.D., University of Louisiana at Lafayette, eek2950@louisiana.edu

ABSTRACT

Altruistic behavior has been conceptualized from a variety of perspectives, including immediate and historical contextual factors. Amongst them is the degree to which parents are caring and protective. The flexible connectedness model offers three potential mechanisms by which parenting may influence altruism: perspective taking, empathic concern, and psychological flexibility. The current study examined perceived parenting style as a predictor of altruism and the flexible connectedness factors as potential mediators of this relationship. The study found that authoritarian parenting positively significantly predicted altruism, and permissive parenting significantly predicted a decrease in altruism. Further, authoritative parenting was found to significantly positively predict perspective taking, and authoritarian parenting significantly negatively predicted psychological flexibility. Neither psychological flexibility nor perspective taking were found to significantly predict altruism, however, making mediation impossible. The current study's results suggest that inflexible parenting (i.e., authoritarian parenting and permissive) may influence how we treat others in unexpected ways, sometimes benefiting society at a cost to the individual.

Key Words: Altruism, Parenting, Psychological Flexibility, Perspective Taking

1. INTRODUCTION

Altruism can be understood as behaviors that are intended to benefit or aid others. However, altruistic acts tend to benefit more than just the target of the actions. The helper can benefit by experiencing increased self-esteem and vitality (Weinstein & Ryan, 2010) and in many cases, whole communities can benefit (e.g., increased pro-environmental behavior, Clark, Kotchen, & Moore, 2003; e.g., increased organ donation, Morgan & Miller, 2002). While altruism is generally difficult to assess, Analog behavioral tasks are commonly used for research purposes (e.g., Rushton, 1976; Savin-Williams, Small, & Zeldin, 1981). For example, altruistic decision making tasks present participants with multiple ways of sharing something with perceived value with another person.

Altruism is impacted by a number of historical and current factors. For example, the degree to which parenting is protective and caring (Baumrind, 1971) can influence later prosocial behavior. Different combinations of protection and caring are typified as authoritarian (low care, high protection), authoritative (high care, high protection), and permissive (low protection) parenting styles (Baumrind, 1971). Some have further characterized parenting styles in terms of flexibility, suggesting authoritative parenting is flexible, while authoritarian parenting is rigid. Parenting flexibility may influence prosocial behavior, in part, by fostering flexibility in connectedness.

The flexible connectedness model considers three factors that can influence altruistic behavior: perspective taking, empathetic concern, and psychological flexibility. Perspective

taking refers to the ability understand a person's life from their point of view (Baron-Cohen, Tager-Flusberg, & Lombardo, 2013; Davis, 1980; Howlin, Baron-Cohen, & Hadwin, 1999). Empathetic concern is a person's ability to show genuine concern and warmth to a person (Batson, Eklund, Chermok, Hoyt, & Ortiz, 2007). Psychological flexibility is the ability to remain in contact with the present moment and pursue actions oriented towards personal values when confronted by changing contexts and conditions (Hayes, Strosahl, & Wilson, 2011).

This study aimed to consider perceived parenting, perspective taking, empathetic concern, and psychological flexibility as possible predictors of altruism. Specifically, it was hypothesized that:

1. *Parenting styles could be used to predict altruism. Authoritative parenting would positively predict altruistic behavior, and altruism's relationship with authoritarian and permissive parenting would be explored as well. The factor of care would positively predict altruism, while overprotection would negatively predict it.*
2. *Parenting style would also predict the level of flexible connectedness factors. Authoritative parenting would positively predict the three factors, while authoritarian parenting would negatively predict them. The relationship of permissive parenting with flexible connectedness would also be explored.*
3. *Flexible connectedness factors would positively predict altruistic behavior.*
4. *The relationship between parenting styles and altruistic behavior would be mediated by flexible connectedness factors.*
5. *The interactions amongst the flexible connectedness factors as predictors would be examined in an exploratory fashion*.

2. METHOD

Participants were college students at the University of Louisiana at Lafayette who volunteered in exchange for course credit. In addition, participants received $4.00 through their participation in the analog behavior tasks. Seventy-six participants volunteered, and 74 participants' data were used during analysis, as two participants were omitted from analysis due to careless responding on critical items Participants were between 18 and 50 years of age (*M* = 20.41, *SD* = 5.63), predominantly female (*N* = 46), and predominantly white (*N* = 49).

3. MEASURES

Acceptance & Action Questionnaire – II (AAQ-II)

The AAQ-II is a 7 item self-report scale that measures psychological inflexibility. Participants were asked to rate items on a 7-point scale from 1 (never true) to 7 (always true).

Interpersonal Reactivity Index (IRI)

The IRI is a 28 item self-report scale that measures perspective taking and empathetic concern. This measure includes 4 subscales: Fantasy (FS), Perspective Taking (PT), Empathetic Concern (EC), and Personal Distress (PD). Participants were asked to rate items on a -point scale from A (does not describe me well) to E (describes me well).

Parental Bonding instrument (PBI)

The PBI is a 25 item self-report scale that measures a participant's perception of the parental care (PC) and overprotection (PO) they received in their household. The participants were asked to respond to items related to these subscales on a 4-point scale from 1 (Very like) and 4 (Very unlike).

Parental Authority Questionnaire (PAQ)

The PAQ is a 30 item self-report scale that measures a participant's perception of the styles of parenting within their household. The styles of parenting are broken into the three subscales of

authoritative (AV), authoritarian (AN), and permissive (PV). Participants were asked to rate items on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree).

3.1 Altruism decision-making tasks

The first task is an adapted version of the Dictator Task (Morishima et al., 2012). Participants were asked to allocate money between themselves and another person through 10 randomized trials. The participant would be unaware that there was no person actually affected by their decision. They were given 2 out of 3 possible options each trial: distribute money equally, give more to the confederate, or give more to themselves. The second task is an adapted version of what is known as the Reciprocity Task (Morishima et al., 2012), which presented 10 randomized trials in which the participants receive 3 options for the allocation of money between themselves and a confederate, and they must eliminate one choice and leave the rest for the confederate to choose from. The third is a continuation of the Reciprocity Task with 10 more randomized trials. Now the participant is given what is supposedly the decisions left over from the confederates eliminations in the second task and must choose one outcome. Finally, participants are asked to complete a volunteer form and provide an amount of time they would be willing to volunteer in a week, though they would never actually be asked to follow up on the commitment.

4. RESULTS

A series of multiple regression analyses were conducted predicting altruism from parenting styles, altruism from flexible connectedness factors, altruism from flexible connectedness factors (including interaction terms), and flexible connectedness factors from parenting styles.

PAQ authoritative (AV) did not significantly predict altruism through the behavior tasks. However, PAQ authoritarian (AN) was found to significantly predict altruism through the behavior tasks, $F(1, 72) = 4.67$, $p = .03$ and $F(1, 72) = 6.42$, $p = .01$. In addition, PAQ permissive (PV) significantly negatively predicted altruism. PBI parental care (PC) did significantly negatively predict altruism through volunteering hours task, $F(1, 72) = 4.87$, $p = .03$.

PAQ AV scores did significantly predict IRI perspective taking (PT) scores, $F(1, 72) = 5.25$, $p = .02$. However, PAQ AV scores did not significantly predict IRI empathetic care (EC) scores. PAQ AN scores did significantly negatively predict AAQ-II scores, $F(1, 72) = 6.19$, $p = .02$. However, PAQ AN scores did not predict either IRI PT or IRI EC scores. PAQ PV scores did not significantly predict any flexible connectedness factors.

Neither IRI PT scores, IRI EC scores, hours volunteered, nor AAQ-II significantly predicted altruism through any tasks. Thus, mediational analyses could not be conducted due to the lack of significant relationships between scores on different assessments of altruism and scores on assessments of flexible connectedness factors.

IRI EC negatively predicted altruism on the reciprocity task when AAQ-II scores were high, $F(1, 72) = 3.82$, $p = .05$. However, no other interaction terms for flexible connectedness factors were significant through any measure of altruism.

5. DISCUSSION

This was the first study to consider parenting style as a predictor of altruism with analog tasks. It may be that perceived parenting style is not actually predictive of altruistic behavior, but it instead only influences their personal opinions of how altruistically they behave. Future studies could confront this by using a behavioral measure of altruism in which a participant encounters a person in need more directly.

Contrary to previous research (e.g., Eisenberg et al., 2001) none of the flexible connectedness factors significantly predicted any measure altruism, but this could be due to the use of analog tasks for measuring altruism as opposed to previously used self-report measures, which may have unintentionally measured personal perceptions of altruism and not actual behavior.

6. LIMITATIONS AND CONCLUSION

One limitation of this study is the successful deception of the participants. The study is not effective unless participants believe another person is affected by their actions and that they will actually fulfill their commitment to volunteer. The convenience sample of only college students can produce biases and is an additional limitation. In addition, only a small amount of participants reported permissive parenting, and a larger study sample may be needed to accurately analyze this style.

Despite these limitations, this study provides an informative perspective on the interactions between parenting style, flexible connectedness factors, and altruistic behavior. Specifically, authoritarian parenting, despite providing low care with high overprotection, seems to be the most statistically sound predictor of higher levels of altruism. Future research might consider if altruism has the same benefits if performed inflexibly as it does when performed flexibly.

