

# INclusive quiry

Research Week 

14<sup>TH</sup> ANNUAL

## Research Week Proceedings

University of the Incarnate Word | April 12-16, 2021



OFFICE of  
RESEARCH &  
GRADUATE STUDIES

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# INclusive quiry

## Research Week

To view poster and podium presentations and access live events, please visit us at this link:

[Virtually Attend UIW Research Week 2021](#)

### Live Event Schedule

	Monday Apr 12	Tuesday Apr 13	Wednesday Apr 14	Thursday Apr 15	Friday Apr 16
LUNCH AND LEARNS	12 – 1 pm	12 – 1 pm	12 – 1 pm	12 – 1 pm	11 – 12 pm
	<b>Topic:</b> <i>How to Publish Your Research</i> <b>Moderators:</b> Dr. Darlene Carbajal, Comm Arts SMD; Dr. Trinidad Macias, ORGS <b>Panelists:</b> Dr. Trey Guinn, Comm Arts SMD; Dr. Sharon Herbers* and Dr. Alfredo Ortiz, Grad Studies DSE <small>*prof emeritus</small>	<b>Topic:</b> <i>Statistical Pearls for Basic, Clinical and Translational Research</i> <b>Presenters:</b> Dr. Jeffrey Rabin and Dr. Frances Silva, Optometry	<b>Topic:</b> <i>The Challenges of Cross-Collaboration: Uniting SATX and CDMX Campuses with Research</i> <b>Presenters:</b> Dr. Scott Roberts, Business Admin HEBSBA and Prof. Felipe Torres, Business Admin, Centro UIW, Mexico	<b>Topic:</b> <i>Who's Reading This Anyway? Open Access and Your Research</i> <b>Presenters:</b> Paul Andersen, Librarian; Erin Cassidy, Dist. Learning Librarian; Kristin Johnson, Grad Studies & Learning Assess. Librarian	<b>Welcome and Keynote:</b> Dr. Arturo Chavez, Asst. VP Mission & Ministry  <b>Topic:</b> <i>Risking the Danger of Trying to Heal in Pandemics</i> <b>Presenters:</b> Prof. Margaret Mitchell and Dr. David McTier, Theatre for Social Change
MOODY LECTURES		2 – 3 pm	2 – 3 pm	2 – 3 pm	12:10 – 1 pm
	 	<b>Topic:</b> <i>Searching for the Motherland: Gendered Notions of Belonging in Contemporary Literature</i> <b>Lecturer:</b> Dr. Tanja Stampfl, UIW	<b>Topic:</b> <i>Inventory Control in the Supply Chain of Perishable Items</i> <b>Lecturer:</b> Dr. Reza Maihami, OLLU	<b>Topic:</b> <i>Clergy Attitudes Toward Credit/Debt</i> <b>Lecturer:</b> Dr. Kristina Terkun, OLLU	Poster Presentations, Service-Learning Opportunities  1 – 3 pm  Podium Presentations, Service-Learning Opportunities  <div style="text-align: center;">   <b>Winning teaching for all who have service learning</b>               “AT ITS CORE, THE MISSION IS ABOUT TRANSFORMING US FROM VIEWERS OF A DISCONNECTED AND CONFLICTED INTERNATIONAL REALITY TO PARTICIPANTS IN CREATING A MORE INTERCONNECTED AND RESPONSIVE GLOBAL COMMUNITY.”            – SR. DOT ETTLING         </div>
SERVICE LEARNING & ENGAGED SCHOLARSHIP SHOWCASE 11 – 3 pm					

Please contact ORGS with any questions or requests at [wandless@uiwtx.edu](mailto:wandless@uiwtx.edu) or (210) 805-3555

# PERFORMING ARTS PRESENTATIONS

COLLEGE OF HUMANITIES, ARTS, AND SOCIAL SCIENCES

## *THE JUDGMENT*

**Joseph DeLeon, PhD<sup>1</sup>**

The Judgment is an artistic representation of the dialog which ensues during the journey between the First Judgment and Final Resolution that takes place between the Body and the Soul immediately after the death of the Person. The Christian

perspective of dualism is examined during this dialog and at the end of journey, the dialectic between the Flesh and the Spirit is ironically and irreducibly resolved by Divine Love.

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## PODIUM PRESENTATIONS

COLLEGE OF HUMANITIES, ARTS, AND SOCIAL SCIENCES

*HUNGERING FOR LITERARY REALITY: APPLYING CHRISTIAN LITERARY THEORY TO DAVID SHIELDS'S REALITY HUNGER (2010)*

**Julia Robles<sup>1</sup>**

**Purpose:** Applying Christian literary theory concepts to a deconstructionist based novel.

**Rationale:** David Shields uses literary collage as the primary medium for his 2010 book *Reality Hunger*: in other words, historical incidents, definitions, art/music movements, and other authors' and artists' quotes create unique intertextual prose that makes up an innovative and visionary text. Shields's deconstructionist literary approach for fiction and non-fiction provides commentary on how the need for "real" has changed the landscape of many art forms and literature. His literary manifesto (as Shields dubs his book) divides the text into twenty-six sections with fragmented writings splattered throughout each segment. The basis of *Reality Hunger's* structural format mimics the human experience of reality. Hence, Shields's choice of construction is not accidental or haphazard but engages the reader seductively into an acceptance of a subjective truth. The embrace of "I" in Shield's book interjects personal beliefs into the myriad of observations in which Shields becomes the narrator and main character. That is not to say the novel presents a resounding narrative point of view by any means, but rather that it emphasizes an unapologetic mimesis (bordering on plagiarism) and that takes liberties as a literary genre. Still, for the reader, ambiguity seems rampant in the constant "discovery" of voices and in the dissection of Shields's motivation. Shield's writing a reminder that all work is derivative and based on the creator's

personal experiences, including, for him, those claims rooted in Absolute Truth. Shields argues that non-fiction writing is an allusion, a figment of our imagination created by personal bias and understanding. Shields presents "the lure and blur of the real" (5)—a literary sfumato that deserves esteem based on the overall effect and not by how closely it aligns with truth. He uses several quotes that treat the term real, reality, realistic, etc., as fluid terms that lack a concrete consensus.

**Methodology:** What I will argue in this presentation is that modern America's rising popularity of alternative facts creates a need to examine the dangers of Absolute Truth denial as it is celebrated in *Reality Hunger* and other postmodern, deconstructionist texts. Deconstruction denies the existence of Absolute Truth altogether.

**Findings:** Thus, I will suggest that it is imperative to use a Christian literary theory perspective entrenched in the idea of the Incarnate Word to push back against the belief that there can never be a shared understanding of Absolute Truth. Shields's *Reality Hunger* provides a platform to question truth and reality and therefore to examine the semantics of reality and the similarities and differences in assessments between deconstructionism and Christian literary theory—the main points I will be taking up as considerations in this analysis.

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*ACCOUNTANTS' PERSPECTIVE ON THE ENVIRONMENT*

**Theresa Tiggeman, PhD, CPA<sup>1</sup>**

**Purpose:** The purpose of this non-experimental, correlation, quantitative study was to examine accountants' environmental worldviews by employing the New Ecological Paradigm (NEP) Scale for accountants as having a pro-environmentalist worldview or a Dominant Social Paradigm (DSP) worldview and the demographic effects on these worldviews. RQ1. To what extent, if any, do accountants score with pro-environmental or dominant social paradigm attitudes when evaluated on the New Ecological Paradigm scale? RQ2. To what extent, if any, is there a statistically significant relationship between accountants' gender and accountants' environmental attitude scores on the New Ecological Paradigm scale? RQ3. To what extent, if any, is there a statistically significant relationship between accountants' age and the accountants' environmental attitude scores on the New Ecological Paradigm scale?

**Rationale:** Criticism of the accounting profession concerning sustainability accounting reporting has appeared in recent accounting literature (Adams, 2015; Flower, 2015). Williams and O'Donovan (2015) emphasized the need for investigating accountants' involvement in sustainability reporting because a gap exists between accountants' perceived contribution and actual contribution in sustainability accounting. Much of the criticism of accountants and sustainability accounting reporting centers on conventional accountants who want to keep the status quo of financial reporting (Adams, 2015; Flower, 2015). However, no research has investigated the environmental worldview of accountants.

**Methodology:** This research was a non-experimental correlational study using the NEP

Scale to determine the worldviews of accountants. The NEP Likert-type scale ranges from strongly agree to strongly disagree with a neutral category of undecided (Chang, 2015). The NEP scale reverses the scoring for odd and even numbered statements yielding an environmental attitude value (Pienaar et al., 2015). The statements alternate with the odd numbers representing a pro-environmentalist worldview and the even numbers represent the DSP worldview (Dunlap, Van Liere, & Mertig, 2000). This research entailed a survey of a random sample of accountants who were Certified Public Accountants (CPAs) and members of the American Institute of Certified Public Accountants (AICPA).

**Findings:** For research question 1, a one-sample t-test to compare a mean score to a known or hypothesized mean was performed. There was a statistically significant mean difference from the NEP sample to the NEP scale midpoint  $t(86) = 2.067$ ,  $p = .042$ . The null hypothesis was rejected,  $\mu \neq 45$ . Accountants scored as pro-environmental on the NEP scale. For research question 2. A point-biserial correlation coefficient was performed to assess the relationship between the NEP and gender. The results showed there was no statistically significant relationship between the NEP and gender,  $r_{pb} = 0$ . For research question 3, a Pearson's product moment correlation was employed to assess the relationship between age and NEP. The correlation was statistically significant,  $p = .049$ . The null hypothesis was rejected. Age was negatively correlated to NEP. This result was a small, but significant correlation, indicating older participants are less pro-environmental. This study provided the first evidence of accountants having a pro-environmental worldview and refuted the criticism in the sustainability accounting literature.

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## *CURRICULUM PLACEMENT IN ACCOUNTING ETHICS EDUCATION*

Trish Driskill, Henry Elrod<sup>1</sup>

**Purpose:** In the United States, ethics education in accounting programs is mandated by the state board of public accountancy, which sets qualifications needed to sit for the uniform CPA examination. These requirements leave several questions unanswered: (a) should instruction be integrated or stand-alone, (b) how should courses be taught, and (c) when should courses be taught? Should ethics be (a) taught at the beginning of undergraduate, (b) taught when students take intermediate accounting, or (c) saved for graduate programs when students are more mature? The purpose of this study was to assist accounting educators in the placement of their accounting ethics content in their curricula.

**Rationale:** Ethics education in accounting programs across higher education has changed since the onslaught of accounting scandals in the early 21st century and after the induction of the Sarbanes-Oxley Act. Numerous state boards now mandate the need to educate future accountants in ethics and moral reasoning.

**Methodology:** This study compiles the research literature and analysis of the approved ethics course listings filed with the Texas State Board of Public Accountancy (TSBPA, 2018). Given the multitude of factors influencing the growth of moral judgment and ultimately moral behavior in the business profession, an empirical study making a judgment about the best time to teach the subject would not be relevant. In other words, one could give a standard test of ethics, but no such test could compensate or assess an ethical/unethical outcome in the future or correlate those actions based on the effectiveness of some prior ethics teaching.

**Findings:** Although conflicting findings surround the topic of stand-alone versus integrated ethics instruction, recent developments point towards the idea that integration of ethics leaves a lasting perception of importance throughout an accounting program if the appropriate focus is placed on ethics and exposure to corporate dilemmas. The researchers also agree that an effective pedagogy of ethics is also necessary, along with educators that are knowledgeable in ethics education. Ultimately, ethics instruction has to be integrated throughout an accounting curriculum top to bottom, as well as in the general non-accounting business curriculum. The placement of an ethics course in the accounting curriculum continues to remain unanswered and varies among institutions. In Texas, the majority of the ethics courses are offered in junior level and above courses. Thus, the thought that teaching ethics at the beginning of the undergraduate program may not be as beneficial as teaching ethics later on when students are taking higher-level accounting courses and can relate the ethical dilemmas to the accounting profession. Effective ethics teaching needs to be in discrete courses for first-year students, as well as for the master's level students (different courses, different expectations). However, the research presented in this report indicates that graduate accounting students are better prepared to deal with the ethics material in the real-world and accounting profession compared to lower level business students. Future research is needed to determine the effectiveness of implementing ethics integration, as well as the development of successful instruction of ethical reasoning within the accounting curriculum.

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*IT TAKES A VILLAGE TO LAND A JOB: AN INTERDISCIPLINARY APPROACH TO HELPING MARKETING STUDENTS BECOME BETTER WRITERS*

**Alberto Rubio, Tanja Stampfl<sup>1</sup>**

**Purpose/Rationale:** Employers in all fields prioritize effective writing and communication in their new hires. Unfortunately, content knowledge and writing skills are taught in discipline-specific silos at the university, so that when the time comes to apply for internships and jobs, students often don't have the requisite writing skills to effectively demonstrate their qualifications for a position in their field. In order to address this deficiency, we chose an interdisciplinary approach by introducing a writing assignment with proven revision strategies into a Marketing class. It consisted of creating a cover letter for a potential internship position, which required students to research the industry, the company, and the specific position being offered; all of these are essential marketing research activities. The students prepared multiple drafts and incorporated feedback from the instructor and Writing Center tutors, which were strategies adapted from the traditional writing classroom. We compared two different sections of the same course to evaluate whether there was a significant difference in the quality of the documents. In particular, cover letters without guidance often merely mirror rather than complement the resume, don't follow genre conventions, are not tailored to the specific position and company, and don't provide enough convincing support for the applicant's qualifications.

**Methodology:** The project was assessed using a mixed method. A rubric and student responses were administered and analyzed both qualitatively and quantitatively by professors in the Marketing and English Departments. Qualitatively, the drafts were assessed by the degree to which they illustrated knowledge of the company and the

particular position advertised and how well the applicant matched select past achievements to specific future contributions. In short, the letter needed to be specific, selective, and convincing. Based on these assessments, each letter received three scores: Content, Format, and Overall Score. Quantitatively scores from the first and the second draft were compared to determine whether a) significant improvement occurred between drafts, and b) whether one area of the cover letter profited most from feedback.

**Findings:** Analysis of Variance was used to investigate the differences between the first and final drafts of the cover letter looking at three scores: Content, format, and the overall score. Significant differences were found for content [ $F(1, 52) = 6.410, p = .014$ ] and the overall score [ $F(1, 52) = 6.734, p = .012$ ], but not for format [ $F(1, 52) = 2.440, p = .124$ ]. Qualitatively, we found that final drafts more often included specific relevant examples that matched the skills advertised in the internship position. While students aimed to accomplish these tasks in the first draft, they mostly resorted to generalized and non-specific language and statements, which are not convincing. Final drafts showed a greater audience awareness and a more informed selection of information to be included in the cover letter. Format improved only slightly, since many grammar, spelling, and stylistic mistakes remained. This study actively combines strategies and skills from the writing and the Marketing classroom to enhance student learning in both disciplines. As a result, students emerge as more effective communicators when they enter the professional field.

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## *THE STRUCTURE OF OECD UNEMPLOYMENT*

Taylor Collins, PhD<sup>1</sup>

**Purpose:** The purpose of this paper is to uncover statistical evidence on the best way to model unemployment in over 30 OECD countries.

**Rationale:** There are currently three primary theories describing the evolution of national unemployment rates: Natural Rate of Unemployment theories, Hysteresis theories, and Structural Change theories. Deciding which theory to use is a key component of macroeconomic modeling, with different theories often leading to wildly different conclusions. My research will provide statistical evidence for or against these theories for each of the countries studied in my paper. This will assist economic researchers in choosing the optimal theory of unemployment to include in their macroeconomic models, thereby facilitating more compelling, accurate, and valuable research. While I am not the first economist to pursue this objective, my research updates this line of research by applying new econometric methods and expanding the research to a wider range of countries.

**Methodology:** Each of the three primary theories on the evolution of the unemployment rate possess distinct statistical characteristics. Natural Rate of Unemployment theories posit that there is some “natural” level of unemployment that the unemployment rate will continually gravitate towards. When unemployment is above this level, economic factors will apply downward pressure and push unemployment back towards the natural rate, and vice versa. In the terminology of statistics, we call this dynamic stationarity. As such, if an unemployment rate is statistically stationary, this will provide support that unemployment is behaving consistently with Natural Rate of

Unemployment theories. On the other hand, Hysteresis theories assert that every shock to unemployment is permanent. If the unemployment rate were to rise or fall, no market force would kick in to return it to any “natural” level. When a time series displays this characteristic, we call it nonstationary. So when an unemployment rate is statistically nonstationary, it provides supporting evidence for Hysteresis theories of unemployment. The final class of theories, Structural theories, posits that most unemployment shocks are temporary, as suggested by Natural Rate of Unemployment theories. However, there are a select few that are permanent, forever altering what the natural rate of unemployment is. In statistics, this is consistent with a time series that is stationary with structural breaks. Meaning, finding evidence of stationarity around a few structural breaks in an unemployment series would be support for a structural theory of unemployment. I therefore apply 3 different stationarity tests on the unemployment series of my OECD countries: Augmented Dickey Fuller (ADF) Tests, Dickey Fuller Generalized Least Squares (DFGLS) Tests, and Markov Switching Augment Dickey Fuller (MSADF) Tests. Of these, application of the MSADF tests are the greatest contribution to this field.

**Findings:** I uncover evidence supporting structural theories of unemployment for approximately two-thirds of the countries studied. The one notable deviation from this trend is a cluster of Eastern European countries, which all found evidence supporting Hysteresis theories of unemployment. This poses an important question: why is the evolution of unemployment behaving differently in Eastern Europe than in the rest of the world?

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## SCHOOL OF MEDIA AND DESIGN

### *CROSS-COURSE COLLABORATION: A MULTIFACETED APPROACH TO ENHANCE STUDENT LEARNING BY PROJECT SCAFFOLDING COHORT COURSES*

**Dr. Diana Allison, NCIDQ, ASID, IDEC, ReGreen Certified; Adam Nash, NCIDQ, IDEC, IIDA, ASID, WELL AP, LEED Green Associate; Judy Ruvuna, M. Arch., Assoc. AIA, IDEC, Assoc. IIDA<sup>1</sup>**

**Purpose:** Students arrive in class with specific processes they perform to create new knowledge (Merriam, et al., 2007). These processes are defined as learning styles. Gregorc (2003) identified four specific learning styles: Abstract Random, Concrete Random, Concrete Sequential, and Abstract Sequential. All these learning styles are represented in the interior design student population. A variety of instructional techniques is needed to address these different styles (Ankerson & Pable, 2008). “Bringing faculty with diverse teaching strategies together on one multifaceted project can accommodate a variety of learning styles” (Waxman et al., 2017, pg. 655).

**Rationale:** Student learning in interior design courses is usually project-based and can adapt to these different learning styles. Students seem to learn best through applying concepts and theories to given scenarios. The second semester sophomore cohort and first semester junior cohort take five and four, respectively, interior design courses in that semester, each course utilizing different project scenarios. The creation of a BFA in the interior design program in 2017 creates student cohorts, most who are taking the same courses. Utilizing a tactic from Florida State University’s interior design program, a single studio project can serve as the project scenario in that cohort’s other interior design courses (Waxman, et al., 2017).

**Methodology:** Using an action research model, faculty collaborated and determined the best fit for project guidelines for each course. For sophomores, the Studio 1 residential design project served as a basis for projects in the last half of their computer-aided drafting class and the final project in their

lighting class. For juniors, the Studio 2 commercial design project served as a basis for projects in their advanced computer-aided drafting class, their codes and construction documents class, and their interior materials class. Faculty shared their observations with each other through the semester. The different teaching styles of the instructors and the different requirements of the non-studio courses allowed students to scaffold information from one class to another and increase their depth of knowledge through the one project. Previously, studio projects required elements from all these classes but contained within the parameters of the one studio class.

**Findings:** Sharing the project scenario in the other cohort courses allowed for an ongoing dialog between students and faculty and enhanced learning outcomes. Students can focus on the design process and development in the studio class, focus on the required elements of the other courses (computer programs, lighting, codes, specifications, materiality, etc.), and obtain a richer understanding of all the requirements as the project is spread through three to four classes. Students reported more focus on the project because of one project scenario to learn instead of different scenarios in each course. They have also reported an increased in-depth exploration with the project. Faculty have noted the success of this scaffolding of knowledge through the courses and the new level of understanding and design application students are achieving. The interior design department intends to continue this collaborative teaching method and expand into other semesters of the students’ path to graduation.

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*FAST FASHION AND SUSTAINABILITY: GENERATION Z AND MILLENNIALS' DISCONNECT BETWEEN ENVIRONMENTAL CONCERNS AND PURCHASING HABITS*

**Julia Robles; Melinda Adams, PhD<sup>1</sup>**

**Purpose:** The opposing beliefs between sustainability and fast fashion are rapidly coming to a head. To examine how Generation Z and Millennials' concern over the environment influences their shopping habits, this pilot study gathered information on top societal concerns, stores shopped, shopping habits, and sustainability of their shopping habits. Research found that most participants listed concerns for fair and ethical labor practices and climate change top concerns. Based on shopping habits reported, these concerns are in direct conflict. The conflicts between concerns and shopping habits show a lack of awareness on the environmental impact fast fashion purchases have. With the pandemic affecting the economy and buying power of these Generation Z and Millennials, it is difficult to know the complete picture. The results of this study show there is a lack of awareness between fast fashions impact on the environment and Generation Z and Millennials concern for fair and ethical labor and sustainable apparel.

**Rationale:** Reconciling fast fashion's harmful environmental impact Generation Z and Millennials growing environmental concern is a global problem. The popular practice of single wear outfits of these generations digital footprint created an environment of trendy value shopping offered by fast fashion. This research aims to discover awareness between Generation Z and Millennial social and environmental concerns and how it affects their shopping habits.

**Methodology:** We will use the following questions to gather and analyze our research. Does concern for the environment influence shopping habits? Does climate change concern influence consumer shopping habits? Are there other social issues besides the environment that influence shopping habits? When developing the survey, researchers considered scholarly literature and industry articles that examine demographics, shopping and spending habits, marketing, social responsibility, pandemic effects to retail, and environmental concerns of the Millennial and Generation Z. These topics were used to develop thirty-five survey questions to gather data on environmental and social concerns and how that may or may not affect apparel purchases.

**Findings:** The pandemic has put more economic limitations on already value driven generations. In turn, it may keep clothing purchasing habits-based climate change concerns far apart. Based on literature, the fashion industry is one of the biggest perpetrators of waste and pollution to our natural resources. The study shows there seems to be a disconnect in Generation Z and Millennials understanding how clothing purchases and climate change are connected. Education and knowledge for consumers should be included in how sustainable clothing brands market to Generation Z and Millennials to match the principles and values of these generations.

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*SURVIVE OR SURRENDER: INDIGENOUS IDENTITY AND LAND IN THE WORKS OF TAYLOR SHERIDAN*

**Raymond Blanton, M.Div., PhD<sup>1</sup>**

**Purpose:** This research is committed to decolonizing public address and foregrounding indigenous voices to broaden and deepen our understanding of the complex rhetorical agency of American indigenous communities. Specifically, I am primarily concerned with the rhetorical significance of indigenous identification with land in the works of Taylor Sheridan. Yet, given the “serious challenges” in conducting research about the “historical construction of Indian in American popular culture,” and moreover, given the largely hostile nature of cinematic history concerning indigenous people and culture, it is imperative to reevaluate and renegotiate the status of sovereignty and land for indigenous communities in the context of the cinema.

**Rationale:** I examine the rhetoric of indigenous identification with land in Taylor Sheridan’s *Hell or High Water*, a heist western set in Comancheria (literally, Comanche land), and *Wind River*, a wintry western set on the Wind River Indian Reservation - along with additional work in the series *Yellowstone*. Altogether, aligned with the theme of *Inclusive Inquiry*, this study provides important considerations related to identity and

representation of indigenous communities in public culture and discourse.

**Methodology:** This is a qualitative and critical research case study.

**Findings:** In short, land is integral to indigenous identity. Specifically, I argue there are four interrelated rhetorical dimensions working to renegotiate indigenous standing: indigenous people and culture are central, indigenous identification with the land is integral, protection and failure to protect play prominently, and finally, indigenous voices are forefront. Consequently, I examine six interworking facets within these dimensions that illustrate how these films mediate the rhetoric of indigenous identification with the land. To be clear, though I explore varied aspects of meaning from the perspectives of the filmmakers and critics, these serve the grander purpose of distinguishing the aforementioned rhetorical dimensions and themes as a means toward dismantling hegemonic stereotypes and renegotiating the status of indigenous sovereignty and land.

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*“YOU ALL LOOK LIKE @WOLFIECINDY:” THE HOMOGENY OF FACIAL SELF-PRESENTATION AMONG FEMALE INSTAGRAM USERS*

Kelly McGinty<sup>1</sup>

**Purpose:** The purpose of this research is to highlight the emergence of a single facial aesthetic (i.e., “Instagram Face”) among professionally beautiful women on Instagram, to demonstrate that users who view this homogenized image of beauty idealize the look, and to argue that women are being encouraged to modify their own self-presentation to replicate this beauty ideal.

**Rationale:** This research contributes to a territory largely uncharted by academic research—scant research exists on facial beauty within Instagram, overshadowed by larger topics of ideal body shape and size on the platform. This research offers a foundation for further critical examination of Instagram Face and considerations of how female facial beauty is presented on Instagram.

**Methodology:** This research utilizes a mixed-methods approach consisting of a quantitative content analysis to explain the homogeneity of Instagram Face amongst female Instagram users followed by a qualitative textual analysis to explore how content on the app encourages conformity to Instagram Face. A quantitative content analysis produces data that reveals the ubiquity of a single form of facial self-presentation among female Instagram users. An analysis of the affordances available to Instagram users such as augmented reality filters, instructional makeup tutorials, and third-party photo editing services demonstrate the idealization of and aspiration towards Instagram Face. Finally, a qualitative textual analysis of the visual and textual content published on Instagram in the form of “Kylie Package” promotions, celebrity call-out accounts, and celebrity plastic surgeons’

accounts through a postfeminist lens argues how Instagram encourages self-objectification, self-surveillance of the body, and managing of facial self-presentation in accordance with Instagram Face.

**Findings:** The faces of women who are considered beautiful on Instagram all look astoundingly the same, constructing a very narrow definition of female beauty. Sixty-four percent of the top 50 female models on the app present their faces with uplifted, catlike eyes. Eighty-six percent have full lips. Defined, chiseled cheekbones, a strongly projected chin, a flat platform beneath the chin, and a defined, chiseled jawline appear across 100% of these women. Additionally, 78% display a straight and upturned nose, 84% have high eyebrows, and 98% have shallow, voluminous tear troughs. As far as skin texture goes, 84% of these women present their faces with a total absence of wrinkles and lines, and 100% present their face sans acne. Furthermore, 48% of them possess all of the characteristics of Instagram Face. Furthermore, Instagram has perpetuated the desire for this standardized face through images and accompanying captions constituting Kylie Jenner filler package promotions, celebrity call-out accounts, and a class of celebrity plastic surgeons on the app. This phenomenon exemplifies postfeminism by encouraging women who consume such content to partake in self-objectification, body-surveillance, and meticulous self-presentation management in accordance with the beauty ideal under a guise of female choice, autonomy, and empowerment.

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*AUGMENT UNMANNED SURFACE VEHICLES' (USVs') MARITIME CONTACT TRACKING CAPABILITY USING MACHINE LEARNING*

**Srikanth Vemula; Eulises D.Franco; Steven Marquez; Dr. Michael Frye<sup>1</sup>**

**Purpose:** Current traffic avoidance software relies on AIS and radar for tracking other craft and avoiding collisions. However, in a contested environment, emitting radar energy presents a vulnerability to detection by adversaries.

**Rationale:** Deactivating radio frequency (RF) transmitting sources mitigates the threat of detection, but without additional sensing and sensor fusion, it would also degrade the unmanned surface vehicles (USV's) ability to monitor shipping traffic in its vicinity. Since there is a need to augment unmanned surface vehicles' (USVs') maritime contact tracking capability.

**Methodology:** This research was focused to address this problem by leveraging a computer vision system that will plot the tracks of shipping traffic

exclusively using the passive sensing capability of onboard cameras. and can be applied for navy vessels performing unsafe navigation on the high seas. The proposed software solution for this challenge uses computer vision-based system that leverages Object Detection, Tracking and Mapping algorithms which plots the tracks of shipping traffic exclusively using the passive sensing capability of onboard cameras by predicting the latitude and longitude of the detected vessel in the video.

**Findings:** As a result of this a GUI interface is created by incorporating the tracking, mapping and prediction of lat & long. This creates the map of the predicted tracking location and calculate the RMSE Loss and compares the predicated latitude and longitude to ground truth.

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*EMS RESPONSE PROTOCOL ON EMERGENCY ROOM VISITS OF MEDICARE FREQUENT FLYERS*

**Patricia Garcia<sup>1</sup>**

**Purpose:** In 2016 ambulance organizations billed Medicare for a total of 14.8 million Part B ground ambulance transports corresponding with 6.1 billion in Medicare fee-for-service payments (Centers for Medicare & Medicaid Services, 2019). Historically, emergency ambulance services do not bill for non-transport cases, meaning that any patient who calls 911 and does not get transported to a hospital setting causes the emergency services department to lose out on otherwise earned revenue. The Centers for Medicare and Medicaid Services (CMS) and the US Department of Health and Human Services (HHS) created the Emergency Triage, Treat and Transport (ET3) model effective January 1, 2021, intended to promote intervention of care without sacrificing payment opportunities for organizations. The ET3 model makes it possible for participating ambulance suppliers and providers to partner with qualified health care practitioners to deliver treatment in place and with alternative destination sites to provide care for Medicare beneficiaries following a medical emergency for which they have accessed 911 services (Centers for Medicare & Medicaid Services, 2019). This pilot program influenced the same protocol that the Laredo Fire Department is following to treat and triage COVID-19 patients. The ET3 pilot program's original start was scheduled for March 2020 but was delayed until 2021 due to the public health emergency. This pandemic has direct stress on EMS, hospitals, and the elderly and disabled populations who are at increased risk. Medicare frequent "flyers" is a common term used to refer to patients who often visit the emergency room and

are not admitted, indicating the likelihood of a preventable emergency room visit was highly possible.

**Rationale:** This case study will examine the potential correlation between the CMS transport ET3 model protocol followed by the Laredo Fire Department and the impact on the number of emergency room transports to Doctor's Hospital of Laredo while mitigating the risk of COVID-19 exposure to patients that could have otherwise been at risk if transported.

**Methodology:** Moreover, this case will determine the impact on Medicare frequent flyer' utilization rates, indicating the EMS pilot program's success using multiple regression analysis. Successful intervention rates can support the fire department's leadership in assigning appropriate allocation of dispatch service employees resources per district and potentially decreasing local capital budget proposals (conservatively).

**Findings:** CMS (2019) confirms the model is designed to work synergistically to reduce avoidable transports to the ED and unnecessary hospitalizations following those transports. Determining EMS protocol success can positively influence future EMS protocols in improving preventative care, quality of care, strategic implementation of similar programs on any future public health emergencies, and an overall increase in patient satisfaction.

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## POSTER PRESENTATIONS

COLLEGE OF HUMANITIES, ARTS, AND SOCIAL SCIENCES

### *A QUALITATIVE STUDY OF FOREIGN LANGUAGE ANXIETY IN SPANISH HERITAGE STUDENTS*

**Michael Tallon, PhD<sup>1</sup>**

**Purpose:** The purpose of this study was to examine the experience of foreign language anxiety (FLA) in heritage students of Spanish from a qualitative perspective. Previous research has suggested that, just like “traditional” foreign language students, heritage language students of Spanish can also experience FLA in the classroom. As the number of heritage students in our classes continues to grow, it is important for teachers to know how anxiety can affect these students. The primary research question for this qualitative study was: How do Spanish heritage students describe their feelings of anxiety about learning Spanish?

**Rationale:** Learning a foreign language can be quite a challenging task. One principal question in Second Language Acquisition theory is why some people are more successful at learning a second language than other people. Many factors come into play to determine the outcomes of the learning process, including individual differences such as cognitive abilities, personality characteristics, learning styles, metacognitive differences, social contexts, and affective aspects. Three main affective aspects include attitudes, motivation, and anxiety. In other words, what the learner brings to the learning situation and how the learner feels can have an impact on what is learned. One of the most important affective variables in learning a foreign language is foreign language anxiety (Horwitz, Horwitz and Cope, 1986). Foreign language anxiety has been found to have potential negative effects on academic achievement (e.g., lower course grades) (Horwitz, 1986; Saito and Samimy, 1996; MacIntyre, Noels and Clément, 1997), cognitive processes (e.g., not being able to produce the language) (MacIntyre and Gardner, 1994), the

social context (e.g., communicating less) (Kleinmann, 1977; MacIntyre and Gardner, 1991a, 1991c; MacIntyre and Charos, 1995), and the reaction for the language learner (e.g., traumatic experiences) (MacIntyre, 1999; Price, 1991; Phillips, 1990). Thus, helping students reduce their anxiety can have important consequences for their ultimate language learning. Most studies on FLA have focused on the traditional language learners; this study changes that focus to Spanish heritage students and does so from a qualitative perspective.

**Methodology:** The subjects for this study came from 27 Spanish classes at a large, public university in the Southwest United States. A total of 413 subjects (209 heritage students and 204 non-heritage students) participated in the study. Qualitative data were collected from open-ended questions on a questionnaire and from telephone interviews. The procedure of content analysis was followed to analyze the data.

**Findings:** Analysis of the qualitative data revealed several sources of anxiety for the heritage students in this study that were similar to sources of anxiety experienced by traditional foreign language students in previous studies. Interestingly, there were several sources of anxiety that were unique to the heritage students. The presentation will include sample quotes from the heritage students, thus providing a better understanding of the heritage students’ views about foreign language anxiety (i.e., to hear directly from these students about their language-learning experiences). The presentation will end with implications for teaching and recommendations for future research.

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*BENEFITS FOR PROFESSORS AND STUDENTS: OBTAINING FEEDBACK ON THE USE OF PROVIDED RESOURCES*

**R.T. Walker, PhD<sup>1</sup>**

**Purpose:** Previous research has explored how professors determine potential resources for students, such as textbooks. The goal of the selection of a textbook is to provide effective resources that can influence student performance. I explored students' perspective of the resources in my courses and examined how their use of their resources might be revised after taking an exam.