REFERENCES

Baron-Cohen, S., Tager-Flusberg, H., & Lombardo, M. (Eds.). (2013). *Understanding other minds: Perspectives from developmental social neuroscience*. Oxford University Press.

Batson, C. D., Duncan, B. D., Ackerman, P., Buckley, T., & Birch, K. (1981). Is empathic emotion a source of altruistic motivation?. *Journal of Personality and Social Psychology*, *40*(2), 290.

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology*, *4*.

Clark, C. F., Kotchen, M. J., & Moore, M. R. (2003). Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology*, *23*(3), 237-246.

Eisenberg, N., Zhou, Q., & Koller, S. (2001). Brazilian adolescents' prosocial moral judgment and behavior: Relations to sympathy, perspective taking, gender-role orientation, and demographic characteristics. *Child Development, 72*(2), 518-534.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy: The process and practice of mindful change*. Guilford Press.

Morgan, S., & Miller, J. (2002). Communicating about gifts of life: The effect of knowledge, attitudes, and altruism on behavior and behavioral intentions regarding organ donation. *Journal of Applied Communication Research*, *30*(2), 163-178.

Morishima, Y., Schunk, D., Bruhin, A., Ruff, C., & Fehr, E. (2012). Linking brain structure and activation in temporoparietal junction to explain the neurobiology of human altruism. *Neuron*, *75*(1), 73-79.

Rushton, J. P. (1976). Socialization and the altruistic behavior of children. *Psychological Bulletin*, *83*(5), 898.

Savin-Williams, R. C., Small, S. A., & Zeldin, R. S. (1981). Dominance and altruism among adolescent males: A comparison of ethological and psychological methods. *Ethology and Sociobiology*, *2*(4), 167-176.

Weinstein, N., & Ryan, R. M. (2010). When helping helps: autonomous motivation for prosocial behavior and its influence on well-being for the helper and recipient. *Journal of Personality and Social Psychology*, *98*(2), 222.

The Optimum Bond Strength of Geo-Polymer Cement

Nicholas Scalfano[1], Syfur Rahman[2], and Mohammad Jamal Khattak, PhD PE[3]

1. Undergraduate Researcher and Presenting Author, *nrs3099@louisiana.edu*, 113 Montgomery Dr. Lafayette, LA 70506
2. Graduate Researcher, *syfur04016@gmail.com*
3. Faculty Advisor, *khattak@louisiana.edu*

ABSTRACT

This research investigates the effect of different parameters (aggregate roughness, Na_2SiO_3/NaOH ratio, NaOH molarity on the bond strength of geo-polymer, and different types of aggregates) in the creation of an optimum strength geo-polymer cement. The bond strength between geo-polymer matrix and specific aggregates is significant and contributes to the strength of the composite material strength. Beam samples were prepared and tested under a four point bending test to extract flexural bond strength data. The data found that lime stone, aggregate roughness created by sand paper #80, a Na_2SiO_3/NaOH ratio of 1, and NaOH of 10M proved to be ideal for flexural strength. By optimizing the bond behavior of geo-polymer cement precise and consistently, the strength can be obtained.

1. INTRODUCTION

Concrete is the backbone of our infrastructure. Commonly used to build roads, foundations, vital columns, floors, and walls, concrete is a substance that has increasing demand as the world's infrastructure advances in new and exciting ways. Modern concrete (most of which uses Ordinary Portland Cement) poses a threat to the advancement of modern technology, due to the large emission factors of CO_2 and damage caused by raw material extraction. Geo-Polymer technology can hopefully change these societal harms.

The durability of structures depends on the strength of the bond between the aggregate and the Geo-Polymer cement paste. In order to enhance the total strength of the Geo-Polymer concrete, the bond strength needs to be tested. Bond strength is the amount of adhesion between the aggregate and paste at the bonded surface. This bond strength depends on the strength of paste, the aggregate, and the paste-aggregate interface.

2. PURPOSE

When compared to modern Ordinary Portland Cement, Geo-Polymer cement has many advantages, including the following:

- A cost-effective solution
- An improved environmental and engineering performance
- Production requires only a moderate amount of energy
- Reduces CO_2 emissions by 80%
- Converts hazardous industrial waste by-product into a valuable construction material

3. OBJECTIVES

The bond strength of concrete made of aggregate and fly ash will be studied. The objectives of our research can be listed as follows:

- Develop and compare different mix proportions of Fly Ash with different aggregates
- Conduct the Compressive Strength test and evaluate the bond strength of the fly ashaggregate beam sample
- Analyze the data using a regression model

4. METHODOLOGY

4.1.1 Specimen Preparation

- The Na_2SiO_3 and selected NaOH solutions were mixed together with mass ratios of 0:1, 1:1 and 2:1 to form alkali solution.
- Fly ash and sand were mixed thoroughly by a mass ratio of 1:1 to form solid particles.
- The measured Alkali solution (Alkali solution to Fly ash 1:4) was poured into solid particles and mixed thoroughly for 3 minutes to get the Geo-Polymer solution.
- The cut and sanded rock cubes were placed into the mold with clamps used to hold them into place.
- Geo-polymer was poured into each cell and stabbed with a thin rod several times to reduce the air void in the sample.
- The sample cured in lab conditions for 30 minutes.

The sample was placed into an oven at 60℃ for 2 hours, de-molded, and placed back in the oven for 22 hours in a vacuum seal for final treatment.

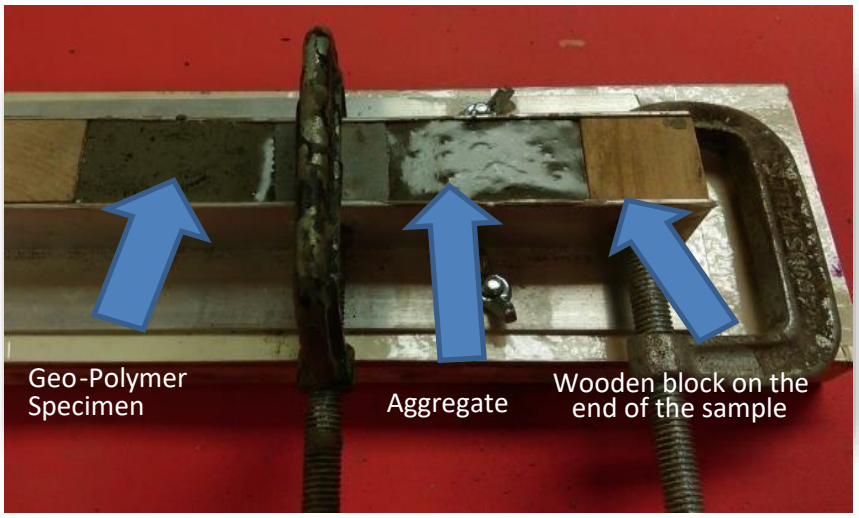


Image 1.

4.1.2. The Variables

- Roughness of rock surface (low, medium and high)
- Molarity of NaOH solution (8, 10 and 12)
- Solution Mass ratio of Na_2SiO_3 to NaOH (0, 1:1 and 2:1)
- Type of Rock (lime stone, granite, and marble).

Note: Rocks were cut into 1 inch cubes and were grinded using sandpaper with varying roughness.

Image 2. Vacuum Sealed Specimens

4.1.3. Experimentation

To conduct the four point bending test on the beam sample, a custom fixture is made. The data acquisition rate was set to 0.1 (readings every 1/10 second). Digital Image Correlation was used to capture the deflection of the beam sample. During the measurement process, an image of the object was taken continuously throughout the load application until complete failure. The results are shown below.