**Significance:** How do professors decide the "best" textbook to use in a specific content area? How do professors know if that textbook is the best resource for their students? What other kinds of resources can you provide? Do students use these resources? Studies have investigated if the aids provided with a textbook have been used (Weiten, et al., 1996) as well as the influences the textbook has on the learning process (Landrum, et al., 2012). There are other resources that indicate study strategies that have been scientifically supported (Putnam, et al., 2016). If these resources are provided do students practice these learning strategies? Obtaining student feedback could provide insight into how a professor integrates resources within their courses.

**Methodology:** The participants for this study included 84 undergraduate students at UIW that were enrolled in my course. Students were asked a

series of questions regarding their study habits, and their use of resources prior to their first exam. For example, "Did you use the textbook quiz and tests for practicing for the exam?", "Do you think the textbook quiz and tests were helpful?". Students were then asked if they would change the use of the resources and study strategy when preparing for their next exam. It is important to note that the techniques for note taking, use of resources, and study strategies were discussed prior to the first exam.

**Findings:** The average amount of time that students studied for their first exam was 3.1 hrs (SD = 1.19). Ninety percent of the students indicated they will alter their study strategies prior to the next exam. Out of the 84 participants only 16 students described how they could alter their strategies. Many of the students in these classes did not use the textbook, the textbook resources or some of the professor resources regarding study habits. However, students did believe the professors resources in terms of online figures and videos were helpful (71%). Finally, over half of the students (57 %) indicated they rewrote their notes and believed it was helpful. This exploration of how student resources are used can provide a professor insight into how to encourage and integrate these resources within a semester.

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*CONSUMERIST EVALUATIONS ENGENDER BELIEFS THAT PROFESSORS ARE RESPONSIBLE FOR STUDENTS' GRADES*

Stefanie S. Boswell<sup>1</sup>

**Purpose:** This study investigated if framing [Ratemyprofessors.com](http://Ratemyprofessors.com) (RMP) evaluations from either a consumer or learner orientation would engender participants' academic entitlement (AE) attitudes that professors are responsible for their academic outcomes. It also investigated effects of professor and participant gender on these expectations. These effects were investigated while controlling for participants' current AE.

**Rationale:** AE is the attitude that one deserves rather than earns academic success. Students high in AE attribute responsibility for academic outcomes to others; for example, blaming their failures on professors. AE is related to a consumerist view of higher education (Chowning & Campbell, 2009); students with a consumer identity view themselves customers who receive positive academic outcomes in exchange for tuition. Those with a learner identity view themselves as students who earn positive academic outcomes (Bunce et al., 2017). Because RMP evaluations represent consumer-culture mentality (Ritter, 2008) and influence students' expectations (Reber et al., 2017), their content (consumer or learner orientation) could influence students' AE attitudes. Professor and participant gender effects are also important to investigate as some research indicates both are related to students' expectations for special academic outcomes. These findings are from a larger project investigating these variables' effects on participants' intentions to request policy exceptions and their expectations that professors will grant them.

**Method:** Participants were 431 undergraduates (64% women; 49.65% first-year student) who were randomly assigned to view five RMP-style evaluations for one of four fictitious professors: either a man or woman who was described using either a consumer ("he wants us to get a good

grade") or learner ("she wants us to learn and understand the material") orientation. Participants rated how much responsibility for their final grade they would attribute to themselves and the professor. They also completed the eight-item AE Questionnaire (Kopp, 2011) and a demographic questionnaire. The study was quasi-experimental and IRB-approved.

**Findings:** Multivariate analyses revealed significant AE covariate and consumer-learner orientation effects. Bonferroni-corrected follow-up analyses found that AE significantly affected attribution of responsibility to the professor. However, consumer-learner orientation significantly affected attribution of responsibility to both sources. Participants exposed to consumer-oriented professor evaluations attributed greater responsibility for the final grade to the professor. Those exposed to learner-orientation professor evaluations, however, attributed greater responsibility for their final grade to themselves. These findings suggest that even brief exposure to consumer-oriented RMP evaluations could vicariously socialize students to a consumer identity and engender beliefs that professors are responsible for their academic outcomes, above and beyond their current AE. It is important to investigate if consumerist language's ability to engender students' AE extends from their peers' evaluations to universities' own advertising. Universities increasingly use a consumer model to compete for students (Harrison & Risler, 2015) with advertising statements about tuition's return on investment and degrees serving as tickets to the workforce. However, these efforts to attract students may inadvertently diminish universities' goal to educate them by encouraging AE. These results, however, also suggest that greater use of learner-oriented language may mitigate AE.

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## *GENDER AND STUDENTS' EVALUATIONS OF TOP CHARACTERISTICS OF INEFFECTIVE PROFESSORS*

Stefanie S. Boswell, Angelina A. Martinez<sup>1</sup>

**Purpose:** This study investigated if words corresponding students' rankings of the top 15 characteristics of ineffective professors (Busler et al., 2017) appear more frequently in man or woman psychology professors' negative [Ratemyprofessors.com](http://Ratemyprofessors.com) (RMP) evaluations. If these words appear significantly more in man or woman psychology professors' evaluations, it could indicate the presence of gender bias.

**Rationale:** Scholars have debated the presence of gender bias in student evaluations of teaching. Some studies have found bias in favor of men (Johnson & Crews, 2013) or women (Fisher et al., 2019); conversely, others have found no evidence of bias (Boehmer & Wood, 2017). This study examined the question of gender bias in student evaluations of psychology professors; it did so by using the public, anonymous student evaluations of teaching available on RMP.

**Method:** We collected data using the Gendered Language in Teacher Reviews tool (<http://benschmidt.org/profGen>) that reports the number of times per million that specific words or two-word combinations appear in positive and negative RMP evaluations for men and women by discipline. Data were recorded for man and woman psychology professors for each of the 15 characteristics (Busler et al., 2017). Characteristics containing three words were changed to the first two words. For example, "Poor communication skills" became "poor communication." Other characteristics were: disrespectful, inflexible, irrelevant course (content), no feedback, nonconfident, not knowledgeable, poor time (management), unengaging, unorganized, unprepared, unrealistically high (expectations), unrepresentative assessment, and not accessible/not helpful (averaged together to form a

composite score). We calculated the proportion of total appearances for each characteristic for each gender. "Unorganized," for example, appeared 560.498 out of 897.235 times per million words in women's evaluations (62.47%). Irrelevant course, unrepresentative assessment, and nonconfident were removed from the dataset because they appeared in no evaluations.

**Findings:** Univariate analysis of variance revealed that the top characteristics of ineffective teachers appeared disproportionately more often in woman psychology professors' evaluations compared to their man peers (large effect size), supporting evidence of gender bias in RMP evaluations. Because RMP evaluations are sometimes used to supplement official evaluation of faculty (Bergin et al., 2013), these findings suggest that woman professors may receive harsher evaluation from administrators that they merit. This may be particularly harmful for part-time/contingent faculty for whom employment decisions may be based solely on students' evaluations. Caution should be exercised when interpreting these results, however, because these results do not take into account evaluations in which students may have used groups of words to communicate the same meaning of one of these characteristics; for example, students may use the phrase "isn't organized" rather than "unorganized." It is possible that searches for synonyms or groups of words commonly used to communicate the meaning of Busler et al.'s characteristics may have shown no bias or, alternatively, bias against man professors. Assignment of professor gender is another limitation; some professors were likely misgendered as the gendered language tool assigns professors to a gender based on datasets of men's and women's first names.

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*LONGITUDINAL MOTHER-CALF INTERACTIONS OF BOTTLENOSE DOLPHINS UNDER PROFESSIONAL CARE*

Ashley Acosta; Rachel Walker, PhD<sup>1</sup>

**Purpose:** The purpose of this study is to gain a better understanding of the patterns in developmental interactions between mother-calf bottlenose dolphins under professional care.

**Rationale:** Relationships and social construction are important in the formation of a prospering species community. Bottlenose dolphins (*Tursiops truncatus*) live in what is known as a “fission-fusion” society (Hoffland et al., 2017). A fission-fusion society is interacting in smaller groups but having an overall connection to the larger community (Hoffland et al., 2017). Dolphins often begin as calves attached to their mother, and with time slowly form other social groups as they age. The relationship between a mother and the calf is vital for calf survival and is impacted by the type of bond the two have together. Mother-calf interactions include a variety of behaviors such as feeding, protection, exploration, play, and nurturing (Hill et al., 2007). Although these may be common behaviors between mother dolphins and their offspring, how they are practiced, differ between each mother-calf relationship. Behavior in bottlenose dolphins can be affected by factors such as season and time of day (Walker et al., 2017). The bottlenose dolphins that were observed in this study were under professional care at Marine Life Oceanarium Park in Gulfport, Mississippi. The bottlenose dolphins observed for this study included two mother-calf pairs. Data for these mother-calf interactions were recorded on a 24-hour day period for one year (four seasons: Spring, Summer, Fall, Winter).

**Methodology:** In this study archival data was used to measure several behaviors of a group of

bottlenose dolphins (under professional care) (Walker et al., 2017). Seven dolphins (four adults, five calves) were housed at this one facility. Data was collected from an earlier study that examined seasonal, diel and age differences in activity budgets. This study is focused on two of the mother-calf pairs: S(mother)/ J(calf) and K (mother) /N(calf). Observed behaviors were recorded in mutually exclusive categories including pair swim, group swim, pair play, and group play. It was also specified if the calf was in the infant or echelon position. Data were collected over a 24-hour time frame in 1-hour increments, throughout four seasons (fall, winter, spring, and summer) in 2000-2001.

**Findings:** The study of these mother-calf interactions changed over the year regarding the types of interactions. There was a small increase in the percentage of time that S/J were involved in play behavior across the year. However, K/N had limited play interactions throughout the year. For both pairs there was increase in their pair swim interactions and a decrease in calf swim positions over the year. As the calves got older, they decreased the echelon position and increased the infant position when engaged in swim behaviors. This study overall provided evidence of developmental changes in the types of mother-calf interactions over a year at this facility. This type of approach to studying mother-calf interactions in a longitudinal and 24-hours can assist in understanding the welfare of these animals.

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*ONLINE EVALUATIONS INFLUENCE INTENTIONS TO REQUEST POLICY EXCEPTIONS AND IMPROVE EVALUATIONS OF PROFESSORS WHO PROVIDE THEM*

**Stefanie S. Boswell<sup>1</sup>**

**Purpose:** This poster presents findings about the effects of positivity or negativity of [Ratemyprofessors.com](https://www.ratemyprofessors.com)'s evaluations, professor gender, and participant gender on participants' 1) intention to request exceptions from a professor's assignment policies and 2) expectation the professor would provide the exceptions. These findings stem from a larger project investigating these variables' effects on students' intentions to request exceptions from several course policies and their expectations that professors will grant them.

**Rationale:** On [Ratemyprofessors.com](https://www.ratemyprofessors.com) (2018), students read and provide anonymous professor evaluations. Exposure to [Ratemyprofessors.com](https://www.ratemyprofessors.com)-style evaluations influences students' expectations about professors (Reber et al., 2017). Furthermore, students are affected more by positive than negative evaluations (Kowai-Bell et al., 2012). Because students expect women professors to provide "special favors" (El-Alayli et al., 2018), they may expect women professors to grant policy exceptions. Therefore, women professors may receive more requests than men professors. Additionally, student gender is important because several studies have found men students expect greater special treatment than women students (e.g., Ciani et al., 2008).

**Methodology:** The study was quasi-experimental; 338 participants (60.4% women) were randomly assigned to view five evaluations for one of four fictitious professors: positively evaluated woman, positively evaluated man, negatively evaluated woman, or negatively evaluated man. During analysis, the experimental groups were crossed with participant gender (man or woman), creating eight groups. Participants rated their 1) intentions to request policy exceptions and 2) expectations

that the professor would grant the exceptions using 9-point, Likert-type scales.

**Findings:** This poster's analyses focus on participants' 1) intentions to request policy exceptions to submit a late assignment and resubmit an assignment for a better grade and 2) expectations the professor would grant these exceptions. Multivariate analysis found a significant evaluation positivity effect. Bonferroni-corrected follow-up analyses found that participants were more likely to make assignment policy exception requests of positively evaluated professors and expect these professors to grant the exceptions, regardless of professor gender. There was also a multivariate evaluation positivity by student gender interaction effect; Bonferroni-corrected follow-up analyses found existed for the expectation the professor would grant a request to resubmit an assignment for a higher grade. Simple main effects analyses found that women participants reported greater expectation that positively evaluated professors would grant them an exception to resubmit an assignment for a better grade. These findings suggest that professors with a positive online reputation can expect more requests for exceptions from class policies. Because dealing with students' expectations for special treatment is related to professor burnout (Jiang et al., 2017), professors with positive online reputations may experience greater occupational stress in this regard than their less favorably reputed peers. They also suggest that the influence of student gender on expectations about these requests is more nuanced than previous research suggested. For women students, requests for exceptions may be made when specific professor characteristics (e.g., positivity) indicate likelihood of success.

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*DISCOVERING SSI BENEFITS, SOCIAL SERVICES AND SUPPORT FOR CHILDREN WITH DISABILITIES: AN ACTION RESEARCH APPROACH*

**Michelle Vasquez<sup>1</sup>**

**Purpose:** The purpose of this study is to examine how parents of children with disabilities find federal program benefits, social services and support. For these parents, gaining access to the SSI program assists families with little to no income. In addition, gaining access to social services and support can improve the quality of life for a child with disabilities. This research seeks to identify opportunities and challenges that parents face in learning about resources, barriers in place, effective information delivery methods, and transitions to advocacy roles.

**Rationale:** The U.S. Social Security Administration administers Supplemental Security Income (SSI) to eligible children with disabilities by providing financial benefits and referrals to healthcare services. Parents of children with disabilities often face numerous challenges navigating a complex healthcare system. In the United States between 2009 and 2017, one out of six children were diagnosed with a developmental disability (Zablotsky et al., 2019). This is a significant increase from previous years. As the number of people diagnosed with disabilities continues to rise within an ever-changing economic environment, the importance of systemic efficiency for SSI benefits has become even more significant (Keesler, 2015). The Social Security Administration reported 1.3 million children in the U.S. receive SSI benefits with anticipated growth in the population. The majority of families with children that qualify for SSI live below or near the federal poverty standard. Due to

this rapid growth of disabilities in children, additional research is needed to better understand the characteristics, risk factors, and accessibility of services and interventions to improve the quality of life.

**Methodology:** Using an emergent community-based participatory action research approach, this study will examine parents' experiences to understand how they learn about federal programs, social services and support. Through this study, parents were recruited to participate in initial meetings, pre-and post-interviews, digital storytelling workshops, and a focus group with a film screening. Research questions include Q1) How do parents with disabled children hear about Social Security disability programs, social services and support through a complex health care system? Q2) What barriers do parents face in accessing programs, services and support? Q3) Are service providers and agencies offering relevant and accessible information to parents when they need it and what are the information delivery methods? Q4) How does advocacy play a role in empowering parents to access these services?

**Findings:** Data analysis has been captured for pre-interviews and digital storytelling workshops. This month a focus group activity will take place. Findings will be determined based on the analysis and data collection. We are already seeing emerging topics and trends that we can report by April 2021.

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<sup>1</sup> University of the Incarnate Word

## FEIK SCHOOL OF PHARMACY

### *A PHARMACY READINESS PROGRAM TO INCREASE STUDENT SUCCESS OF ADMITTED STUDENTS*

**Sushma Ramsinghani, PhD; Paulo Carvalho, PhD; Adeola Coker, PhD; Amy Diepenbrock, PhD; Lila LaGrange, PhD; Anita Mosely, PhD; Hansita Patel, PhD; Raghu Yendapally, PhD<sup>1</sup>**

**Purpose:** Most failing grades at the Feik School of Pharmacy occur in the P1 fall semester. Admissions data for class of 2022 revealed that students with a product score (PCAT composite score x Math-Science GPA) <150 had more failing grades in P1 fall semester than those with a product score  $\geq 150$ . The purpose of this study was to determine if a Pharmacy Readiness Program (PRP) will increase student success.

**Rationale:** The fall semester of the first year (P1) curriculum at the Feik School of Pharmacy (FSOP) consists of a total of 19 credit hours with 14 credit hours of pharmaceutical sciences (PS) courses and five credit hours of pharmacy practice courses. From 2016-2018, the total number of failing grades (D or F) across all courses in P1 fall semester was 104 of which 97% were in PS courses. Analysis of the admission and course performance data of students in P1 fall 2018 showed that when students were grouped by the product score, there was a distinct correlation to their performance in the four PS courses (Pharmacy Calculations, Physiology I, Pharmaceutics I, and Biochemistry). This led to our hypothesis that an early intervention for the student group with a product score of <150 could help reduce failing grades and put the students on the path of success. We proposed to design and implement a Pharmacy Readiness Program (PRP) in summer 2019 to improve student success in P1 class admitted for fall 2019.

**Methodology:** Twenty-two students selected for PRP attended a week of in-class activities in the summer that simulated a typical week of coursework in the P1 fall semester. Self-help activities, group work, office hours, and tutoring were included. The in-class activities week was followed by six weeks of online activities.

**Findings:** Of the 20 students that completed PRP and attended P1 fall semester, 16 had product scores <150. Mean GPA in four science courses in P1 fall was used to determine student success. Multiple regression analysis with the mean GPA as dependent variable and the product score, participation in the PRP, being a first-generation student, and belonging to a minority group as independent variables indicated that the product score and PRP participation were statistically significant. For students with product scores <150, the PRP group had statistically higher mean GPAs than the non-PRP group (mean GPA 3.19 versus 2.73,  $p=0.022$ ). The study indicates that participation in the Pharmacy Readiness Program positively influenced student success. The product score was a better predictor of student outcomes (mean GPA) than either PCAT score or Math-Science GPA. Furthermore, being a minority or first-generation student did not statistically affect student success.

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*IMPACT OF COVID-19 TO BORDER TOWN ECONOMIES: A CASE STUDY OF US - MEXICO BORDER IN LAREDO*

**M.C. Canales<sup>1</sup>; N. A. ZANCA<sup>2</sup>**

**Purpose:** The objective of this research is to investigate the economic impact of the SARS-CoV-2 pandemic to the United States-Mexico border in Laredo, Texas. The border crossings are vital to the economies of both Texas and Mexico and have contributed to Mexico's status as being an important trading partner for Texas. In addition, Texas and Mexico share 1,254 miles of common border and are joined by 28 international bridges and border crossings. In this research paper, we address the importance of the international-economic-linkages between US and Mexico and bring awareness to the impact of the pandemic on the safe crossing of people and goods.

**Rationale:** The rationale of this research is to expand on existing studies regarding the particular impact of the economic crisis, known as The Great Lockdown, stemming from the pandemic into the United States-Mexico border in Laredo, Texas. Border communities, like Laredo are composed of mainly Hispanic population (at least 95%, according to US Census Bureau) an ethnicity tied to higher mortality rates than other comparative groups. It was reported that hospitalization rates were highest among Latinos, at 3.3 times the rate among Whites. A comprehensive assessment of the economic effects from the pandemic are yet to be observed, considering a general lag for data to pick up such impact. The authors understand that reasonable limitations exist in the assessment, as some economic effects will not be captured by the data. However, the four-international-economic-linkages methodology intends to mitigate such

limitations by measuring effect through four crucial economic interactions.

**Methodology:** This poster paper will demonstrate four-international-economics-linkages in the context of US-Mexico border. In studying international trade, scholars frequently use the four-international-linkages model as it visualizes the interaction between two nations. These four-international-linkages are (i) International Trade (Export and Import) (ii) Labor Movements (Legal and Illegal) (iii) Exchange Rate (iv) Information Technology Our poster paper will specifically address the issue along with empirical evidence from pre- and post- pandemic with regards to US-Mexico border in Laredo, Texas.

**Findings:** International trade is an important economic linkage among United States and Mexico. Any disruption affects cross-border movement which provide essential economic lifeline to citizens of both US and Mexico. On March 21, 2020, the United States and Mexico agreed to restrict non-essential travel over the border. The evidence shows that because the border economy is heavily dependent on cross-border trade and consumption, the economic impact of this reduced cross-border mobility cannot be underestimated. This restriction has meant economic loss since tourists and shoppers were unable to cross the border to buy goods and services. Consequently, it is estimated an estimated reduction of nearly \$4.9 billion in the GDP of these border counties, representing 6.1% of their total GDP.

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<sup>1</sup> Laredo Rotary Club

<sup>2</sup> University of the Incarnate Word

*A NEW TECHNIQUE TO RECORD ERGs FROM MELANOPsin SENSITIVE GANGLION CELLS*

**Neda Tahvillian, BS; Jessica Carachure, BS; Tayde Contreras, BS; Lydia Geabou, BS; Annie Ku, BS; Dung Nguyen, BS; Jared Sies, BS; Julie Lovell, MS, PhD; Jeff Rabin, O.D., M.S., Ph.D., F.A.A.O., Dipl. Vision Science<sup>1</sup>**

**Purpose:** To evaluate the response of intrinsically photosensitive retinal ganglion cells (ipRGCs) using the electroretinogram (ERG) and selective chromatic adaptation.

**Rationale:** ipRGCs absorb short wavelength light via melanopsin and mediate circadian photoentrainment, pupil responses, alertness and cognition, functions which persist despite blindness. Giant ipRGCs, which send signals to the LGN and visual cortex, implying a role in visual perception, show an inhibitory opponent blue (S) cone off response. Human long-latency ipRGC ERGs elicited with silent substitution (selective stimulation of ipRGCs) utilize high contrasts which can inadvertently stimulate other cells lessening ipRGC isolation. We used selective chromatic adaptation to stimulate ipRGCs and S cones to reveal ipRGC ERGs & VEPs (Rabin et al. Eye 2020, <https://www.nature.com/articles/s41433-020-01185-3>). Our purpose was to extend this effort and develop new metrics to quantify ipRGC ERGs.

**Methods:** 20 adults (mean age  $25 \pm 3$ , 14 females) participated after informed consent. A Ganzfeld (Diagnosys, LLC) was used to present 200-msec. blue flashes (448 nm) on a rod and red/green (LM) cone saturating amber background (590 nm, 560 cd/m<sup>2</sup>) to stimulate S cones (426 nm peak) and ipRGCs (480 nm). ERGs were recorded in 1000 msec epochs after 30 sec. of adaptation to the amber background over a 4-log unit range (16.7 to .0167 cd/m<sup>2</sup>). Digital values ( $\mu$ V vs. msec.) were averaged to compute mean ERGs (n=20). Control ERGs on the

amber background showed no ERG to the ISCEV scotopic flash (0.01 cd/m<sup>2</sup>/sec.) and a small S cone ERG to the 300X brighter standard flash indicating no recordable input from rods, M or L cones.

**Findings:** ERGs revealed a small amplitude S cone ERG followed by a negative waveform derived from S cone inhibitory input to ipRGCs. Amplitudes were quantified as this negative trough to the first positive peak (ipRGC on response). Log amplitude increased with log luminance (F = 13,787, P < .0001, R<sup>2</sup> = 1.0). ipRGC latency was quantified as the difference between negative trough and positive peak latencies which decreased with decreasing log luminance (F = 23.31, P < .05, R<sup>2</sup> = 0.91) since the latency of the negative wave from S cones increases with decreasing luminance bringing it closer to the ipRGC onset peak. The ratio of ipRGC amplitude/latency (throughput) provides a new metric which combines the two variables and is highly dependent on luminance (F = 55.83, P < .02, R<sup>2</sup> = 0.97). Selective chromatic adaptation, wherein a bright amber field suppresses input from all retinal receptors except short wavelength absorbing S cones and ipRGCs, is an efficacious technique to reveal the retinal response of ipRGCs, including unique inhibitory input from S cones. Since ipRGCs mediate numerous functions and can be impacted by ocular disease, this technique may prove useful for earlier detection and monitoring of eye disease as well as those affecting circadian rhythms, pupillary function, and cognition. Planned research will examine the pupillary response mediated by ipRGCs using the same visual stimulus.

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## *A NEW TECHNIQUE TO RECORD VEPs FROM MELANOPsin SENSITIVE GANGLION CELLS*

Annie Ku, BS; Jessica Carachure, BS; Tayde Contreras, BS; Lydia Geabou, BS; Dung Nguyen, BS; Jared Sies, BS; Neda Tahvillian, BS; Julie Lovell, MS, PhD; Jeff Rabin, O.D., M.S., Ph.D., F.A.A.O., Dipl. Vision Science<sup>1</sup>

**Purpose:** To evaluate the response of intrinsically photosensitive retinal ganglion cells (ipRGCs) using the visual evoked potential (VEP) and selective chromatic adaptation.

**Rationale:** ipRGCs absorb short wavelength light via melanopsin and mediate circadian photoentrainment, pupil responses, alertness and cognition, functions which persist despite blindness. Giant ipRGCs send signals to the LGN and visual cortex, implying a role for ipRGCs in visual perception. These ipRGCs also show an inhibitory opponent blue (S) cone off response. Human long-latency ipRGC electroretinograms (ERGs) elicited with silent substitution (selective stimulation of ipRGCs) utilize high contrasts which can inadvertently stimulate other cells lessening ipRGC isolation. Given evidence of ipRGC input to visual cortex, the site of conscious visual perception, we sought to determine whether visual evoked potentials (VEPs), a measure of perception at the visual cortex could be recorded from ipRGCs. We used selective chromatic adaptation to stimulate ipRGCs and S cones to reveal ipRGC ERGs & VEPs (Rabin et al. Eye 2020, <https://www.nature.com/articles/s41433-020-01185-3>). Our purpose was to extend this effort & develop new metrics to quantify ipRGC VEPs.

**Methods:** Fourteen healthy adults (mean 24.2 ± 1.6 years, 11 females, 3 males) participated in our IRB approved protocol after providing informed consent. A Ganzfeld (Diagnosys, LLC) was used to present 200-msec. blue flashes (448 nm) on a rod and red/green (LM) cone saturating amber

background (590 nm, 560 cd/m<sup>2</sup>) to stimulate S cones (426 nm peak) and ipRGCs (480 nm). VEPs were recorded in 1000 msec epochs after 30 sec. of adaptation to the amber background over a 4-log unit range (16.7 to .0167 cd/m<sup>2</sup>). Digital values (μV vs. msec.) were averaged to compute mean VEPs (n=20). Control ERGs on the amber background showed no ERG to the ISCEV scotopic flash (0.01 cd/m<sup>2</sup>/sec.) and a small S cone ERG to the 300X brighter standard flash indicating no recordable input from rods, M and L cones.

**Findings:** VEPs revealed a complex waveform with positive peaks associated with both onset and offset of the flash stimulus. The first positive peak (P1) of the flash VEP (quantified as the preceding trough to the peak in μV) is associated with ganglion cell activity and is decreased in glaucoma. This response was assumed to derive primarily from ipRGCs since chromatic S cone VEPs are characterized by a negative waveform. VEP amplitude increased significantly with luminance (F = 608, P < .002, R<sup>2</sup> = 1.0) and latency to P1 increased with luminance (R<sup>2</sup> = 0.6). A more expedient metric reflecting both parameters was throughput (VEP amplitude/latency) which increased with luminance (F = 169, P < .006, R<sup>2</sup> = 0.99). Finally, ipRGC VEP amplitude increased exponentially with ERG amplitude across the luminance range (R<sup>2</sup> = 0.91). This substantiates a contribution of the ipRGC retino-cortical pathway to human visual perception. These objective metrics may be useful for detection and monitoring eye disease as well as circadian function, cognition, and awareness mediated the ipRGC pathway.

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*CONE CONTRAST TEST PREDICTS PERFORMANCE ON AN OCCUPATIONAL TEST OF COLOR VISION*

Tayde Contreras, BS; Jessica Carachure, BS; Lydia Geabou, BS; Annie Ku, BS; Dung Nguyen, BS; Jared Sies, BS; Neda Tahvilian, BS; Logan Skrobarcek, BS; Julie Lovell, MS, PhD; Jeff Rabin, O.D., M.S., Ph.D., F.A.A.O., Dipl. Vision Science<sup>1</sup>

**Purpose:** To determine if the cone contrast test predicts performance on an occupational test of color vision.

**Rationale:** There are many clinical tests that accurately detect individuals with color vision deficiency (CVD) and confirm normal color vision (CVN) as well. However, occupations such as aviation, transportation, law enforcement, and the military, have specific occupational demands which may require secondary or primary testing with tests developed to address these occupational demands. We evaluated how well a sensitive clinical test (computer based CCT) predicts performance on an occupational test of CVD.

**Methods:** A total of 50 subjects, 25 CVN and 25 CVD, participated in our IRB approved study after providing written informed consent in accord with our IRB approved protocol. All subjects were initially tested with black-white visual acuity and contrast sensitivity tests to assure normal vision followed by the Ishihara 24 plate book test to identify CVD vs. CVN. The computer-based Cone Contrast Test (CCT, Innova Systems, Inc.), which presents letters of decreasing cone contrast to determine red, green and blue cone contrast sensitivity, was used as one of the preliminary tests. The occupational

test (CVFT) required the subject to accurately name signal lights using a real-world system presenting four colored LED lights [red (R), green (G), yellow (Y), white (W)] at ¼ mile. A total of 20 randomized trials were given and passing required that the subject identify all lights correctly on the first run, or if  $\leq 1$  error was made all lights must be correctly identified on a second series of testing.

**Findings:** There was no significant difference in age between CVDs (30 YO) and CVNs (25 YO,  $P = .07$ ). In CVNs all subjects passed color vision screening tests, the occupational color vision test (100% specificity) and red, green and blue cone CCT tests. In contrast, all CVDs failed the occupational test as well as the CCT (100% sensitivity for CVD detection on both tests.) Importantly, regression analysis showed that the occupational test scores were significantly related to the CCT score for the deficient cone type ( $F = 5.63, P < .03$ ). These findings suggest that the rapidly administered CCT may eventually provide a surrogate for the occupational test which requires extensive planning and outdoor testing. These findings emphasize the importance of correlating real world performance demands with expedient clinical testing.

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*DEVELOPMENT AND VALIDATION OF THE IRDGT INSTRUMENT TO ASSESS ATTITUDES TOWARDS GENETIC TESTING FOR INHERITED RETINAL DISEASE*

**Patricia C. Sanchez-Diaz; David S. Fike; Stephanie R. Schmiedecke-Barbieri; and Jackelyn T. Meyer<sup>1</sup>**

**Purpose:** To develop and validate an instrument assessing the attitudes of optometry interns towards genetic testing for inherited retinal disease.

**Rationale:** Despite government and private foundations' initiatives such as EyeGene and My Retina Tracker, clinicians in primary care settings may feel unprepared to incorporate genetic testing as a diagnostic tool into their practice. Prior work performed with patients with breast cancer and clinicians in Europe, indicates that clinician attitudes toward genetic testing is a determinant factor for patients deciding to undergo genetic testing. A patient with access to evidence-based information will be better equipped to: 1) understand their condition, 2) initiate earlier interventions that improve quality of life, and 3) search for novel therapies.

**Methodology:** Instrument design We chose the European International Cancer Risk Communication Study as the template to design a scale for eye care. Our Inherited Retinal Disease Genetic Testing (IRDGT) scale had 14 items to evaluate the perceived benefits (8 items) and risks (6 items) of genetic testing for patients with vision impairment. A 5-point Likert scale was used from either: 1=very beneficial/very high risk; to 5=not beneficial at all/minimal risk. Data collection and statistical analysis The IRDGT questionnaire was distributed via SurveyMonkey®. Construct validity and internal consistency were tested using exploratory factor analysis (EFA), Pearson correlations, and Cronbach's  $\alpha$ . SPSS 25.0 (IBM) was used for statistical analyses with  $p=.05$  as cutoff for significance.

**Findings:** Participant characteristics One hundred and three interns (3rd year=58%) comprising mostly

females (74%) participated in this study. Asians were the most represented group (43%), followed by whites (39%), Hispanics (15.5%), and blacks (3%). Primary care was the preferred career path (56%). Construct validity We confirmed that our data was suitable for structure detection (KMO test=.795; Bartlett's test of sphericity  $p<.001$ ) and conducted a principal component analysis to determine the number of distinct features measured by our instrument. Using the Kaiser's criterion, our EFA identified three dimensions with eigenvalues  $>1$ . In this 3-factor model, several items had high cross loadings, indicating a poor structure. We ran an EFA with 2-factor extraction with a Varimax rotation and found that items 1-8 mapped to a benefits dimension and items 9-14 mapped to a risks dimension. Inter-scale item correlations ranged from .047 to .322 being lower than the intra-scale coefficients, which ranged from .566 to .879. This result demonstrated that, as hypothesized, the 2-factor was a better model since (1) all benefit items grouped together and all risk items grouped together, (2) there were no substantive cross loadings, (3) the two subscales named "Benefits" and "Risks" had low correlation indicating that they measured independent constructs. Internal consistency, ceiling or floor effects Cronbach'  $\alpha$  for the Benefits and Risks subscales was .863 and .841 respectively, indicating a good reliability. Interns reported a positive attitude towards genetic testing. The mean score on the Benefits subscale was 1.84 (SE=.06) and the mean on the Risks subscale 2.6 (SE=.07). No ceiling or floor effects were detected using 15% as threshold. In conclusion our IRDGT instrument demonstrated construct, convergent and discriminant validity as well as internal consistency to assess attitudes of optometry interns towards genetic testing. This tool may be useful to other school when assessing the attitudes of their interns and practicing clinicians.

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*FACTORS ASSOCIATED WITH OPTOMETRY STUDENTS' ATTITUDES TOWARDS GENETIC TESTING FOR INHERITED RETINAL DISEASE*

**Patricia C. Sanchez-Diaz; Stephanie R. Schmiedecke-Barbieri; David S. Fike; Jackelyn Meyer; and Maggie M. Ho<sup>1</sup>**

**Purpose:** This study aimed to assess the attitudes of optometry interns towards genetic testing and to identify factors associated with these attitudes.

**Rationale:** With the approval of RPE65 gene therapy (Luxturna; Spark Therapeutics) by the FDA and more than 30 additional gene therapy trials registered, genetic testing is justified for inherited disorders as part of the management for patients with degenerative retinal conditions. Clinicians in primary care settings may feel unprepared to incorporate this diagnostic tool into their practice. The provider can have a significant impact on patients' decisions to undergo genetic testing. A definitive molecular diagnosis will help patients to plan for the progression of their disease while providing information about the inheritance or their condition.