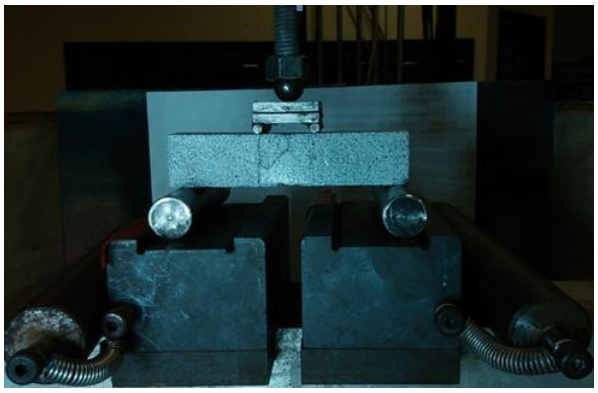


Image 3. Four-Point Bending Test Apparatus

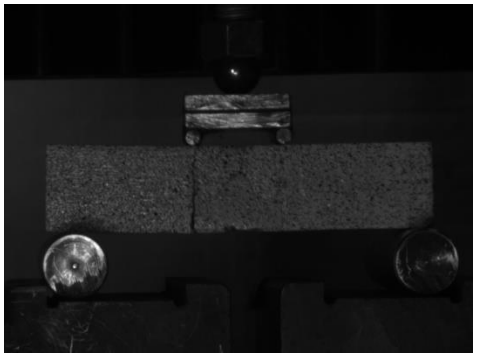


Image 4.
Specimen before load is applied

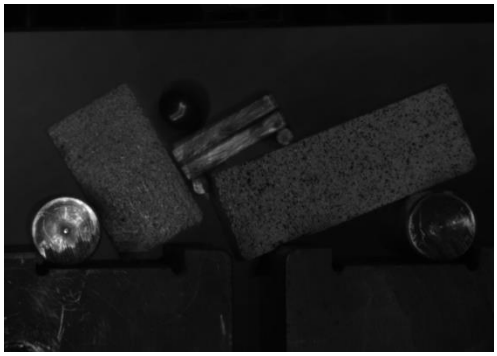


Image 5.
Specimen that has exceeded maximum load

5. RESULTS

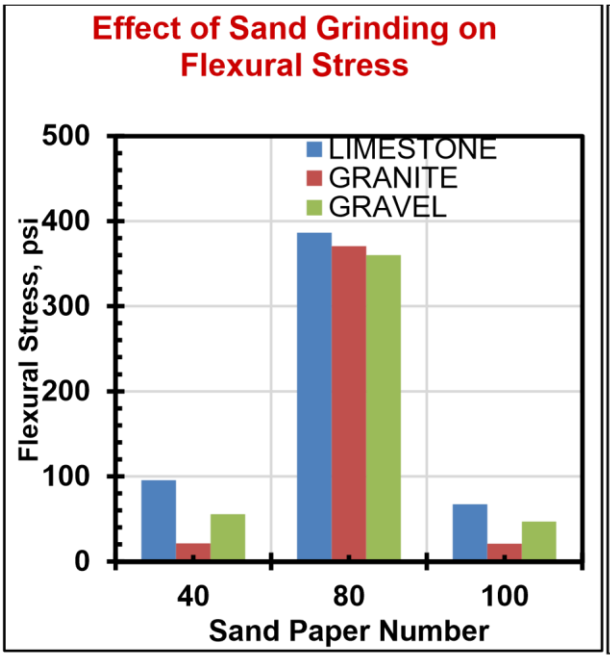


FIGURE 1

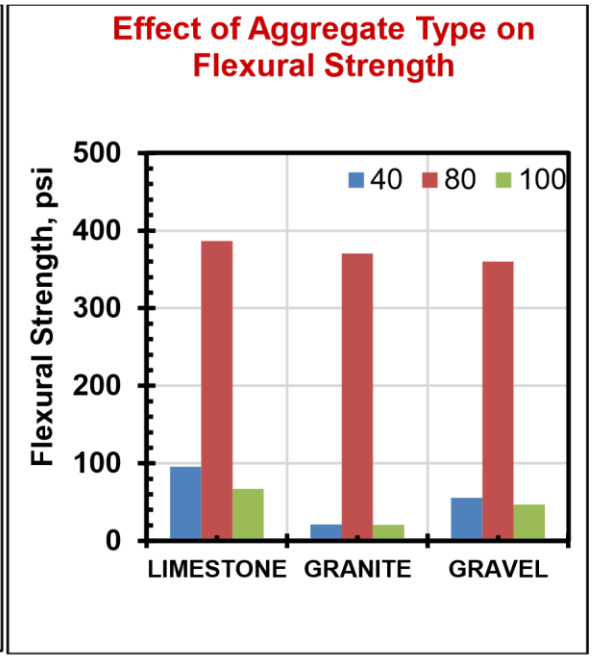


FIGURE 2

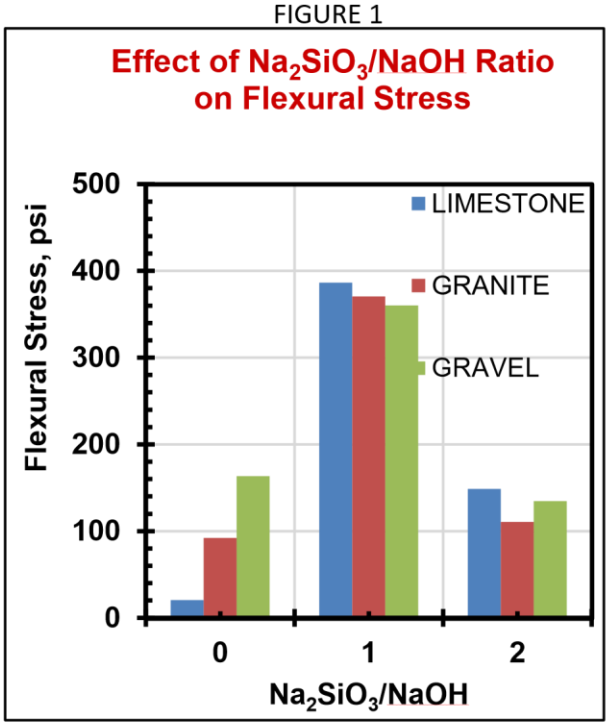


FIGURE 3

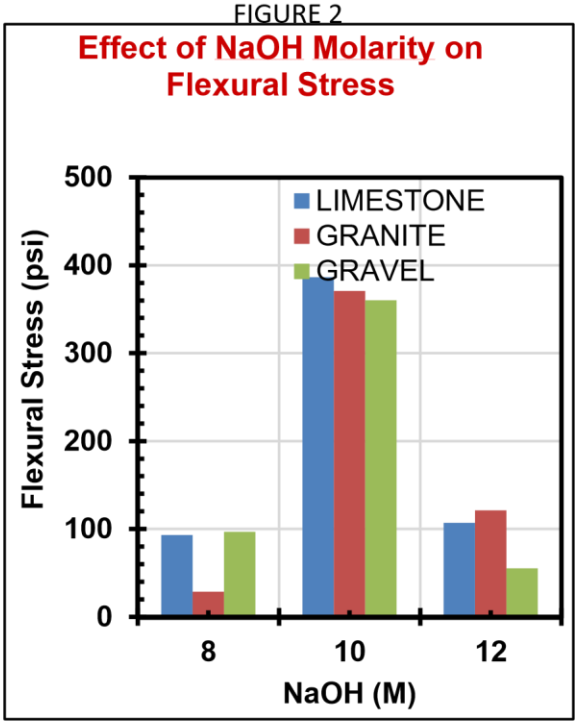


FIGURE 4

6. DATA ANALYSIS

Based on the results and discussion the following conclusions were drawn:

- Increase of Molarity – bond strength increases then drops after 10M. (FIGURE 4)
- Increase of Na_2SiO_3/NaOH ratio – maximum flexural bond strength achieved at 1:1 ratio. (FIGURE 3)
- Sand grinding affects on bond strength - medium sand paper (80) yielded max bond strength. (FIGURE 1)
- Limestone provided the optimum strength when loaded. (FIGURE 2)

7. CONCLUSIONS

Based on the results and discussion the following conclusions were drawn:

- With the increase of Molarity, the bond strength increases, then drops after 10M.
- With the increase of Na_2SiO_3/NaOH ratio, the flexural bond strength increases, until a ratio of 1, where it then decreases.
- Sand grinding affects the bond strength and it is found that the medium sand paper with number 80 yielded max bond strength.
- *The optimum Geo-Polymer mix variables are:*
    - *10M NaOH*
    - *1.0 Sodium Silicate/Sodium Hydroxide ratio*
    - *Lime Stone* o *Medium Sanding*

ACKNOWLEDGMENTS

The authors wish to express their sincere gratitude toward the University of Louisiana at Lafayette Civil Engineering Department for the financial support needed to conduct this research, Mohammad Jamal Khattak, PhD. P.E. for providing this opportunity, and Mark LeBlanc, Laboratory Technician, who helped us in conducting the lab experiments.

The Missing Media: Determining the Relationship Between Missing Persons Cases and Media Coverage

Margaret Storms[1], Dr. Michelle Jeanis[2]
[1]University of Louisiana at Lafayette, mts0124@louisiana.edu
[2]Criminal Justice Department, Supervising Faculty, University of Louisiana at Lafayette, mjeanis@louisiana.edu

ABSTRACT

The media possesses a major influence in our daily exposure to information pertaining to the world around us. When it comes to missing persons, information sharing is vital to the outcome of the case. However, some cases get much more attention than others. While some missing persons cases reach levels of national or even international news coverage, many missing persons go without a single article written about them. In those cases, the missing persons are given much less of a chance of being found than if their disappearances had been given any media exposure at all. This study aims to answer why there is such a disparity in media coverage of missing person cases. By analyzing every piece of news coverage for each missing person case across the country spanning decades, results may point toward certain characteristics of missing persons and their cases that affect the amount of media coverage they and their cases receive. Once knowing which characteristics negatively correlate with media coverage, steps can hopefully be taken to change how and what the media reports.
Key Words: Missing Persons, Media Attention, Coverage

1. INTRODUCTION

Although media coverage is considered to be vital in the recovery of victims (Fyfe, Stevenson, & Woolnough, 2014), the media views victimization in terms of "hierarchical levels of newsworthiness" (Jeanis & Powers, 2016, pg. 14). When it comes to gender, Jeanis and Powers (2016) found missing women to receive a disproportionate amount of media attention in comparison to men. In terms of age, Pollak and Kubrin (2007) found that missing children are more likely than adults to receive more coverage in the news. Race has been found to negatively affect the amount and quality of attention given to minority victims in the media (Jeanis & Powers, 2016).

The purpose of this study is to identify if there is a correlation between media coverage and reporting on missing persons and the characteristics of the person, case, and offender. Moreover, the purpose is to determine which specific characteristics of a missing person and the case correlate both positively and negatively to media exposure for his or her case.