**Methodology:** We modified the European International Cancer Risk Communication Study scale to adapt it to optometry. Gender, ethnicity, and career interest were collected as demographics. Validation of our instrument was by Cronbach's  $\alpha$  and exploratory factor analysis. Our survey contained 8 items in the "Benefits subscale" and 6 items in the "Risks subscale". The Benefits subscale ranged from 1: very beneficial to 5: not beneficial at all, and the Risks subscale from 1: very high risk to 5: minimal/no risk. Interventions and participants Third year interns (n=60; didactic cohort) completed the survey before and after a 1.5 credit hour Genomics Medicine course. Fourth year interns (n=43; clinical cohort), who had finished the didactic course at least six months prior to the clinical intervention, completed the survey before and after a Low Vision rotation where they performed genetic testing for IRD. Data Collection and Statistical Analysis Responses were collected

via SurveyMonkey®. SPSS 25.0 (IBM) was used for statistical analyses and G\*Power 3.1.9.2. in power calculations. Pre- and post- differences on the Benefits (8 items) and Risks (6 items) subscales were measured between (independent t-test) and within cohorts (paired t-test). For paired t-tests with  $\alpha = .05$ ,  $d_z = .5$ , and  $.8$  power a sample of 34 was needed. Both cohorts met the size requirement.

**Findings:** Our sample was 74% females, Asians and whites 83%, and primary care the preferred career path (56%). No significant demographic differences were found between the two cohorts (Chi Square test  $p > 0.05$ ). After the didactic intervention, the mean Benefits subscale score improved from 2.04 (SE=.08) to 1.78 (SE= .06) in the 3rd year cohort ( $t(59) = -2.934$ ,  $p = .005$ ; Cohen's  $d = 0.379$ ). In the clinical group, these mean scores did not change with the clinical intervention (1.56; SE=.06 vs 1.48 SE=.07). The clinical group reported a more positive attitude in the Benefits subscale compared to 3rd years (1.56 vs 2.04 pre-; and 1.48 vs 1.78 post-). The differences were significant ( $t(101) = 4.4$ ,  $p < .001$ ; Cohen's  $d = 0.879$  pre-;  $t(101) = 3.024$   $p = .003$ ; Cohen's  $d = .608$  post-intervention). No significant change was observed in the Risks subscale either between or within cohorts. In summary, genetic testing is a tool available to optometrists in the diagnosis and management of retinal disease. Here we found that a didactic intervention was associated with an improvement in the attitudes of 3rd year interns towards genetic testing. The 4th years showed a more positive baseline attitude, possibly because they had already completed the didactic course during their 3rd year. Their attitude did not change with the clinical intervention. A longitudinal study will be needed in order to assess the long-term effects of the interventions.

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## *LOW VISION REHABILITATION OF GENETICALLY CONFIRMED STARGARDT DISEASE TYPE 1*

Joyce Zhang OD; Stephanie Schmiedecke-Barbieri OD, FAAO, ABCMO, Dipl LV; Patricia Sanchez-Diaz DVM, PhD, FAAO<sup>1</sup>

**Purpose:** A 51-year-old African American female presents to the Low Vision Clinic with reduced visual acuity since age 12 and goals of wanting to see small print and street signs better when she was riding the bus. She also wants to reduce the amount of glare she experiences in bright conditions.

**Rationale:** Our patient had clinical findings that were consistent with a hereditary retinal dystrophy, however, genetic testing was able to provide a molecular diagnosis of Stargardt disease Type 1. A low vision exam allowed us to find the proper devices that would address her goals. The multidisciplinary aspects of this case were crucial in helping our patient maintain her functional vision and plan for the future now that she knows her clinical diagnosis.

**Methodology:** These results were obtained by a complete low vision exam and genetic testing. A complete low vision exam entailed visual acuity, contrast sensitivity, refraction, arc perimetry, fundus examination, color fundus photos, and optical coherence tomography scans. Genetic testing was completed by collecting a saliva sample in office which was then sent to Blueprint Genetics for analysis.

**Findings:** Our patient was best-corrected to 20/200 with a -1.00DS OU glasses prescription and able to see 0.6M (20/30) with +3.00DS reading add to read small print with her iPhone applications. She also had moderately reduced contrast sensitivity, making it hard for her to distinguish things from its background. To relieve this, we evaluated different

colored filters and found the plum-colored filter to help enhance contrast and reduce the amount of glare she experiences in bright conditions. The genetic testing revealed that she was homozygous for a pathogenic missense variant in the ABCA4 gene which translates to a molecular diagnosis of Stargardt Disease Type 1. A pathogenic variant of ABCA4, an ATP-binding cassette membrane protein, results in the accumulation of toxic chemical compounds in the retina which causes permanent retinal cell damage. Stargardt disease is the most common childhood macular degeneration that manifests within the 1st-2nd decade of life. Symptoms include progressive vision loss, light sensitivity, and impaired color vision. The typical presentation includes yellow pisciform flecks of accumulated lipofuscin within the retina and “beaten-bronze” macular mottling that progresses to macular atrophy in a bull’s eye configuration. This presentation was found in our patient and fundus photos were taken to illustrate the retinal damage causing her vision loss. She had central blind spots due to the macular damage, but we were able to improve her distance vision to see street signs better with a 6x monocular telescope that allowed her to see 20/50. Although our patient was molecularly diagnosed at a later stage in life, she is still able to educate her family of the condition and maintain her functional vision with the help of low vision rehabilitation. A molecular diagnosis of Stargardts Disease helps to maximize a patient’s functional vision with low vision rehabilitation. Genetic testing allows for early diagnosis and finding new-target therapies while helping patients with family planning.

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## *MICROSTRABISMUS: DETECTING THE UNDETECTABLE*

**Yutaka Maki<sup>1</sup>**

**Purpose:** To increase the awareness of this unique ocular condition called Microstrabismus and educate optometrists and other clinicians how we can better detect and serve patients with this condition.

**Rationale:** Microstrabismus is a unilateral strabismus of less than five degrees with harmonious anomalous correspondence, partial stereopsis and slight amblyopia in the non-fixating eye. It is estimated to be seen in approximately one percent of the population. Sometimes these patients go through comprehensive eye exams undetected since most of these patients are asymptomatic and some standard optometric tests can show a negative result.

**Methodology:** In this poster, two cases with previously undiagnosed Microstrabismus will be presented to demonstrate how it can be detected using standard optometric equipment.

**Findings:** Case Report A: A 20-year-old male complained of decreased vision in the left eye presented for a second opinion. He had a comprehensive eye exam one week ago, however, they could not tell him why his vision in the left eye was decreased. Best corrected visual acuities (BCVA) were 20/20 OD, 20/40 OS at distance. Other pertinent findings included: (-) cover test, (-)

Random dot stereogram, (+) 4 Base Out test OS, Steady central fixation OD, Steady 1PD Nasal Eccentric Fixation OS. He was diagnosed with Microstrabismus OS. The patient was apprised of the exam findings and recommended to monitor. Case Report B: A 28-year-old male complained of decreased vision in the right eye presented for a comprehensive eye exam. He regularly had an eye exam since he was a child, but no doctors could explain why his vision in the right eye had been decreased. BCVA were 20/30+ OD, 20/20 OS at distance. Other pertinent findings included: (-) cover test, (-) Random dot stereogram, (+) 4 Base Out test OD, Unsteady 0.5PD Temporal Eccentric Fixation OD, Steady Central Fixation OS. He was diagnosed with Microstrabismus OD. The patient was apprised of the exam findings and recommended to monitor. Conclusion: Although Microstrabismus can be easily missed, it can be detected with the standard primary care equipment alone if properly evaluated. Microstrabismus should be one of the differential diagnoses especially in unilateral decrease of visual acuity for which no organic cause can be found in patients with no apparent strabismus and with no refractive amblyogenic factors. Detection at young age is crucial since it can be treated with proper management. Extensive neuro-ophthalmologic evaluations and fears of an intracranial lesion can be avoided with a proper diagnosis.

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## NOVEL METRICS OF CONTRAST SENSITIVITY FOR GLAUCOMA AND SUSPECTS

Talia Tunstill, OD<sup>1</sup>; Jeff Rabin, OD, PhD<sup>1</sup>; Grant, Slagle, DO<sup>2</sup>; William Sponsel, M.D.<sup>2</sup>; Jeannette Wong-Powell, OD<sup>1</sup>; Thien Huong Nguyen, OD, FAAO<sup>1</sup>; Richa Garg, OD<sup>1</sup>

**Purpose:** Glaucoma can cause a dramatic reduction in visual field prior to any loss of high contrast visual acuity (VA). However, spatial and temporal contrast sensitivity (CS) and color vision can be impaired early in glaucoma. Our purpose was to quantify novel measures of CS and VA with and without glare in a heterogeneous cohort of glaucoma patients.

**Rationale:** The study was important to optometry as it helps develop new metrics for detection and monitoring.

**Methodology:** 30 subjects (mean age  $54 \pm 12$ , 23 females) with diagnosed or suspected open or narrow-angle glaucoma, scheduled to undergo laser peripheral iridotomy, participated in our IRB approved protocol after written informed consent. Measures included high contrast VA with and without glare (BAT; Brightness Acuity Tester, Marco Ophthalmic), CS across four spatial frequencies (3, 6, 12, 18 CPD) with & without glare (Vector Vision/Guardion: VVG CS), and Pelli-Robson CS. Repeated measures ANOVA, t-tests, and sensitivity analyses were used to evaluate CS metrics.

**Findings:** Mean VA (n=60 eyes) without glare was 0.053 log MAR and slightly decreased (.084) with glare ( $P < .03$ ). However, two-way ANOVA of VVG CS across spatial frequency and glare showed a significant effect of spatial frequency ( $F=71.4$ ,  $P < .0001$ ) but no significant effect of glare ( $F = 2.53$ ,  $P = 0.1$ ). The VVG CS test did reveal decreased CS in 54% to 79% of eyes across for spatial frequencies with the greatest decrease at 12 CPD (20/50 equivalent). Moreover, the sum of VVG log CS values computed to the approximate area under the CS curve showed that 74% of eyes were below age comparable norms, with Pelli Robson log CS (mean 1.47) below age norms in 68% of eyes (Elliot et al., 1990). Conclusions: Glare disability did not prove to be a strong index of glaucomatous dysfunction, but CS is often decreased in various types and degrees of glaucoma including suspects. Pelli Robson large letter (20/700) CS proved sensitive, as did VVG higher spatial frequency CS (20/50) also measurable with small letter CS testing, a potential new metric for glaucoma. Finally, the VVG test can be used to sum log CS across spatial frequencies as a sensitive, expedient metric of overall CS which may prove useful to monitor vision in advanced disease.

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*PANDEMIC PIVOT - EDUCATIONAL EXPERIENCES OF FLIPPED CLASSROOM DESIGN IN OPTOMETRY*

**Lourdes Fortepiani MD, PhD; Dede Rios; PhD<sup>1</sup>**

**Purpose:** The aim of this study was to investigate the effectiveness of an on-line flipped classroom design on student academic achievement and perception in a Systemic Pathology course for optometry students.

**Rationale:** The University of Incarnate Word (UIW) closed campuses and transferred all instruction to an online platform as part of the risk mitigation plan during the Covid-19 pandemic. UIW offered faculty training on flipped classroom design, which has been proposed to improve student learning in the health professions. However, whether or not this model is effective in a completely on-line platform or if students perceive it as helpful in their learning experience has yet to be evaluated.

**Methodology:** In this study, two student cohorts enrolled in a Systemic Pathology course in Optometry were compared: 1) traditional on-site lecture format (n= 55) and 2) on-line flipped instruction (n= 66). In the traditional lecture-based cohort, students attended the didactic lecture in person and additional work was not required. In the flipped classroom cohort, students utilized the same amount of lecture time, first watching shorter recorded lectures before the synchronous session and then working in groups on selected cases during the synchronous session time, which was held via zoom. Group work required students to

conduct a literature search and select authoritative evidence to support their case. In addition, the flipped classroom cohort was asked to complete a feedback questionnaire after the course instruction ended, and there was a 40.9% completion rate. Student learning was assessed in both cohorts with several quizzes, midterms and a final exam.

**Findings:** We found that the two cohorts, traditional vs flipped, obtained similar scores in the quizzes, midterms (78.53 vs 77.12, p=0.08), final exam (74.41 vs 73.94, p=0.32), and course average (76.49 vs 76.27, p=0.47). However, the survey responses indicated that students preferred the traditional on-site format to the flipped online format and did not consider the group work useful to their own learning or understanding of the concepts addressed in the cases. The data also showed that not every student actively participated in their assigned group. In conclusion, the transition from a traditional to a flipped classroom course design was effective and did not negatively impact the student performance in the course, despite the students' dissatisfaction with course design. The student's perception might have been influenced by several elements such as the lack of adaptation time to the new format, the lack of on-site components, and obviously the pandemic situation, which may have all contributed to less student satisfaction. Further studies are warranted to determine such elements.

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## *PERCEPTUAL LEARNING OF HUE DISCRIMINATION IN JEWELRY APPRAISERS*

**Julie Lovell, MS, PhD; Jeff Rabin OD, MS, PhD, FAAO, Dipl Vision Science<sup>1</sup>**

**Purpose:** Perceptual learning can improve visual acuity, contrast sensitivity, vernier acuity and stereo-acuity in adult amblyopes beyond the critical period for visual development. Latent neural connections and/or development of new connections may underlie these improvements, coupled with the relative balance of excitatory and inhibitory neurotransmitters. Recently we reported superior hue discrimination in largely elderly jewelry appraisers who must discriminate subtle changes in hue to ensure optimal gemstone valuation. The purpose of this study was to determine the mediator of this enhanced hue discrimination.

**Rationale:** The principle of perceptual learning wherein repetition on specific tasks enhance performance and shifts the relative balance of brain serotonergic excitatory and GABAergic inhibitory activity possibly re-awakening latent synapses and/or formation of new synapses. Indeed, perceptual learning has revealed improvements on various visual tasks such as visual and vernier acuity as well as stereo-acuity in adult amblyopic individuals. Hence latent cortical connections and/or new connections can be formed even in adulthood after “critical” periods of development. Such neuro-plasticity could explain the enhancement in hue perception with age following repeated, reward-based completion of critical tasks.

**Methods:** Jewelry appraisers (n=18, mean 57 ± 12 YO) undergoing color vision certification on the FM 100 hue test in accord with the National Association of Jewelry Appraisers (NAJA) were invited to participate in a study to assess performance on the Ishihara (to rule out hereditary color deficiency), FM-100 Hue (currently used by NAJA), desaturated

D15 and the cone contrast test (Innova Systems, Inc) which quantifies L, M and S cone contrast sensitivity (CS). Subjects provided written informed consent for our IRB approved protocol.

**Findings:** All subjects passed the Ishihara and desaturated D15 tests confirming normal color vision. Combined M and S cone CCT scores were predictive of FM 100 Hue total error score (TES;  $F = 7.76$ ,  $P < .02$ ,  $r^2 = .45$ ). 17 of 18 subjects had 100 Hue TES scores which were >2SD below age-matched normal means indicating enhanced hue performance. Partial TES analysis revealed error rates were greatest on the blue-yellow (BY) axis. Elderly jewelry appraisers show enhanced hue discrimination due to a highly practiced, reward-based repetition—tenets of perceptual learning. Correlation between M and S CCT and FM Hue scores suggests greater importance of M and S cone hue discrimination and CS for accurate gemstone discrimination. This is evident when viewing highly valued gemstones in normal, protan, deutan and tritan views. The protan (lacks L cones) and normal views essentially match while deutan (lack M cones) and tritan (lack S) views appear different from the normal, highly valued view, exemplifying M and S cone importance in gemstone hue discrimination. The subtle differences impact gemstone valuation. Elderly jewelry appraisers show enhanced hue discrimination due to a highly practiced, reward-based repetition—tenets of perceptual learning. Correlation between M and S CCT and FM Hue scores suggests greater importance of M and S cone hue discrimination and CS for accurate gemstone discrimination. This is evident when viewing highly valued gemstones in normal, protan, deutan and tritan views. The subtle differences impact gemstone valuation.

*REFRACTIVE ERROR FINDINGS AND OCULAR HEALTH DIAGNOSES ON A VOSH INTERNATIONAL  
CLINICAL TRIP TO THE DOMINICAN REPUBLIC*

**Arielle Angel, BSA, Raelyn Ottenbreit, OD, FAAO; Aubrey Breithaupt, OD, FCOVD; Allan McCleary, OD; Timothy A. Wingert, OD, FAAO, FNAP, FEAOO<sup>1</sup>**

**Rationale:** Optometric services in many parts of the world are unavailable, or when available, limited to those individuals who have the resources and proximity to gain access to them. Recognizing this disparity in availability of eyecare services, teams from developed countries have been volunteering to provide eyecare in these countries for many years. Over time, these groups have also adopted a mission of enhancing the local infrastructure to create long-term improvement.

**Purpose & Methodology:** All records from a VOSH clinical trip to the Dominican Republic were retrospectively analyzed for patient demographics, entering visual acuity, prevalence of refractive error, and frequency of ocular health diagnoses and referrals.

**Findings:** On average, data gathered demonstrated reduced visual acuity and mild uncorrected refractive error. The average entering distance visual acuities were 20/50.91 and 20/50.23 for OD and OS, respectively. The mean spherical refractive error was low hyperopia and the mean refracted cylinder value was -1.07DC OD and -1.01DC OS with an against-the-rule orientation. The most prevalent ocular health finding was cataract with 218 cases OD and 216 cases OS encountered. VOSH provides a valuable service to many lacking access to routine eye care. As illustrated, many individuals in the Dominican Republic live with uncorrected refractive errors and ocular pathology, such as cataracts, significantly impacting their quality of life. Future VOSH trips, by implementing consistent documentation methods, can contribute to building the healthcare infrastructure.