2. METHOD

The sample consists of missing persons data that was obtained from national missing persons databases NamUs and Doe Network. All media attention data was collected through searches on the NewsBank database, Google, and YouTube.

The variables are coded for each article written on every missing person in the sample. If the missing person has no media attention that can be found, then only the individual demographic characteristics are coded.

The dependent variables pertain to the scope of media coverage and attention received in a missing persons case. Meanwhile, the independent variables pertain to the characteristics of a missing person and his or her case. Figure 1 below depicts the relationship that select independent variables have on media coverage, which is made up three dependent variables (additional independent variables will also be assessed).

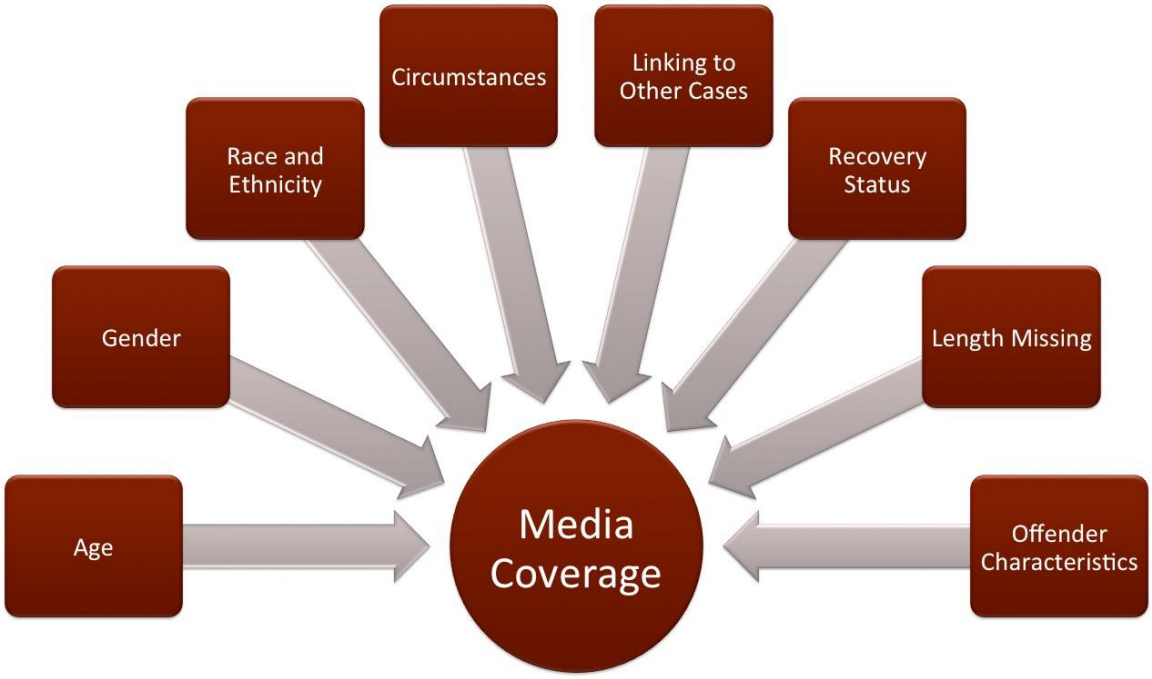


Figure 1. Relationship Between Key Variables

2.1. Dependent Variables

These variables include three key elements in shaping the scope of news coverage: Frequency, distance of coverage, and depth of coverage. Frequency refers to the number of articles and videos published relating to each case. Distance of coverage refers to the location of the news outlets relative to the city from which the missing person disappeared. Depth of coverage refers to the length of the published media. If it is a video, this would be the duration of it; if it is an article, it would be the word count.

2.2. Independent Variables

These variables can be grouped into four broad categories: Individual characteristics of the missing person, case characteristics, offender characteristics, and the type of news media. Individual characteristics refer to information about the missing person, such as his or her age,

gender, race and ethnicity, hair color, weight, height, and occupation. The case characteristics refer to what the article provides in relation to the circumstances of the disappearance, any link to other cases, length missing, recovery status of the missing person, if there has been an arrest made, and the adjudication status of the offender. Offender characteristics refer to the age, gender, and race of the offender, as well as what kind of offender he or she is and the relationship with the missing person. Type of news relates to the way in which the information is being reported, such as through an article, a video, or police agency outreach.

3. OUTLOOK

The independent variables will be run against the dependent variables coded for each case. This will show any correlations, positive or negative, between any characteristics of a missing person or the case and the media attention he or she receives. Results found will be more generalizable since the sample of missing persons taken is the largest ever analyzed.

4. DISCUSSION

The results will provide insight into why some of the missing have received more media coverage than others, and also why some receive little to no attention**.** This information can then be used to create change in both the way in which the media reports missing persons as well as how we inform ourselves about them**.** The extent of the relationship between the media and missing persons cases has yet to be fully realized.

REFERENCES

Fyfe, N, Stevenson, O., and Woolnough, P. (2014). Missing persons: The processes and challenges of police investigation. *Policing and Society, 24*(1), 1–17.

Jeanis, M. N., & Powers, R. A. (2017). Newsworthiness of Missing Persons Cases: An Analysis of Selection Bias, Disparities in Coverage, and the Narrative Framework of News Reports. *Deviant Behavior*, *38*(6), 668-683. https://doi.org/10.1080/01639625.2016.1197618

Pollak, J. & Kubrin, C. (2007). Crime in the news: How crimes, offenders and victims are portrayed in the media. *Journal of Criminal Justice and Popular Culture, 14*, 59–83.

The Spatial Pattern of Element Distribution in an Actively Growing Soybean Root.

A'Ishah Trahan[1], Akim Junior Mitoumba[2], Sage D Banks[1], Sharena A Thibodeaux[1], Aniruddha Acharya[1,3]

[1]Department of Biology, University of Louisiana at Lafayette.
[2]Department of Mathematics, University of Louisiana at Lafayette.
[3]Microscopy Center, University of Louisiana at Lafayette. C00250629@louisiana.edu

ABSTRACT

The development and growth of a plant depends on healthy development of roots. They are responsible for anchorage, storage of reserve carbohydrates, absorption and transport of solutes. Roots encounter various environments; regardless of the environment they grow they must maintain a certain ionic environment within the cell for metabolic process to occur at an optimal rate. Element compartmentation plays a major role in the process, where toxic elements or the elements which are excess within the cell are isolated or compartmentalized within the vacuole to maintain a certain concentration within the cytoplasm for the biological metabolic process to occur. To understand compartmentation, we observed the spatial patterns of element distribution in soybean roots. Soybean is a widely used legume grown across the world with USA being the top producer. It is a high food value crop and used for oil seed, human food, animal consumption and biofuel production. We studied the endogenous element distribution of an actively growing soybean root using cryo-SEM/EDS. Our results indicate that the potassium and phosphorous distribution in a soybean root is tissue specific and depends on the developmental stage of the root. We also found a certain degree of symmetry in the pattern of distribution that compliments the anatomical features of the root.

Key Words: Scanning Electron Microscope (SEM), Energy Dispersive Spectroscopy (EDS), Element Compartmentation, Soybean.

1. INTRODUCTION

Soybean (*Gylcine max*) is a widely used legume grown across the world with USA being the top producer (Masuda and Goldsmith et al. 2009). It is a high food value crop and used for oil seed, human food, animal consumption and biofuel production. Soybean plant has a symbiotic relation with nitrogen fixing bacteria called *Rhizobium* and forms nodules. (Long 1989, Bohlool and Schmidt 1974). In roots, nodules are the sites where atmospheric nitrogen is converted to organic nitrogen by Rhizobia and utilized by the plant. Soybean is an important source of protein. They develop from seeds which after germination gives rise to radicle. Radicle in turn develops into root. The development and growth of a plant depends on healthy development of roots. Roots are responsible for anchorage, absorption and transport of solutes/water and storage or carbohydrates (Esau 1977).

Roots encounter various environment and they must adapt quickly and grow for successful growth of a plant. Regard less of the environment they grow they must maintain a certain ionic concentration within the cell for metabolic process to occur at an optimal rate. Cytoplasm and vacuole are the two major ionic pools within a cell. Element compartmentation plays a major role in the process of ionic compartmentation, where toxic elements or the

elements which are excess within the cell are isolated or compartmentalized within the vacuole to maintain a certain concentration within the cytoplasm for the biological metabolic process to occur. This has direct impact in growth of plants. The distribution, spatial patterns and tissue specific distribution and accumulation of K, P and S in peanut root is poorly understood. A detailed knowledge of the ionomics may help to understand several complicated biological processes inside the root that helps the root to grow, adapt and transport materials both through apoplast and symplast.

2. MATERIAL AND METHODS METHOD

Using the experimental system developed by Pesacreta et al. (Pesacreta 2018), the element distribution in a young and actively growing soybean radicle was observed. The system was so designed as to focus exclusively on the phloem-transported endogenous elements from cotyledons to the root tip of an actively growing radicle. Soybean seeds of Chiba green variety were purchased from Burpee (Warminister, PA, USA). Seeds were soaked overnight in deionized water and rinsed several times in the same quality of water before placing them in between two chromatography quality Whatman papers supported by plastic plates. To ensure adequate aeration for proper growth of radicle, spacers were used to separate the plastic plates. Clippers were used to hold the two plastic plates together and provide a stable support for germination and growth of radicle. The plastic plates were submerged almost two centimeters in deionized water (17 mega ohms resistance) such that water can rise due to capillary action and soak the seeds. The whole system was placed in a light and temperaturecontrolled growth chamber. After 7 to 9 days the actively growing young radicles between the lengths of 8 to 12 centimeter were used for experiments.