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*RESULTS OF A VOSH TRIP TO PANAMA*

**Emily Burnette, BS; Timothy A. Wingert, OD, FAO, FNAP, FEAO; Allan McCleary, OD; Aubrey Breithaupt, OD, FCOVD; Raelyn Ottenbreit, OD, FAA<sup>1</sup>**

**Rationale and Significance:** Optometric services in many parts of the world are unavailable, or when available, limited to those individuals who have the resources and proximity to gain access to them. Recognizing this disparity in availability of eyecare services, teams from developed countries have been volunteering to provide eyecare in these countries for many years. Over time, these groups have also adopted a mission of enhancing the local infrastructure to create long-term improvement.

**Purpose and Methodology:** All records from a VOSH clinical trip to Panama were retrospectively analyzed to determine the prevalence of ocular conditions diagnosed.

**Findings:** As expected the mean refractive error was low hyperopia, however, most astigmatism was

oriented in an against-the-rule direction. There was also an earlier need for an additional near correction. There were 488 instances of non-refractive ocular conditions documented with cataracts constituting 75.6% of these. Documented measurement of intraocular pressures (IOP) demonstrated most findings fell within the accepted normal range of 11-22mmHg, however, there were occurrences above and below this range. The trip benefited many individuals while also highlighting the need for a long-term solution by improving the public health infrastructure. It demonstrated the immediate impact that can be had with a short-term intervention while also diagnosing ocular conditions that would require long term management. Without an improvement in access to local care these conditions cannot be successfully treated.

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## SELF REPORTED SLEEP QUALITY INDEX AND ACADEMIC PERFORMANCE

Christina Banh; Lizett Martinez; Dede Rios, MS, PhD, AHIP; Matt Valdes, OD, FAAO<sup>1</sup>

**Purpose:** This study investigates the correlation between self-reported sleep quality and academic performance in optometry students by utilizing an instrument adapted from the Pittsburgh Sleep Quality Index (PSQI) and actigraphy data.

**Rationale:** Professional students are inclined to sacrifice sleep for more productivity in order to accommodate an ever-increasing workload and stress. It has been well documented that elevated stress can impact sleep quality and overall health (Knudsen, 2007). Poor concentration and inability to function during the day can negatively impact their working capability and academic performance (Almojali, 2017). We aim to measure student's subjective understanding of sleep quality and relate it to their academic performance (Cumulative GPA) throughout their time in a professional program.

**Methodology:** A cohort of professional (OPT III) were recruited to participate in a self-reported sleep quality survey adapted from the Pittsburgh Quality Sleep Index (PQSI) instrument. Items of interest included the following: • Usage of Sleep Aids (I.e. Rx or OTC) • Time needed to fall asleep • Level of alertness throughout the day • Overall daily impact of poor sleep (I.e. concentration,

productivity, etc.) • Prioritization of receiving enough sleep • Duration of poor sleep (e.g. Chronicity) • Number of steps throughout the day Academic performance was measured using the subjects' cumulative grade point average (GPA) which was self-reported and confirmed through student affairs, with subject consent.

**Findings:** 32 professional school students (63% female), aged 25.4±1.94, enrolled and completed this study. Subjects averaged an aggregate sleep index score of 16.18±2.72. Chronic difficulty falling asleep was correlated with lower GPA but did not reach statistical significance ( $R^2 = 1.28$ ,  $p = 0.051$ ). Increased sleep score index was also correlated with lower GPA and reached statistical significance ( $R^2 = 0.132$ ,  $p = 0.047$ ). All other items of interest did not correlate with reduced academic performance. Conclusion: This study has the potential benefit of screening students who may be at risk for poor academic performances resulting from poor sleep quality given an increased sleep index score. By increasing our understanding of sleep quality and academic performance we hope educate our students and to develop interventions related to sleep hygiene and positively impact both areas.

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## *SENSITIVITY AND SPECIFICITY OF AN OCCUPATIONAL TEST OF HUE DISCRIMINATION*

**Dung Nguyen, BS; Jessica Carachure, BS; Tayde Contreras, BS; Lydia Geabou, BS; Annie Ku, BS; Jared Sies, BS; Neda Tahvilian, BS; Logan Skrobarcek, BS; Julie Lovell, MS, PhD; Jeff Rabin, OD, MS, PhD, FAAO<sup>1</sup>**

**Purpose:** To determine sensitivity and specificity of a new field test to assess hue discrimination of railroad employees.

**Rationale:** Numerous clinical tests accurately detect individuals with color vision deficiency (CVD) and confirm normal color vision as well (CVNs). However, specific occupations, including aviation, transportation, law enforcement, and the military, have specific occupational needs which may require secondary or primary testing with tests developed to address specific occupational demands. We evaluated sensitivity (percent CVDs identified correctly) and specificity (percent CVNs identified correctly) with a new occupational color vision field test for railroad workers.

**Methods:** A total of 50 subjects, 25 CVN and 25 CVD, participated in our IRB approved study after providing written informed consent in accord with our IRB approved protocol. All subjects were initially tested with black-white visual acuity and contrast sensitivity tests to assure normal vision followed by the Ishihara 24 plate book test to identify CVD vs. CVN. Additional tests included the Oculus HMC Anomaloscope, the computer-based Cone Contrast Test (CCT, Innova Systems, Inc.), the CCT-HD (Konan

Medical, Inc.) and NCI CCT (Nordstrom Consulting, Inc.). The occupational test requires the subject to accurately name railroad signal lights using a real-world system which presents four colored LED lights [red (R), green (G), yellow (Y), white (W)] at ¼ mile encountered while performing their normal railroad duties. A total of 20 randomized trials are given and passing requires that the subject identifies all lights correctly on the first run, or if  $\leq 1$  error is made all lights must be correctly identified on a second series of testing.

**Findings:** There was no significant difference in age between CVDs (30 YO) and CVNs (25 YO,  $P = .07$ ). In CVNs all subjects correctly passed color vision screening tests and identified all signal lights, 19 on the first test and 20 on the second test. Hence 100% of CVNs correctly identified all signal lights resulting in 100% specificity for the signal light test. In contrast, all subjects confirmed to have hereditary red-green CVD on multiple tests failed the signal light test (mean  $\pm$  SD correct out of 20 =  $11.44 \pm 4.17$  correct, range 5 – 18 correct). These findings validate the sensitivity and specificity of the new test of hue perception in railroad employees and provides validation to make occupational decisions based on real-world color vision requirements.

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*SENSITIVITY AND SPECIFICITY OF CONE CONTRAST SENSITIVITY: A COMPARISON BETWEEN THREE TESTS*

Jessica Carachure, BS; Tayde Contreras, BS; Lydia Geabou, BS; Annie Ku, BS; Dung Nguyen, BS; Jared Sies, BS; Neda Tahvilian, BS; Julie Lovell, MS, PhD; Jeff Rabin, OD, MS, PhD, FAAO, Dipl Vision Science<sup>1</sup>

**Purpose:** Our purpose was to compare sensitivity and specificity of the cone contrast test (Innova CCT modified to include lower contrasts), NCI and Konan systems for detecting type & severity of hereditary CVD.

**Rationale:** Computerized color contrast sensitivity (CS) tests that aim to determine presence, type and severity have been developed and are available but data on agreement between tests is lacking.

**Methods:** Twenty-five color vision normal (CVN) & 25 color vision deficient (CVD) subjects (mean age  $27 \pm 9$ ), confirmed by Ishihara and anomaloscope testing, were recruited from the local community. Each provided written informed consent in accord with our IRB-approved protocol which addressed occupational color performance as well. Subjects were tested with right and left eye on the CCT, Konan and NCI systems in random order. Each test presents letters (CCT) or Landolt Cs visible only to red (R), green (G) or blue (B) cones in staircase fashion to determine cone CS thresholds.

**Findings:** Since there was no difference between right & left eyes across systems for CVNs ( $F = 0.05$ ,  $p > 0.81$ ) and CVDs ( $F = .51$ ,  $p > .47$ ), the average of

the two eyes was used for each subject. In CVNs there was a significant difference between systems ( $F = 2304$ ,  $p < .001$ ). Post hoc comparisons showed that Konan R and G cone CS was higher than CCT and NCI scores (Tukey-HSD). However, B cone CS was higher for the CCT compared to Konan and NCI. CVDs also showed a difference between systems ( $F = 592$ ,  $p < .001$ ) with higher protan and deutan Konan scores but no difference for the normal cone CS scores. The CCT again showed higher B cone scores vs Konan and NCI (Tukey-HSD). All three tests showed 100% sensitivity for detection and identification of CVD and type. In CVNs all tests showed 100% specificity for confirming normal R and G cone CS, but Konan showed 96% specificity in CVNs and 92% in CVDs for B cone CS. All systems showed 100% sensitivity for detection and identification of type of CVD and high specificity for confirming CVN. The Konan system yielded higher values for R & G cone CS, attributable to its finer gradation in contrast steps & PSI method of achieving a threshold. However, the CCT with extended contrast range yielded higher B cone scores most likely due to the larger character size used on the CCT to render its target near the peak of the B cone CS function. Future comparisons to anomaloscope & occupational measures of color vision are forthcoming.

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## SLEEP PATTERNS AND THEIR IMPACT ON ACADEMIC PERFORMANCE

**Matt Valdes, OD FAAO; Christina Banh; Lizett Martinez; Dede Rios, MS, PhD, AHIP<sup>1</sup>**

**Purpose:** Significant research into academic achievement has focused on external factors such as teaching styles, learning resources and technology. This study aims to evaluate sleep patterns in relation to academic performance among optometry students.

**Rationale:** Demanding professional program schedules force students to make difficult decisions regarding their lifestyle habits (eating, sleeping, exercise, etc.) without appreciating the impact on academic performance. Within this study we aim to examine the relationship between personal sleep habits, sleep patterns and academic performance among optometry students. Prior research investigating academic performance and sleep (Zeek et al., 2015) found most pharmacy students received less than 7 hours of sleep during a typical school week. They also noted a positive correlation between increased sleep duration and higher course grades and grade point averages (GPAs). Unfortunately, many sleep studies have relied on self-reported data. By using wrist-based accelerometers we look to replicate a prior pilot study looking at consistent sleep patterns and academic performance.

**Methodology:** This longitudinal study was conducted during the Summer semester with optometry school students (OPT III) taking at least 19 credit hours. The study protocol was approved by the Institutional Review Board. A pre-study Lifestyle Habits Questionnaire was administered to collect self-reported data in the following areas: ● Typical Bedtime (Weekday vs Weekend) ● Typical Wake time (Weekday vs Weekend) ● Time required to fall asleep ● How poor sleeps impact on day to day productivity ● Duration of poor sleep patterns

(acute vs chronic) Academic performance was measured using the subjects' cumulative grade point average (GPA) which was self-reported and confirmed through student affairs, with subject consent. Wrist based accelerometers (MiBand 2. Beijing, China) were used to monitor bedtimes, wake times and sleep duration for 30 days (21 day minimum). Data was analyzed using Google Sheets (Mountain View, CA) and XLMiner Analysis Toolpak to compare subjective responses, measured sleep habits and GPAs.

**Findings:** 32 professional school students (63% female), aged  $25.4 \pm 1.94$ , enrolled and completed this study. On average, students receive 7:05 hours of sleep per night. They also received significantly less sleep during the week than the weekend (6:44 vs 8:01, respectively [ $P < 0.001$ ]). Total Sleep duration did not correlate with GPAs ( $R^2=0.02$ ,  $P=0.44$ ). The most meaningful correlations with academic performance included earlier bedtime during the weekday ( $R^2=0.085$ ,  $P=0.11$ ) and consistency of bedtime during the weekday ( $R^2=0.144$ ,  $P = 0.025$ ), where sleep consistency was evaluated using the standard deviation of each variable. Weekend bedtime [ $R^2 = 0.007$ ,  $P=0.66$ ], wake time [ $R^2=0.002$ ,  $P=0.83$ ], or sleep duration [ $R = 0.01$ ,  $P=0.54$ ] showed no correlations with GPA. Conclusion: This study was able to reproduce findings from a pilot study, highlighting the value of a consistent bedtime and its positive relation to academic performance. Students with less variable sleep schedules during the weekday were also less likely to report chronic sleep problems and ultimately performed better academically. Future studies should consider the impact technology has on maintaining a consistent sleep schedule and strategies to encourage better sleep habits.

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## THE IMPACT OF MACULAR PIGMENT OPTICAL DENSITY IN REFRACTIVE SURGERY

Jared Sies, BS; Jessica Carachure, BS; Tayede Contreras, BS; Lydia Geabou, BS; Annie Ku, BS; Dung Nguyen, BS; Neda Tahvilian, B.S; Julie Lovell, MS, PhD; Jeff Rabin, OD, MS, PhD, FAAO, Dipl Vision Science<sup>1</sup>

**Purpose:** To determine the impact of macular pigment optical density (MPOD) on visual acuity (VA) and small letter contrast sensitivity (CS) in refractive surgery patients.

**Rationale:** Both the cornea and macular pigment absorb short wavelength light. The macular pigment (lutein, zeaxanthin, meso-zeaxanthin) in the retina outer plexiform layer absorbs damaging high energy light which produces free radicals contributing to eye disease. Absorption also decreases glare from bluish light. We hypothesized that in laser assisted in situ keratomileusis (LASIK) and comparable procedures wherein up to 1/3 of the cornea is photo-ablated, there would be decreased absorption of blue light causing more glare and producing a greater impediment to vision. Hence, despite LASIK, patients with higher MPOD would show better VA and CS.

**Methods:** Nineteen healthy young adults (ages 22-38 years) without evidence of ocular, systemic or neurologic disease who underwent refractive surgery within the last five years (14 LASIK, 4 implantable collamer lenses, 1 PRK) participated in our study after written informed consent in accord with our IRB approved protocol. Each subject had their distance VA and CS measured in their right eye, left eye and both eyes at 4 meters in a darkened room viewing the Super Vision Test (Innova Systems, Inc.) which is a letter chart with VA and small letter CS (20/25 letter CS) back illuminated by a fluorescent (bluish white) light. The chart luminance was 206 cd/m<sup>2</sup> and CIE

chromaticity (x,y = 0.266, 0.268) corresponding to a bluish white. VA and CS were recorded as letters read correctly in log MAR and log CS units, respectively, on preprinted score sheets. MPOD was measured with the QuantifEYE™ MPS II, which uses heterochromatic flicker photometry to determine the green/blue (530/465 nm) luminance ratio to achieve minimum perception of flicker for a 1-deg. foveal target compared to a 2 deg. extra-foveal target (8 deg). From fixation outside the macular pigment) with the difference in log blue luminance an estimate of MPOD.

**Findings:** There were no significant differences between subjects' right and left eyes for VA (P > .34), CS (P >.59), pupil size (P > 0.33) and MPOD (P > .51); hence right eye and left eye means were used for analyses. VA (P > 0.59), CS (P > 0.64) and MPOD (P > 0.68) were not significantly different from corresponding values in 25 subjects of comparable age without refractive surgery. However, both VA (F = 27.22, P > .001, R<sup>2</sup> = 0.62) and CS (F = 13.93, P > .002, R<sup>2</sup> = 0.45) increased significantly with increasing MPOD. Given the loss of corneal thickness post-LASIK, the consequent increased transmission of higher wavelength ultraviolet light (UVA) potentially increasing autofluorescence by the lens and scatter by the cornea and lens, potential glare sources which may be mitigated by denser MPOD. Prolonged exposure to greater UV light post-LASIK could contribute to cataracts and macular degeneration. Further research is needed to support these possibilities.

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## *THE IMPACT OF MACULAR PIGMENT OPTICAL DENSITY OF VISUAL ACUITY AND CONTRAST SENSITIVITY*

Lydia Geabou, BS; Jessica Carachure, BS; Tayde Contreras, BS; Annie Ku, BS; Dung Nguyen, BS; Jared Sies, BS; Neda Tahvilian, BS; Julie Lovell, MS, PhD; Jeff Rabin, OD, MS, PhD, FAAO, Dipl Vision Science<sup>1</sup>

**Purpose:** To determine the impact of macular pigment optical density (MPOD) on visual acuity (VA) and small letter contrast sensitivity (CS).

**Rationale:** Macular pigment (MP) is a “yellow pigment” which absorbs blue light in the central retina. It is comprised of carotenoids (lutein, zeaxanthin, meso-zeaxanthin). It is located mainly in the Henle fiber layer (photoreceptors axons within outer plexiform layer). This pigment absorbs potentially damaging high energy blue light associated with generation of free radicals which cause oxidative stress and contribute to eye disease. It can also decrease glare from bluish light not directly on the line of sight. We hypothesized that a letter chart back illuminated by a “cool” (bluish white) light may produce less glare in subjects with higher MPOD.