Fresh radicles were cut into 10mm long pieces starting from apex and placed in a graphite filled hole in a steel stub. The stub was submerged in liquid nitrogen and the roots fractured under liquid nitrogen. The liquid nitrogen filled stub was quickly transferred to SEM chamber and kept in vacuum overnight for sublimation (as described by Ensikat and Weigend 2013). Following sublimation tissues were observed with 3-D backscatter mode, no tissue shrinkage was found. Hitachi S 3000 SEM coupled with EDS and IXRF software were used for element mapping and analysis.

3. RESULT AND DISCUSSION

Cryo-SEM/energy-dispersive X-ray analysis (EDS) has been successfully used for elemental analysis in biological tissues. The principle of EDS is an incident electron beam that strikes an atom to produce X-rays that are characteristic to that atom and is detected by an X-ray detector and processed by IXRF software. Growing roots in deionized water was essential because our target was to look at endogenous element distribution so the exclusion of any ions from exogenous source was important. We found that element distribution varies according to tissue type and developmental stage. A tissue specific and symmetric accumulation of elements were observed. The K and P concentration were relatively higher in stele than in cortex. This shows a different level of chemical organization other than what we already know at anatomical, biochemical and molecular level. A potassium ring near the epidermis was observed in mature sections of the radicle. The tetrarch organization of the root was also evident from patterns of potassium and phosphorous distribution. Xylem vessels had low concentration of potassium and phosphorous while the adjoining tissues had a relatively higher concentration of the same element.

3.1.1 Spatial patterns of element distribution in soybean radicle

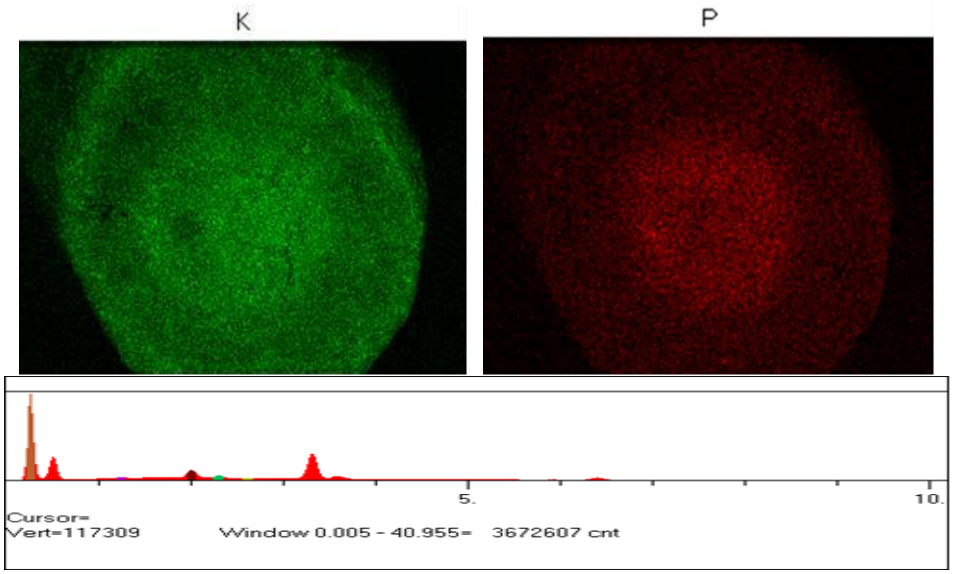


Figure 1. 7 mm from root tip

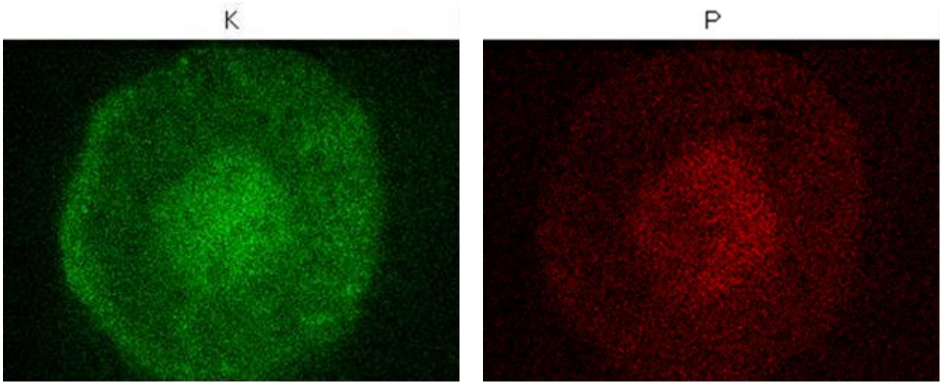


Figure 2. 16 mm from root tip

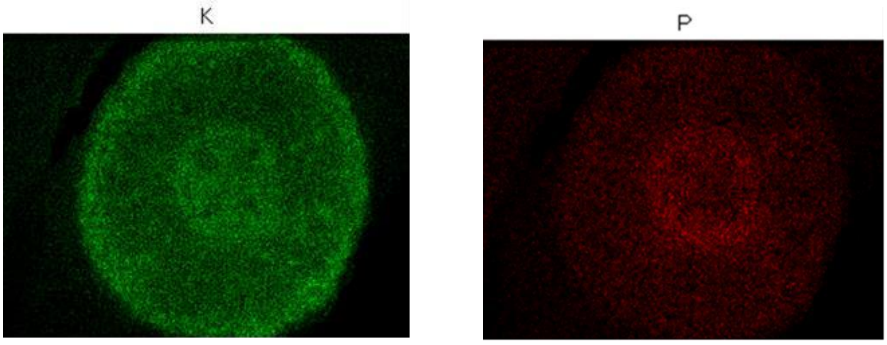


Figure 3. 26 mm from root tip

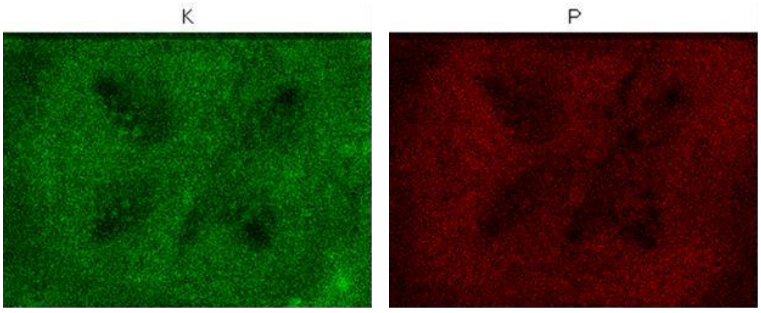


Figure 4. Vascular region at 45 mm

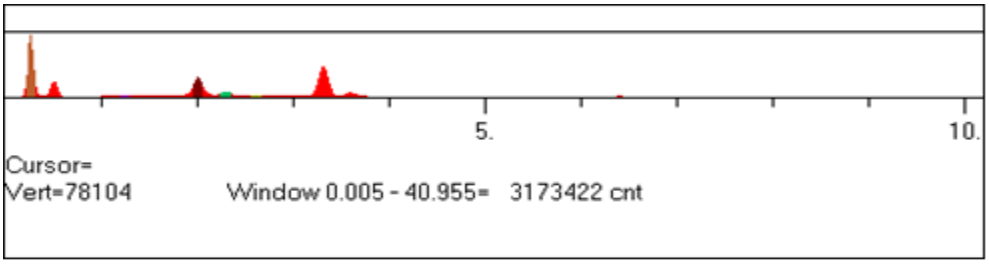


Figure 5.

REFERENCES

Bohlool, B. B., & Schmidt, E. L. (1974). Lectins: a possible basis for specificity in the Rhizobium— legume root nodule symbiosis. Science, 185(4147), 269-271.

Esau K (1977) Anatomy of seed plants, 2nd edn. Wiley, New York

Long, S. R. (1989). Rhizobium-legume nodulation: life together in the underground. Cell, 56(2), 203-214.

Masuda, T., & Goldsmith, P. D. (2009). World soybean production: area harvested, yield, and long-term projections. International food and agribusiness management review, 12(4), 143-162.

Pesacreta, T. C., & Hasenstein, K. H. (2018). Tissue accumulation patterns and concentrations of potassium, phosphorus, and carboxyfluorescein translocated from pine seed to the root. Planta, 1-15.