**Methods:** Twenty-five healthy young adults without evidence of ocular, systemic or neurologic disease participated in our study after written informed consent in accord with our IRB approved protocol (mean age  $\pm$  SD: 25  $\pm$  3 YO, 15 females, 10 males). Each subject had their distance VA measured in their right eye, left eye and in both eyes at a distance of 4 meters in a darkened room viewing the Super Vision Test (Innova Systems, Inc.) which is a letter chart VA and small letter CS (20/25 letter CS) back illuminated by a fluorescent light panel. This was followed by measurement of CS using the Super Vision Chart. The chart luminance was 206

cd/m<sup>2</sup> and CIE chromaticity  $x, y = 0.266, 0.268$  which corresponds to a slightly bluish white. VA and CS were recorded as letters read correctly in log MAR and log CS units, respectively, on preprinted score sheets. Pupil size was then measured in mm using a smaller ruler. This was followed by measurement of MPOD (QuantifEYE™ MPS II) which uses a heterochromatic flicker photometric technique to determine the green/blue (530/465 nm) luminance ratio to achieve minimum perception of flicker for a 1 degree foveal fixated target compared to a 2 degree extra-foveal target (outside the range of macular pigment) with the difference in log blue luminance and estimate of MPOD.

**Findings:** There was no difference between subjects’ right and left eyes for VA ( $P > .11$ ), CS ( $P > .17$ , and MPOD ( $P > .30$ ); hence the mean right eye/left eye mean was used for analysis. Contrary to the hypothesis that greater MPOD would lessen blue glare and improve performance both VA and CS decreased with increasing MPOD. The two scores were combined to yield a composite log score which decreased significantly with increasing MPOD (linear regression:  $F = 5.92, P < .024, R^2 = 0.21$ ). This indicates that, while the blue component of the fluorescent light was insufficient to produce glare, its absorption, which increased with MPOD, did decrease the retinal illuminance of the stimulus yielding slightly lower VA and CS. This is nontrivial when conducting exacting measures of vision with “cool” (bluish white) light.

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## *THROUGHPUT: A NEW METRIC FOR QUANTIFYING COLOR VISION*

Logan Skrobarcek, BS; Jeff Rabin, OD, MS, PhD, FAAO, Dipl Vision Science; Jule Lovell, MS, PhD; Jessica Carachure, BS; Tayde Contreras, BS; Lydia Geabou, BS; Annie Ku, BS; Dung Nguyen, BS; Jared Sies, BS; Neda Tahvilian, BS<sup>1</sup>

**Purpose:** To describe and evaluate a new metric for quantifying color vision which is the cone specific sensitivity divided by the average response time.

**Rationale:** There are many clinical tests that accurately detect individuals with color vision deficiency (CVD) and confirm normal color vision (CVN) as well. However, relatively few tests indicate type [red (R), green (G) or rarely blue (B)] or severity of CVD. The cone contrast test (CCT, Innova Systems, Inc.) is a computer-based test which uses an adaptive staircase to rapidly assess R, G and B sensitivity and has proven highly sensitive for detection of both hereditary X-linked red-green CVD as well CVD acquired in ocular, systemic and neurologic disease. In addition to providing R, G and B sensitivity the CCT also provides average response time to identify the low contrast, colored letters. Since CVDs often take longer than normal to complete color specific tasks, we developed a new metric which encompasses both sensitivity and completion time as throughput: sensitivity/response time and evaluated its sensitivity and specificity in CVN and CVD subjects.

**Methods:** 25 CVNs (mean age  $\pm$  SD: 25  $\pm$  3) and 25 hereditary CVDs (30  $\pm$  12 YO), confirmed to be CVD on multiple tests, participated after providing written informed consent in our IRB approved protocol. The CCT presents letters of decreasing cone contrast to determine R, G and B cone

sensitivity and average response time. Throughput (sensitivity/response time) was computed for each subject and paired and unpaired t-tests were used to assess differences with Bonferroni correction for multiple comparisons. P-values less than .001 were specified as  $P < .001$ .

**Findings:** Mean ( $\pm$  SD) throughput values for CVNs were: R cone 36.8  $\pm$  7.4, M cone 36.8  $\pm$  8.7, B cone 54.5  $\pm$  10.0). While there was no difference between R and G cone throughput in CVNs ( $P = .96$ ), B cone throughputs were higher ( $P < .001$ ). This was due to a ceiling effect as higher threshold contrasts are used for B cones allowing more subject to perform maximally on this test. CVDs showed a significant decrease in throughput for the affect cone type. In R cone (protan) CVDs ( $n = 7$ ) mean throughput was 2.7  $\pm$  1.4 which was significantly lower than their G cone mean throughput (30.5  $\pm$  6.2,  $P < .001$ ) and lower than CVN R cone mean throughput ( $P < .001$ ). In G cone (deutan) CVDs ( $n = 18$ ) mean throughput was 10.0  $\pm$  5.6 which was significantly lower than their R cone mean throughput (30.7  $\pm$  5.5,  $P < .001$ ) and CVN G cone throughput ( $P < .001$ ). The lower throughput of R cone CVDs vs. M cone is attributable to lower CCT scores in R cone CVDs reported in comparable color tests. Throughput was 4.6 SDs below the CVN mean in L cone CVDs and 3.1 SDs below the mean in M cone CVDs. Throughput is a sensitive metric of CVD with vast potential applications.

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*A NATURAL COMPOUND SCREEN FOR SPOP DOWNREGULATED BREAST CANCER*

**Esther Galindo; Marieke Burleson<sup>1</sup>**

**Purpose:** Downregulation of Speckle Type Poz protein (SPOP) appears to be a key driver of breast cancer since a large fraction of breast cancer patients display downregulated SPOP expression. This thus prompts the critical need for the discovery of superior treatment strategies that can effectively target breast cancer in patients with downregulated SPOP. The purpose of our study is therefore to screen a natural compound library in order to uncover novel therapeutic strategies for SPOP downregulated breast cancer.

**Rationale:** Since breast cancer is the second leading cause of cancer deaths among American women there is a compelling need to uncover novel and superior treatment regimens for women suffering from this disease. Interestingly, several studies have indicated that up to 70% of breast cancer patients have downregulation of SPOP thus indicating that SPOP is a critical tumor suppressor gene in breast cancer. Our lab has previously shown that SPOP targets GLI3 for ubiquitination to promote SHH signaling in prostate cancer patients, a finding that we hypothesized to be true for breast cancer as well since SHH signaling is often found to be hyper-activated in advanced breast cancer. We further hypothesized that SPOP downregulated breast cancer cells therefore will likely have a differential response to targeted therapy and that SHH targeted

drugs could prove to be beneficial for SPOP downregulated breast cancer patients.

**Methodology:** First of all, to study the effect of downregulated SPOP, a lentivirus carrying an shRNA against SPOP was generated and infected into MCF-7 cells. Proliferation assays were utilized to confirm that downregulated SPOP plays a role in the increased proliferation of breast cancer cells. Next, quantitative PCR was performed to determine the effect of downregulated SPOP on the expression of GLI3-dependent SHH target genes. Finally, a natural compound library was utilized to find a novel therapeutic strategy for SPOP downregulated breast cancer.

**Findings:** Our findings confirmed that SPOP knockdown increases proliferation of MCF-7 cells in vitro. Furthermore, quantitative PCR confirmed that GLI3 target genes are upregulated in MCF-7 cells when SPOP expression is low. Finally, our natural compound library screen identified novel therapeutic compounds that specifically target SPOP downregulated MCF-7 cells in a manner that involves disruption of GLI3-dependent SHH signaling. These findings therefore provide critical insight into novel treatment strategies for patients suffering from SPOP downregulated breast cancer.

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*ANALYSIS OF SURFACE WATER FOR METAL IONS BY INDUCTIVELY COUPLED PLASMA-MASS SPECTROSCOPY (ICP-MS) IN SEVEN RIO GRANDE RIVER BASIN SITES OF TEXAS*

**Alakananda Chaudhuri, PhD; Edward Gonzalez PhD; Sara Ibarra; Victoria Doan; Gabriela Zuniga, BS; Jaime Castro BS<sup>1</sup>**

**Purpose:** The aim of the study was to determine the metal content of the surface water collected from seven different sites of the Rio Grande River Basin in Texas between Amistad Reservoir and Zapata. The objective was to assess the levels of toxic and other metals following the standard EPA (Environmental Protection Agency) methods for water quality control.

**Rationale:** The Rio Grande River is a natural boundary between U.S. and Mexico from El Paso, Texas to Brownsville, Texas, and stretches over 2000 miles from the Southern Rocky Mountains in Colorado to Texas where it meets with the Gulf of Mexico. The contamination of chemical pollutants in the Rio Grande River water and sediments has been an ongoing issue on both sides of the border but limited information is available on the intense monitoring of the metal content of the river. The Environmental Protection Agency (EPA) and the State of Texas have set federal standards of the amount of pollutants and metal ions in surface, potable and recreational waters. The specific aim of this study was to assess the current conditions of the metal content of the selected sites of the Rio Grande River Basin of Texas to be used as a reference for future studies in monitoring the trace and major metals.

**Methodology:** The river water samples were analyzed for 27 metals using inductively coupled plasma-mass spectroscopy (ICP-MS) following the standard EPA method 200.8. The water samples

were collected from seven different sites of the Rio Grande River Basin in Texas such as (1) Amistad Reservoir, (2) Del Rio, (3) Eagle Pass, (4) Laredo/Columbia, (5) Cenizo, (6) San Igancio, and (7) Zapata. The collected water samples were acidified with nitric acid (1+1) and hydrochloric acid (1+1), filtered in the lab through a 0.45 µm filter followed by digestion between 93-96oC, and then analyzed for 27 metal ions by ICP-MS using a Bruker model 820 MS ICP-MS instrument.

**Findings:** The results of the analysis were compared to EPA limits for surface water. The percent recovery values for these metals in the spiked control samples varied between 96% and 110%. The results show an elevated lead concentration, a toxic heavy metal, of 0.041 mg/L in Amistad Reservoir that was above the federally regulated EPA limit of 0.015 mg/L lead for surface water. The Amistad Reservoir water sample also showed the highest concentrations of other metals like nickel, silver vanadium, and zinc, whereas the river water from Zapata showed the highest concentration of copper. All metals (except lead in the Amistad Reservoir) analyzed in the water samples from these seven Rio Grande River Basin sites were within the permissible limits of the EPA and the State of Texas Commission on Environmental Quality standards. Further water quality studies will include the analysis of metals in the remaining sites of the Rio Grande Basin of Texas from Falcon Reservoir to Brownsville.

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*CALCIUM-DEPENDENT DUAL OXIDASE 2 IS A NOVEL SOURCE OF REACTIVE OXYGEN SPECIES  
IMPLICATED IN GLOMERULAR MESANGIAL CELL FIBROTIC RESPONSE TO ANGIOTENSIN II*

**Gabriela Gomez-Garcia<sup>1</sup>; Teresa Baistra<sup>1</sup>; Bridget Ford, PhD<sup>1 2</sup>;**

**Purpose:** In this study, we demonstrate Duox2 upregulation in response to angiotensin II (Ang II). The role of calcium was also analyzed in relation to Ang II-mediated Duox2 activation and the resulting fibrotic response in glomerular mesangial cells. This research potentially identifies and helps to establish the role of Duox2 in diabetic nephropathy (DN) and helps to identify future therapeutic strategies to prevent or improve any damages caused by DN.

**Rationale:** The vasoactive peptide, angiotensin II (Ang II), contributes to the initiation and progression of glomerular fibrosis via activation of glomerular mesangial cells (MCs) and subsequent extracellular matrix expansion. We have previously shown that oxidative stress is critical for MC fibrotic response to Ang II. Here, we demonstrate that Dual oxidase 2 (Duox2), a member of the Nox/Duox family of NADPH oxidases, is present in MCs and that its protein expression is upregulated by Ang II.

**Methodology:** Rat mesangial cells were grown to confluency in Dulbecco's modified Eagle's medium. After 24 h serum deprivation, cells were exposed to vehicle (control) or 1 $\mu$ M angiotensin II. Small interfering RNA (siRNA) were used to inhibit expression of Duox2 and hydrogen peroxide production was determined using an Amplex Red assay. Western blot analysis was used to observe differential protein expression and Fura2

fluorescence was used to show calcium mobilization.

**Findings:** Small interfering RNA (siRNA)-mediated downregulation of Duox2 significantly reduces Ang II-induced increase in reactive oxygen (ROS) generation and prevents the stimulatory effect of Ang II on MC fibrotic injury (as assessed by measuring  $\alpha$ -smooth muscle actin and fibronectin expression). To demonstrate that Duox2 activation is Ca<sup>2+</sup>-dependent, we show that the extracellular Ca<sup>2+</sup> chelator BAPTA prevented Ang II-induced ROS generation and the stimulation of MC fibrotic injury by Ang II. Moreover, treatment of MCs with ionomycin resulted in increased ROS production and enhanced MC fibrotic injury. These effects were abrogated by siRNA targeting Duox2. Fura-2 fluorescence was utilized as well to show calcium mobilization in response to Ang II and this effect was abrogated with siDuox2 transfection. These data indicate that Ang II-stimulated Duox2 activation and ROS generation subsequently lead to MC fibrotic injury. In summary, we have identified a novel role for Duox2 as a major source of ROS in response to Ang II and established the significance of Duox2 in Ang II-mediated MC activation and fibrotic injury. Therapeutic targeting of this pathway may prevent or reverse pathophysiologic manifestations of renal fibrotic diseases.

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## CHARACTERIZATION OF THE PHOTORECEPTIVE SYSTEM IN *LUMBRICULUS VARIEGATUS*

Emma L. Vequist<sup>1</sup>; Marina Vargas<sup>2</sup>; Erica L. Cain<sup>3</sup>; Veronica G. Martinez Acosta<sup>1</sup>

**Purpose:** Although light is most commonly thought of as a visual stimulus detected by eye structures which provide imaging information to the brain, many organisms have the ability to detect light outside of the eye to support a variety of functions, including predator avoidance, regulation of gene expression, transition through developmental stages, and phototactic responses (Cronin and Johnsen, 2016). While the use of light to drive non-visual responses has been documented for some time in invertebrates, much of the early studies of photoreceptor function, utilizing vertebrate systems, focused on photoreception as method for transduction of visual information to the brain. The discovery in the early 2000s of novel photoreceptors within the mammalian brain which utilized unique photopigments (melanopsins) to help synchronize circadian rhythms (Berson, 2003), drew attention to other types of photoreceptor cells and photopigments which could have functions beyond visual input. Thus, the identification of novel photoreceptor types and photopigments in non-mammalian systems is of significance as these unique organisms may provide clues to the evolutionary origins of phototransduction and its function in higher order phyla.

**Rationale:** A crucial point in understanding evolution of photoreception is the characterization of the enormous structural diversity of the photoreceptive cell, their photoreactive pigments, and their functional outputs. We utilize *Lumbriculus variegatus* as an annelid model. In the Annelids, photoreceptors are found within eye structures and as well as situated in different locations within the derma or various photoreceptor-like sense organs (Purschke et al., 2006). *Lumbriculus* possess photoreceptors within its posterior-most segments,

which help mediate rapid escape tail withdrawal, which is evoked when a shadow is cast over the water column by a predator (Drewes and Fournier, 1989). This study characterizes the Lumbriculid photoreceptor system.

**Methodology:** Phototactic experiments were conducted on regenerating worms at different time points post amputation. Each worm was placed separately into a testing arena under a controlled light environment. After a period of dark adaptation, regenerating worms were exposed to different wavelengths of light corresponding to white, UV, blue, green and red wavelengths. Simple LED wands were designed using five different wavelengths of light, including: UV (395-405nm), blue (460-470nm), green (515-520nm), red (615-640nm), and white (500-600nm). Using transmission electron microscopy, we identify the photoreceptors within the body segments and describe in detail their arrangement.

**Findings:** Under white light, 11 unique behavioral responses were detected. Following, one week of regeneration, 71% of the posterior fragments responded to a light stimulus but few successfully moved toward the darkened portion of the arena. Anterior fragments moved toward the darkened portion of the arena 100% of the time. This preliminary data suggests that, although photoreceptors are present in posterior segments, anterior segments are also responsive to light stimulus. Ultrastructural studies have proven difficult without a marker for the Lumbriculid photoreceptive cells. Thus, we hope to move our ultrastructural studies forward using a recently cloned, putative LVa-opsin4 gene that will be serve as a marker for these photoreceptive cells.

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## *EFFECT OF HMG-CoA REDUCTASE INHIBITORS ON CANDIDA ALBICANS BIOFILM FORMATION*

**Alexandra Y. Winter; McKenna R. Armstrong-VanLaar, BS; Christopher G. Pierce, PhD<sup>1</sup>**

**Purpose:** The purpose of this project is to repurpose statins, HMG-CoA reductase inhibitors used to lower LDL cholesterol, in effort to address the urgent need of developing new treatment strategies targeting the resistant *C. albicans* biofilms.

**Rationale:** *Candida albicans*, while a common inhabitant of the human microbiota, represents an increasing health threat to immune and medically compromised individuals. As an opportunistic pathogen, *C. albicans* is capable of causing disease ranging from superficial to life-threatening systemic candidiasis. The seriousness of *Candida* infections is heightened due to the lack of antifungal drugs available, particularly against the biofilm mode of growth. *C. albicans* biofilms are clinically relevant as they are more resistant to antifungal drugs. In addition to *C. albicans* ability to

develop drug resistance, the toxicity of these antifungals to human cells represents a major problem.

**Methodology:** Briefly, the statins were screened to identify inhibitors of *C. albicans* biofilm formation and fully mature pre-formed *C. albicans* biofilms using the microtiter plate model for biofilm formation coupled with the XTT reduction assay.