Graphene Nanoscrolls Induced Unique Crystallization of Poly (lactic acid)

Caroline Werther[1,2], Oluwakemi Ajala[1,3], Dilip Depan[1,4,]
1 Institute for Materials Research and Innovation, Chemical Engineering Department, University of Louisiana at Lafayette, P.O. Box 44130, Lafayette, LA 70504-4130, USA.
2 C00240350@louisiana.edu
3 kemi.oajala@gmail.com
4 Ph. D, ddepan@louisiana.edu

ABSTRACT

Due to their unique open topology, graphene nanoscrolls (GNS), which are carbonbased, one-dimensional nanomaterials, have been predicted to have extraordinary characteristics, but have not been studied for their effect on the polymer matrix when used as a nanofiller. Poly (lactic acid) (PLA), an environmentally friendly, biodegradable polymer with a promising outlook in the biomedical field, faces a major drawback in its use due to its brittleness and poor toughness. This creates a need for a nucleating agent within its polymer matrix. This study investigates the effects of graphene nanoscrolls on the morphology and crystallization behavior of PLA. GNS was obtained through thermal annealing and lyophilization of graphene nanoplatelets (GNPs), before being used in crystallizing PLA through solution mixing. FTIR and SEM show that incorporation of GNS as a nucleating agent affects the crystallization of PLA. This is the first study found to look into the effect of GNS as a nanofiller.

Key Words: Graphene Nanoscrolls, Poly (Lactic Acid), Crystallization.

1. INTRODUCTION

Graphene nanoscrolls (GNSs) have gained attention recently because of their unique onedimensional, open topology (Zheng, Xu, & Gao, 2016). This allows for more solvent accessible surface area, as the solvent can enter the nanoparticle just by facile infiltration (Xu, Zheng, Chen, & Gao, 2014). Graphene is known for its capacity for chemical functionalization, alone with its large surface area and high mechanical strength. GNS maintains the same properties of its parent but differs in its rate performance when compared to planar graphene and its counterpart, the carbon nanotube (CNT), as the edges of GNS's scrolled sheets are not fused (Perim, Machado, & Galvao, 2014). GNS are formed by adding energy to the graphene, and it maintains its shape through the van der Waals and π-π interactions between overlapping layers (Tang, Yun, Xiong, & Wang, 2018).

Poly (lactic acid) (PLA), compared to commercially available polymers, offers amazing physical, optical, and mechanical properties, and along with its biocompatibility shows promise in biomedical applications (Castro-Aguirre, Iñiguez-Franco, Samsudin, Fang, & Auras, 2016). It can be semi-crystalline or amorphous based off its thermal history and stereochemistry (Lim, Auras, & Rubino, 2008). However, PLA has a poor toughness and inherent brittleness that limits its use in biomedical applications, resulting in the addition of nanofillers and polymer blending in order to improve its crystallinity (Chieng, Ibrahim, & Yanus, 2014). Incorporation of a nucleating agent in the polymer matrix not only determines the crystalline fraction's size, but also the

number and size of the polymer crystallites (Wang, et al, 2017). By increasing the nucleation density, they accelerate crystallization and decrease the nucleation barrier (Bai, Zhang, Deng, Zhang, & Fu, 2011). PLA poses some difficulty in crystallization due to its stereochemical conformation and rigid short chains. The physical properties of PLA are dependent on the crystallization process (Barrau, et. al, 2011). Studies on the use of graphene as a nanofiller have shown it to increase the thermal and mechanical properties of PLA. CNT has also been used broadly in PLA crystallization, but uniform dispersion of CNT in the polymer matrix poses a challenge for controlling its properties (Kumar, Depan, Singh Tomer, & Singh, 2009). The use of GNS as a nanofiller for PLA has been previously uninvestigated, but its large surface area and high dispersibility offers advantages over CNT as a nanofiller for PLA. In this study, GNS was obtained through the transformation of graphene nanoplatelets, and then incorporated into PLA through solution mixing before comparing its characteristics to that of pure PLA.

2. METHODS

Graphene nanoplatelets were rolled into GNS by the following method: graphene nanoplatelets were added to toluene, keeping the concentration at 0.1 mg nanoplatelets per 1 mL toluene and probe sonicated at two-minute intervals three times. The mixture was then dispersed dropwise into liquid nitrogen, causing the mixture to freeze. After letting the mixture to melt at room temperature, the mixture was then transferred into a petri dish to allow the solvent to evaporate and obtain GNS needed for PLA crystallization.

To prepare the PLA-GNS nanocomposite, 0.5 g of PLA was dissolved in 15 mL of THF for 60 minutes at 60 °C in an oil bath and using a magnetic stirrer. At the same time, GNS powder obtained from the previous steps was dispersed in 10 mL of THF and bath sonicated at room temperature for 60 minutes. The GNS-THF dispersion was then added to the PLA-THF solution and mixed with a magnetic stirrer at 60 °C for 120 minutes before being poured into a glass petri dish and dried overnight under atmospheric pressure and room temperature. To remove residual solvent, the membranes were placed in a vacuum oven at 40 °C for 60 minutes. The PLA-GNS samples were prepared with different weight ratios of 0.1, 0.5, 1, and 2% GNS. For comparison, pure PLA was crystallized in the same manner by dissolving 0.5 g PLA in 25 mL THF at 60 °C for 3 hours.

The samples were then characterized using SEM, TEM, and FTIR.

3. RESULTS AND DISCUSSION

3.1 Graphene Nanoplatelets to Graphene Nanoscrolls

Scanning and transmission electron microscopy images were taken of graphene nanoplatelets and graphene nanoscrolls for comparison. Figure 1 (a-d) shows the morphology of GNPs. The GNP is shown as 1-2 layer stacked sheets of the nanoplatelets with a lateral width of approximately 500 nm. After ultrasonication and thermal annealing, the GNP rolled up into the GNS as evidenced in Figure 1 (e-h). As shown, the nanoscrolls show well-defined concentric structures. The average length of the fibers ranged from 20-40 µm, with a lateral width of less than 1 µm. This lateral width is smaller than the lateral width of GNPs, indicating that a single GNS is made from a single GNP or a small bundle of GNPs.

GNS formation requires overcoming an energy barrier of about 100 s to 1000 sJ/mol . Ultrasonication provided the energy needed to overcome the barrier and induce scrolling of GNP, while lyophilization aided in stabilizing the scrolled structure.

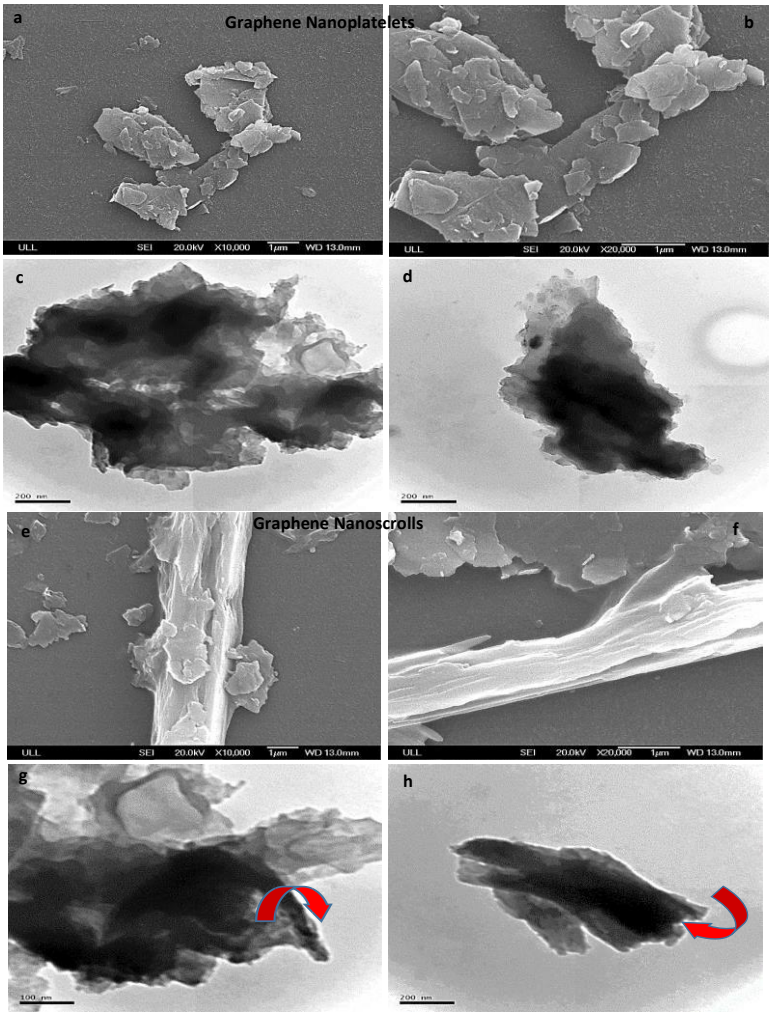


Figure 1. SEM and TEM Images of Graphene Nanoplatelets and Graphene Nanoscrolls

3.2 Graphene Nanoscrolls Induced PLA Crystallization

Unlike regular graphene, GNS has a higher surface area which is more advantageous for crystallization purposes. Figure 2 shows the scanning electron micrograph images of pure PLA and GNS induced PLA crystallization. Figure 2 (a-b) shows images of pure PLA crystallized. Many branches crystallites formed without the presence of any nucleating agent, ranging in size of 3-5 µm, with a radial branch diameter of ~ 500 nm.

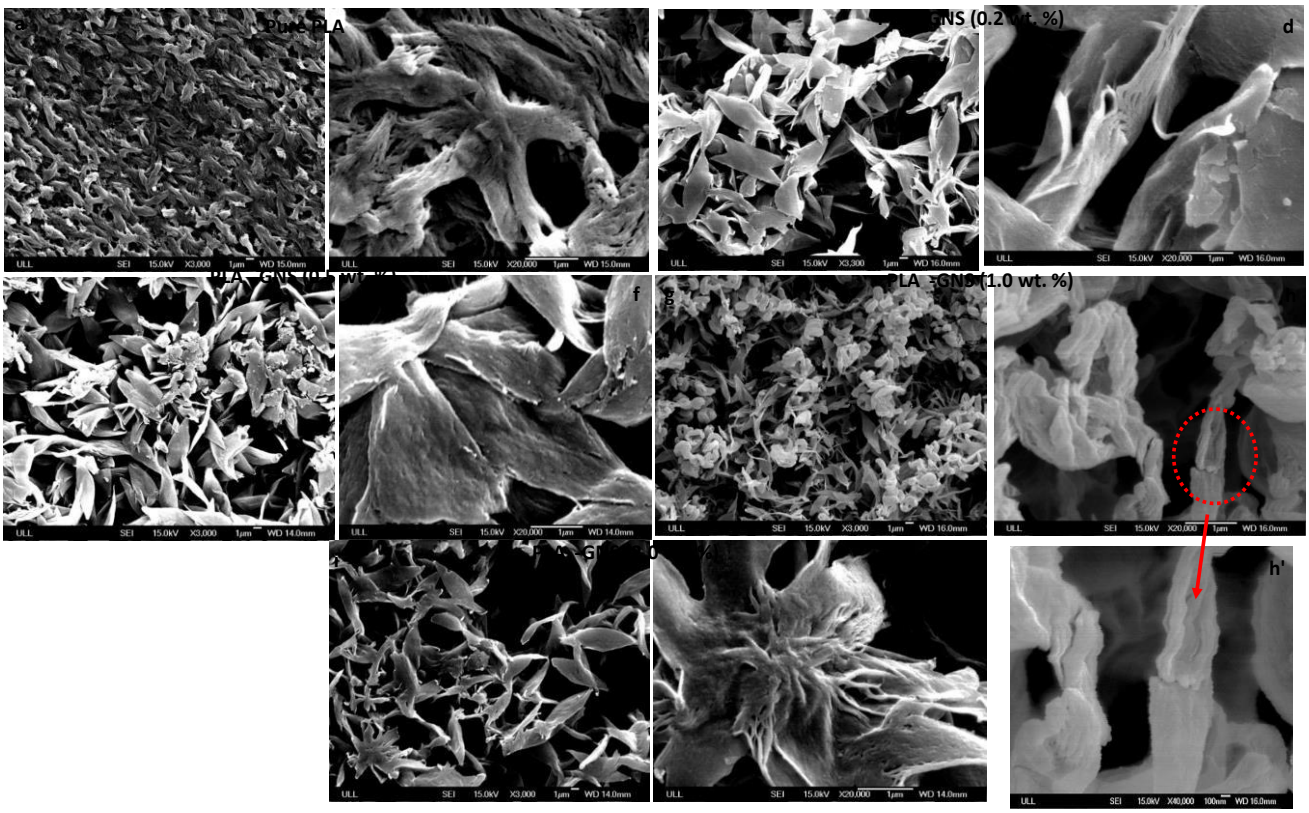


Figure 2. SEM Images of Pure PLA and PLA-GNS

However, when GNS was used as a nucleating agent, the crystal structure obtained was flower-shaped and random. Because GNS has an open topology, PLA can enter into the scroll, increasing the area of the nucleation site. As the PLA chains build, the only space for the crystals that start on the inside of the structure is outwards, through the last layer that opens up the scroll and the open sides. As the PLA crystallizes along the surface of the scroll, the crystal structures combine with those inside the scroll to form a petal-like crystal structure, as seen in Figure 2. The lateral dimensions of the PLA crystals approached approximately 400 nm. These findings indicate that GNS is mostly used to restrict and control the motion of the PLA chains.

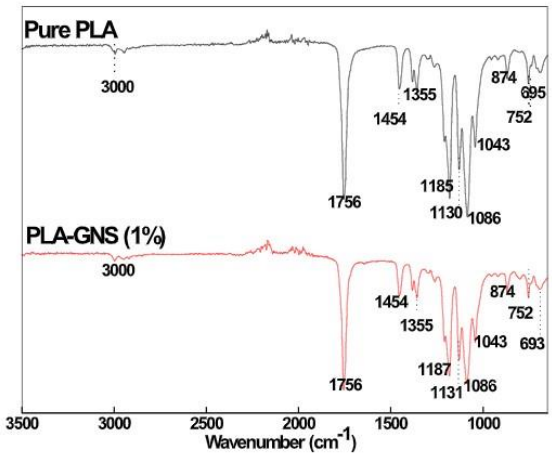


Figure 3. FTIR Spectra of Pure PLA and PLA-GNS (1%)

FTIR results are shown in Figure 3. As seen in the table, the peaks between the pure PLA and PLA-GNS nanohybrids rarely differ, suggesting that no chemical or physical interactions occurred between the PLA and GNS, only changing the structure of the crystals.

REFERENCES

Bai, H.; Zhang, W.; Deng, H.; Zhang, Q.; Fu, Q. (2011) Control of Crystal Morphology in Poly(l-Lactide) by Adding Nucleating Agent. *Macromolecules*, *44* (6), 1233–1237.

Barrau, S.; Vanmansart, C.; Moreau, M.; Addad, A.; Stoclet, G.; Lefebvre, J. M.; Seguela, R. (2011) Crystallization Behavior of Carbon Nanotube-Polylactide Nanocomposites. *Macromolecules 44* (16), 6496–6502.

Castro-Aguirre, E.; Iñiguez-Franco, F.; Samsudin, H.; Fang, X.; Auras, R. (2016) Poly(Lactic Acid)—Mass Production, Processing, Industrial Applications, and End of Life. *Advanced Drug Delivery Review*, *107*, 333–366.

Chieng, B. W.; Ibrahim, N. A.; Yunus, W. M. Z. W.; Hussein, M. Z. (2014) Poly(Lactic Acid)/Poly(Ethylene Glycol) Polymer Nanocomposites: Effects of Graphene Nanoplatelets. *Polymers (Basel)*, *6* (1), 93–104.

Kumar, A. P.; Depan, D.; Singh Tomer, N.; Singh, R. P. (2009) Nanoscale Particles for Polymer Degradation and Stabilization-Trends and Future Perspectives. *Progress in Polymer Science*, *34* (6), 479–515.

Lim, L. T.; Auras, R.; Rubino, M. (2008)Processing Technologies for Poly(Lactic Acid). *Progress in Polymer Science*, *33* (8), 820–852.

Perim, E.; Machado, L. D.; Galvao, D. S. (2014) A Brief Review on Syntheses, Structures, and Applications of Nanoscrolls. *Frontiers in Materials*, p 31.

Tang, B.; Yun, X.; Xiong, Z.; Wang, X. (2018) Formation of Graphene Oxide Nanoscrolls in Organic Solvents: Toward Scalable Device Fabrication. *ACS Applied Nano Materials*, acsanm.7b00160.

Wang, X.; Gao, Y.; Li, X.; Xu, Y.; Jiang, J.; Hou, J.; Li, Q.; Turng, L. S. (2017) Selective Localization of Graphene Oxide in Electrospun Polylactic Acid/Poly(ε-Caprolactone) Blended Nanofibers. *Polymer Testing*, *59*, 396–403.
Xu, Z.; Zheng, B.; Chen, J.; Gao, C. (2014) Highly Efficient Synthesis of Neat Graphene Nanoscrolls from Graphene Oxide by Well-Controlled Lyophilization. *Chemical Materials, 26* (23), 6811–6818.
Zheng, B.; Xu, Z.; Gao, C. (2016) Mass Production of Graphene Nanoscrolls and Their Application in High Rate Performance Supercapacitors. *Nanoscale*, *8* (3), 1413–1420.

Torrefaction of Sewage Sludge to Increase Energy Characteristics

Joshua Worley[1] and Dr. Prashanth Buchireddy[2]
1 Chemical Engineering Department, University of Louisiana at Lafayette, jew8186@louisiana.edu
2 Chemical Engineering Department, University of Louisiana at Lafayette, pxb5173@louisiana.edu

ABSTRACT

As the global population continues to rise so does demand for energy and fuel products. This demand is currently met with non-renewable fossil fuels and their derivatives even amid rising concerns about supply and the environmental effects burning fossil fuels has. According to the Global Energy Statistical Yearbook, CO2 emissions rose by 2.1% in 2017 alone. Further, other environmental toxins are released during fossil fuel consumption such as nitrogen oxides and sulfur dioxide which cause rainwater acidification and habitat destruction. This ongoing increase of pollutants in the atmosphere affects everything from climate change and weather patterns, to the amount arable land and ocean acidity. Socio-environmental concerns notwithstanding, there is another large problem with fossil fuels: they are completely non-renewable and are being produced at an unsustainable rate. Thus, it is essential that cleaner, safer, and renewable sources of fuel be found to meet and exceed this increasing demand.

Each year, massive amounts of waste are produced in industry, agriculture, and municipalities, and much of this waste is disposed of in unsustainable and non-environmentally friendly ways. This waste generally falls into two categories: lignocellulosic and non-lignocellulosic, each with their own unique benefits and challenges as sources of sustainable and economic energy production. Sewage sludge is a large and ever-increasing part of this waste which is currently only used for agricultural fertilizer or is land-filled- both at significant cost to municipalities and waste management companies. However, this sludge is very energy rich; thus, it constitutes a large, cheap, non-utilized, and increasingly interesting material for fuel conversion research.

Key Words: Renewable Energy, Waste Conversion, Torrefaction

1. INTRODUCTION

Torrefaction is a promising process of producing coal like products from this sludge which can be blended and co-fired in industrial power and chemical production processes. The process is a mild form of pyrolysis at temperatures between 200 and 300 degrees Celsius. It can be used alone to produce biochar, or it can be used as a pretreatment method for other processes such as gasification. We wished to study the characteristics of the biochar produced by torrefying sludge. In terms of torrefaction, two of the most important process parameters are residence time and temperature. Other process parameters can be tweaked to marginally increase desired properties of the char, or economics of the process, but temperature and residence time are most important. These two parameters affect the mass and energy yields of the product, the energy requirements of the process, and the calorific value of the fuel produced. The process parameters for lignocellulosic biomasses are well researched; however, the parameters for sewage waste are not. Therefore, the goal of this study was to determine the properties of

sewage sludge after torrefaction and to discover how changing process parameters changes the fuel properties. Further, this study aimed to determine the viability of recycling gasses produced during the process to supplement the fuel required for drying and reaction heating. In terms of process economics, such recycling and self-sustainability could be vital to industrial torrefaction operations.

2. RESULTS

We found that the torrefaction temperature has a greater effect on the properties of the biochar produced. Further, we found that ash is a major barrier to the viability of torrefied sewage sludge as an energy source as it significantly decreases the heating value of the product. The gasses produced during the torrefaction reaction require more thorough analysis to determine exact energy values and component makeup, but we found that there are sufficient species in the gas mixture to allow cofiring to supplement natural gas. Further research should be concentrated on remediation of the problem of ash- whether that be through removal or blended torrefaction- as well as identification of all species contained in the off-gas stream.

Demons Within: Shared Perspectives between Undergraduates and a Local Mass Shooter

Kyla Zimmerman[1], Jonah McManus[2], Emily K. Sandoz[3]
1 kjz6214@louisiana.edu, University of Louisiana at Lafayette
2 Jonahdm@gmail.com, University of Louisiana at Lafayette
3 eek2950@louisiana.edu, University of Louisiana at Lafayette

ABSTRACT

It is difficult for most people to imagine the kinds of ideas would support someone committing horrific violence against strangers. And yet, these crimes occur in the U.S. with a fair degree of regularity, suggesting the sentiments involved may not be all that bizarre. The current study sought to explore how a sample of undergraduates might endorse the ideas of a local mass shooter, and how that endorsement might correlate with measures of psychological well-being and prosocial behavior. Statements were harvested from the personal diary of John Houser. Undergraduates self-reported their agreement with his statements, and completed questionnaire assessments of psychological flexibility, self-compassion, and sexism. A significant number of undergraduates endorsed the diary statements, which tended to fall into two primary factors: criticisms of America, and criticisms of minorities. Patterns of correlations suggested that both factors were associated with psychological flexibility, self-compassion, and sexism in distinct patterns.

1. INTRODUCTION

If questioned, most people would probably assert that perpetrators of violent crimes think much differently than they do. This makes sense – it seems a perfectly natural and comforting assumption for the average person to think that they could not possibly have anything in common with a murderer or other violent offender. In fact, it has often been the case historically that those who commit evil acts are viewed as "separate" from the rest of society somehow – marked as different by their monstrosity, and certainly nothing like anyone else. But it is often the case that those who commit great atrocities are not unlike those around them; many have meaningful relationships and are well assimilated into their communities (Waller, 2007). Given the increasing frequency of mass shootings and other violent crime in American society, it seems likely that the thoughts of violent offenders must not be as far-fetched as most think. It also seems likely that there must be some common themes in thoughts and opinions held by those who kill, and those who do not. In this study, researchers examined how the thoughts of a local mass shooter, John Houser, converged with those in the public and with various measures of psychological and prosocial functioning in an effort to understand the mechanisms by which extreme thoughts can become extreme actions.

2. METHODS

Participants in this study were undergraduate students at the University of Louisiana at Lafayette, who participated in the study in exchange for credit in their psychology classes. This study utilized a series of questionnaires to gather information from participants. A demographic questionnaire obtained age, sex, and ethnicity. The Acceptance

and Action Questionnaire II (AAQII; Bond et al., 2011) assessed psychological inflexibility, acceptance, and experiential avoidance in participants. The Ambivalent Sexism Inventory (ASI; Glick & Fiske, 1996) was used to measure attitude of both hostile and ambivalent sexism among participants. The Self Compassion Sub-scale (SCS; Neff, 2003) was used to assess self compassion in terms of self kindness, common humanity, mindfulness, self judgment, isolation, and overidentification. In addition, the Thematic Reliability Survey (TRS) was developed for this study by harvesting statements from the personal diary of a local mass shooter.

3. PROCEDURE

Participation for the study was conducted online, with participants accessing the materials through Survey Monkey. Participants were first instructed to review an online informed consent form, which allowed them to document electronically whether or not they wished to proceed. If they indicated "no," they were thanked for their interest and informed that they could close the browser window and would incur no penalty. If they indicated "yes" to proceeding, they were directed to complete the study's questionnaires. Upon completion of all questionnaires, participants were shown to an electronic debriefing form, which told them in a little more detail about the study's purpose, described the variables relevant to the study, and let them know about on campus counseling services available to them should they need such services. After reading the debriefing form, participants were directed to a final page which asked them for their names and CLID numbers, which were the pieces of information needed to assign credit to the students. As these pieces of information were in no way associated with the participants' data, researchers did not deem this to be a threat to confidentiality. Finally, participants were thanked once more and told that they could close their browser windows and that their participation was complete.

4. FINDINGS

Data analysis proceeded in two stages. First, TRS data were subjected to factor analysis to see if patterns of responding emerged. Second, factors that emerged were subjected to correlational analysis along with scores for psychological flexibility, sexism, and self-compassion.

A factor analysis was performed to determine if there were any significant patterns of responding that would suggest that statements converged around key factors. Examination of eigenvalues from the factor analysis revealed four potential factors, two of which accounted for 23% percent of the variance in responses. The data were subjected to varimax rotation to yield two factors, and all items with rotated factor loadings over .30 were retained. Items were examined for thematic similarity. In this solution, items loading on factor 1 pertained to the perpetrator's criticisms of America and its perceived moral decline, and items loading on factor 2 pertained to the perpetrator's criticisms of various minority groups – including people of color, women, and the LGBT community. Scores were calculated for both factors, which were named America-Critical and Minority-Critical. Distributions of responses to both newly formed scales suggested a number of participants exhibited the thinking patterns they assess.

Correlational analyses revealed a number of convergences. Scores on the AAQII ($R = 0.39$, $P < 0.0001$), SCS Self Judgment ($R = 0.22$, $P < 0.0001$), and SCS Over Identified scales ($R = 0.33$, $P < 0.0001$) were all significantly positively correlated with scores on the new America-Critical scale. Scores on Overall Sexism ($R = 0.58$, $P < 0.0001$), Hostile Sexism ($R = 0.5$, $P < 0.0001$), Common Humanity ($R = 0.13$, $P = 0.0214$), and Mindfulness scales ($R = 0.13$, $P = 0.196$) were all positively correlated with the Minority-Critical scale. The Benevolent Sexism Sub-scale (America Critical: $R = 0.12$, $P = 0.0291$, Minority

Critical: R = 0.5, P < 0.0001) and Total Self Compassion Scales (America Critical: R = -0.24, P = 0.0291, Minority Critical: R = 0.14, P = 0.0144) correlated significantly with both factors.

5. DISCUSSION

The aim of this study was to examine how opinions in a population of college students compared to those of a local mass shooter. Having now identified two significant factors in this study, researchers plan on conducting further investigation into how those factors may relate to other opinions held by participants. It stands to reason that certain surveys correlated more with certain factors. The Minority-Critical factor, for example, correlated significantly with surveys assessing qualities like sexism, which is logical when considering that Factor 2 pertains to discriminatory opinions. Researchers are interested now in further examining how certain qualities will correlate with the two factors. Additional measures will be added in the future to assess how qualities like patriotism, nationalism, racism and homophobia in participants relate to the two factors. The Thematic Reliability survey used in this study contains statements written by an individual whose distaste for American society and minority groups within it led him to commit a violent act. The goal of this research is to assess how the kinds of statements that people relate to and the opinions they hold can be impactful, even leading to violent consequences.

REFERENCES

Bond, F. W., Hayes, S. C., & Baer, R. A. (2011). Preliminary psychometric properties of the acceptance and action questionnaire – II: a revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42* (4), 676 – 688.

Glick, P., & Fiske, S. T. (1996). The ambivalent sexism inventory: differentiating hostile and benevolent sexism. *Journal of Personality and Social Psychology, 70* (3), 491 – 512.

Neff, K. D. (2003). Development and validation of a scale to measure self compassion. *Self and Identity, 2,* 223 – 250.

Waller, J. (2007). *Becoming Evil: How Ordinary People Commit Genocide and Mass Killing.* New Yok, NY: Oxford University Press.