**Findings:** Of the statins tested, pitavastatin and fluvastatin had the greatest effect on *C. albicans* biofilm formation and fully mature preformed biofilms. Pitavastatin inhibits biofilm formation by more than 80 percent at a concentration of 8 µg/ml, while fluvastatin inhibits 80 percent of biofilm formation at 16 µg/ml. Currently, the effects of statins in combination with fluconazole, a commonly used antifungal, are being investigated.

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*EFFECTS OF STANDARD-BASED MULTIDISCIPLINARY SCIENCES PROFESSIONAL DEVELOPMENT PROGRAMS ON SCIENCE TEACHERS' CONTENT KNOWLEDGE AND CLASSROOM PRACTICES: RESULTS FROM A LONGITUDINAL STUDY*

**Alakananda Chaudhuri, PhD<sup>1</sup>; Bonnie McCormick, PhD<sup>1</sup>; Richard Lewis, PhD<sup>2</sup>**

**Purpose:** The purpose of the study was to investigate the outcomes of standards-based multidisciplinary science institutes funded by the Texas Higher Education Coordinating Board Teacher Quality Grant Program (TQGP) to improve science content knowledge, pedagogical content knowledge, and incorporation of inquiry activities of San Antonio middle and high school science teachers in different cohorts over a period of twelve years.

**Rationale:** The National Science Education Standards (NSES) and Next Generation Science Education Standards (NGSES) emphasize the professional development (PD) of science teachers by learning science through inquiry and collaborative group work. No Child Left Behind (NCLB) required states to ensure high-quality PD for all teachers. Based on these principles, UIW offered Science Institutes to meet the PD needs of middle and high school science teachers in San Antonio, Texas to enhance the science preparation in essential content areas of physical, life, and earth sciences and to link this content enhancement to improved classroom performance of both the teacher participants and their students. The study specifically explores how inquiry-based PD impacted the implementation of inquiry instruction by middle and high school science teachers in their classrooms.

**Methodology:** The program assessment was conducted every year between 2004 and 2016. A total of 162 science teachers from 15 school districts participated in the chemistry, biology, physics, earth science, and environmental science institutes over this time period. Four approaches were used: 1) analysis of content knowledge gains, 2) participant assessment of the program, 3)

analysis of redesigned lesson plans and 4) classroom observations. Content knowledge gains were evaluated through pre-post tests of each course using test score means, standard deviations, comparison of differences between paired pre-and post-test scores. Comparisons of participant perceptions were accomplished by analyzing differences in frequency distributions. Teachers' reflections were used to analyze their perceptions of the effect of the program on their teaching. Redesigned lesson plans were analyzed to confirm that the participants were able to develop inquiry activities related to the content standards. Classroom observations provided evidence of the implementation of inquiry activities in the science classrooms.

**Findings:** Analysis of data over time demonstrated an increase in teachers' content knowledge and teaching practices in their classrooms and indicated gradual advancement in the use of inquiry-based instruction, active learning opportunities, instructional technology, and teacher networking. The post-test averages were higher than the pre-test averages in the range of 20 – 45%. The differentials between the pre-test and post-test were statistically significant in all the courses. Throughout the twelve-year assessment periods, participants in all the cohorts indicated that the program had a significant influence on their overall teaching effectiveness, perceptions of student learning abilities, science instruction in the classroom, and their instructional methods. The analysis of results clearly supports that the 5E learning and instructional model provided the teachers with the tools to alter their traditional teaching practices and to include the inquiry-based teaching practices specified by NSES, NGSES, and the state standards.

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*EMOTIONAL INTELLIGENCE, PERCEIVED STRESS, AND ACADEMIC PERFORMANCE AMONG GRADUATE DIETETIC STUDENTS*

**Heather Frazier, PhD, RDN, LD<sup>1</sup>; Liette Ocker, PhD<sup>2</sup>; Teresa Araas, PhD, CHES<sup>3</sup>; Sara Blackburn, DSc, RDN<sup>4</sup>**

**Purpose:** To explore the relationship of emotional intelligence (EI) and perceived stress of graduate dietetic students in Combined Master of Science (MS) and Dietetic Internship (DI) programs to academic performance.

**Rationale:** Students with high EI may be better able to regulate their emotions and acknowledge their feelings and thus be more successful in their academic endeavors by employing more effective coping strategies for handling stress. Interestingly, EI has been well researched among graduate student programs in fields such as psychology and nursing; but has been absent in studies related to dietetics. Becoming more aware of the EI of dietetic students potentially could assist dietetic educators when engaging dietetic students in the learning process and in guiding them toward successful completion of the Combined MS/DI program.

**Methodology:** An online survey using two validated data collection instruments: 1) Schutte EI Scale and 2) Perceived Stress Scale-10 was used to measure students' EI and perceived stress, respectively. GPA was self-reported. Participants included a total of

102 graduate dietetic students, that had completed at least one semester of graduate coursework.

**Findings:** There was no significant gender difference in EI scores ( $p = 0.082$ ). Mean scores of perceived stress was higher in females than males, which was a statistically significant difference ( $p = 0.011$ ). The mean GPA score for graduate dietetic students was 3.79 ( $SD \pm 0.32$ ). Although the students with the highest GPA had the highest EI scores, no statistical significance was found ( $p = 0.673$ ). No statistically significant correlation was found between EI and academic performance ( $r = 0.100$ ,  $p > 0.05$ ). Age, gender, and GPA were found to not be significant predictors of EI ( $p > 0.05$ ). Further studies are required to explore the association between EI, perceived stress, and GPA because dietetic students who are struggling academically might be experiencing increased stress in their program. If these students are able to improve their EI, they might improve their GPA, which, subsequently, could help reduce their stress levels. Potentially, development of EI in dietetics curricula might help graduate dietetic students deal with stress more efficiently.

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*IMMUNOHISTOCHEMICAL EXPLORATION OF CHANGES IN SYNAPTIC PROTEIN EXPRESSION DURING REGENERATION*

**Mauren A. Duran Zamora; Han Dang; Veronica G. Martinez Acosta, PhD<sup>1</sup>**

**Purpose:** The purpose of this research project is to characterize the types of synaptic proteins that contribute to the process of regeneration of *Lumbriculus variegatus*.

**Rationale:** Characterization of synaptic proteins utilized during the process of regeneration of *Lumbriculus variegatus* will contribute to the body of knowledge in the regeneration field. Additionally, the data collected with this proposed project will have implications for the evolution of regeneration in different organisms.

**Methodology:** The freshwater oligochaete, *Lumbriculus vaeriegatus* is an excellent regenerating model system. *Lumbriculus* undergoes rapid regeneration from as little as three body segments. Our lab has investigated cellular and molecular changes that occur at various time points of regeneration within the nervous system of the worm. Recent electrophysiological studies demonstrate recovery of function in the Lumbriculid nervous system occurring as early as 24hr post amputation (Lybrand et al, 2020). Interestingly, studies of regeneration in the Sea Lamprey indicate differential expression of synaptic proteins like, synapsin I (Lau et al, 2011), during

spinal cord regeneration. In our current study, we have taken an immunohistochemical approach to determine if there are similar changes in expression of synaptic proteins, specifically DSAP47 and syntaxin, during Lumbriculid ventral nerve cord (VNC) regeneration.

**Findings:** DSAP47 epitopes were observed in co-lateral extensions that arise from the VNC and are thought to be points of sensory integration from the periphery (Dang and Martinez Acosta, 2019). Immunoreactivity of DSAP47 is found along the length of the VNC, more closely associated with the lateral giant fibers. In cross-section, syntaxin is found at active synapses within the neuropil of the VNC in regenerating fragments. With the emergence of neuronal activity 24hrs following amputation, it is expected that these synaptic proteins will be highly upregulated as early as 3hrs post amputation; with expression patterns that peak between 24hrs and 1-week when recovery of behavioral function is complete. Overall, continued investigation of the expression patterns of synaptic proteins during regeneration will inform our understanding of the role these proteins play in the recovery of function in a successful regenerating model system.

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*MAMMALIAN TARGET OF RAPAMYCIN MEDIATES EXPRESSION AND ACTIVITY OF ADAM 17 IN  
DIABETIC KIDNEY DISEASE*

**Najwa Faiz<sup>1</sup>; Sachin Abraham<sup>2</sup>; Bridget Ford, PhD<sup>1,3</sup>**

**Purpose:** Previous data have illustrated a role for the matrix metalloprotease A Disintegrin And Metalloprotease 17 (ADAM17), known to cleave growth factors and cytokines, in renal cell injury in diabetes. The goal of this study was to identify upstream regulators of ADAM17 in the cascade of events contributing to extracellular matrix accumulation in diabetic nephropathy.

**Rationale:** Diabetic kidney disease is a serious complication faced by type 1 and type 2 diabetic patients alike. Albuminuria and extracellular matrix accumulation are prominent features of the disease and this accumulation of extracellular matrix is a contributing factor to renal fibrosis and decline in renal function. The mechanisms involved in the pathogenesis of diabetic kidney disease have not been completely identified.

**Methodology:** Age and weight-matched Sprague Dawley rats were obtained from Harlan Laboratories (Indianapolis, IN). Type 1 diabetes was induced through tail vein injection of

streptozotocin. After rats were determined to be diabetic by blood glucose measurement, rapamycin treatments were administered intraperitoneally for two months. Both kidneys were removed and frozen in liquid nitrogen for microscopy and experimental analyses or formalin fixed for morphometric imaging at the experimental endpoint. Kidney cortex homogenates were used for western blot analyses and enzymatic activity assays.

**Findings:** Using the mTOR complex 1 inhibitor rapamycin, it was determined that increased ADAM17 enzymatic activity and ADAM17 protein expression is dependent on mTORC1 in streptozotocin-induced type 1 diabetic rats. Inhibition of mTORC1 with rapamycin abrogated the increase in collagen IV  $\alpha$  2 protein expression observed in diabetic rat cortex. Additionally, this study is the first to provide evidence that mTOR complex 1 activates ADAM17 contributing to extracellular matrix accumulation in diabetic nephropathy.

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*MED12 MUTATIONS PROMOTE CASTRATION RESISTANT PROSTATE CANCER THROUGH HYPERACTIVATED SHH SIGNALING*

**Cristian Gonzalez; Marieke Burleson<sup>1</sup>**

**Purpose:** Approximately 5% of prostate cancers harbor mutations within the Mediator subunit MED12. However, the mechanistic role underlying MED12 mutations in prostate cancer progression is currently not well understood. The purpose of this study is therefore to investigate the role of MED12 mutations in prostate cancer.

**Rationale:** Prostate cancer is the most common malignancy and the second leading cause of cancer associated deaths among US men. As an androgen-driven disease, prostate cancer is critically dependent upon androgen receptor (AR) signaling. Accordingly, most prostate cancer patients respond very well to androgen deprivation therapy. The current problem lies with the fact that nearly all patients progress to a lethal form of the disease after androgen deprivation therapy known as castration resistant prostate cancer (CRPC). Once patients reach the stage of CRPC, treatment options are frustratingly limited and average survival times range from only two to three years. Thus, there is a compelling need to develop effective treatments for patients suffering from CRPC. Sonic hedgehog (SHH) signaling is a stromal-epithelial interacting pathway that is critical for prostate development and cell growth. SHH signaling is induced by androgen deprivation thereby leading to re-activation of AR target genes to promote prostate cancer cell growth in the absence of androgens. Furthermore, AR interacts with GLI proteins, downstream effectors in the SHH pathway. Therefore, GLI3-dependent SHH signaling in androgen deprived cells could promote re-activation of AR target genes and consequently lead to CRPC. Several studies have found that MED12, a subunit of Mediator, is commonly mutated in

prostate cancer and, interestingly, MED12 has been shown to play a critical role in restricting GLI3-dependent SHH signaling. We therefore hypothesize that MED12 mutations promote GLI3-dependent SHH signaling in prostate cancer to drive progression towards CRPC.

**Methodology:** First of all, we generated stable MED12 knockdown prostate cancer cells through a lentivirus-mediated approach. Since MED12 mutations have been shown to lead to impaired MED12 protein function, the knockdown setting likely recapitulates a MED12 mutant setting. Next, we carried out proliferation and qPCR assays using the SPOP wildtype and SPOP knockdown cells in androgen replete and androgen deprived conditions. Finally, we used a lentivirus-mediated approach to simultaneously knock down GLI3 in order to test whether MED12 functions through the GLI3-dependent SHH signaling pathway.

**Findings:** Our results show that MED12 knockdown promotes prostate cancer growth specifically in an androgen deprived setting and that this hyperactive growth is dependent upon GLI3. Furthermore, we also show that GLI3 target genes are sharply upregulated when MED12 expression is low and androgens are absent. The collective results of our study therefore indicate that prostate cancer patients with MED12 mutations could relapse to CRPC after androgen deprivation therapy by hyperactivating the GLI3 dependent SHH signaling pathway. Importantly, our results thus suggest that therapeutic agents that target the SHH signaling pathway could prove to be beneficial for MED12 mutant prostate cancer patients.

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*NATURAL COMPOUNDS CAN TARGET SHH SIGNALING TO BLOCK MED12 MUTANT BREAST CANCER ONCOGENESIS*

**Shivani Akula; Marieke Burleson<sup>1</sup>**

**Purpose:** Recent findings have shown that up to 67% of breast cancer tumors carry a mutation in the Mediator subunit MED12 thus indicating that MED12 likely has a critical tumor suppressive role in breast cancer. Since there are currently no effective treatments for MED12 mutant breast cancer, there is a compelling need for the discovery of superior treatment regimens. The purpose of this study is therefore to discover novel therapeutic treatment strategies for patients that suffer from this specific subclass of breast cancer.

**Rationale:** Current statistics show that breast cancer is the second leading cause of cancer deaths among American women, thus highlighting the need to find improved treatment strategies for women suffering from this disease. Though radiation and chemotherapy have been the frontline choice of treatment for cancer over the past few decades, personalized treatment is rapidly rising as a superior treatment method. Recently, it has been found that up to 67% of breast cancer tumors carry a mutation in MED12 thus indicating that MED12 likely has a critical tumor suppressive role in breast cancer. Previous results from our lab, and others, have indicated that MED12 plays a critical role in restricting GLI3-dependent SHH signaling. This finding is of particular interest to this study since hyper-activated SHH signaling is known to play a major role in promoting breast cancer oncogenesis. Due to these findings, we hypothesize that mutations in MED12 cause hyper-activated SHH signaling in breast cancer to promote oncogenesis and, furthermore, that natural compounds could provide useful as a personalized treatment for MED12 mutant breast cancer.

**Methodology:** To study the effect of mutant MED12, a lentivirus carrying an shRNA against MED12 was generated and infected into MCF-7 cells. Since the vast majority of breast cancer-associated MED12 mutations lead to loss of protein function, the knockdown strategy through lentiviral shRNA is assumed to mimic the MED12 mutant setting. Proliferation assays were utilized to confirm that downregulated MED12 plays a role in the increased proliferation of breast cancer cells. Next, quantitative PCR was performed to determine the effect of downregulated MED12 on the expression of genes that are known to be regulated by GLI3. Finally, a screening strategy was employed by using a natural compound library and MTT assays to find potential novel treatment strategies for MED12 mutant breast cancer.

**Findings:** Our findings confirmed that downregulation of MED12 increases proliferation of breast cancer cells in vitro thereby providing a strong argument that mutant MED12 would have the same effect. Through quantitative PCR it was confirmed that GLI3 target genes are upregulated in cancer cells when MED12 expression is low. Importantly, our natural compound screen identified several novel therapeutic compounds that specifically target MED12 downregulated breast cancer cells through a mechanism that involves SHH signaling. We therefore uncovered that MED12 mutations promote GLI3-dependent SHH signaling in breast cancer and, importantly, we identified potential novel therapeutic strategies for MED12 mutant breast cancer patients.

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*NOVEL ROLE OF DUAL OXIDASE 2 AS A MEDIATOR OF PODOCYTE INJURY IN THE DIABETIC ENVIRONMENT*

**Maaz Syed<sup>1</sup>; Aracely Castro<sup>1</sup>; Sachin Abraham<sup>1</sup>; Bridget Ford, PhD<sup>1 2</sup>**

**Purpose:** The goal of this study was to characterize the role of dual oxidase 2, Duox2, as a mediator of podocyte injury in diabetic nephropathy (DN). Our study demonstrates, for the first time, that Duox2 is responsible for increased ROS generation and subsequent alteration of podocyte function in response to HG. Our work serves as proof of concept to demonstrate the utility of targeting Duox2 as a future therapeutic intervention to reduce diabetes-mediated glomerular lesions.

**Rationale:** Glomerular injury is a prominent pathological feature of diabetic nephropathy (DN). In glomerular epithelial cells, or podocytes, hyperglycemia alters slit diaphragm proteins and causes foot process effacement, apoptosis and cell detachment. Oxidative stress has emerged as an important pathogenic mechanism in the development of glomerular injury in DN. However, the mechanisms by which these factors exert their action remain poorly understood.

**Methodology:** Rat podocytes, courtesy of Dr. Jeffrey I. Kreisberg, were grown to confluency in Dulbecco's modified Eagle's medium. After 24 h serum deprivation, cells were exposed to 5 mmol/l glucose (control) or 25 mmol/l glucose (mimics

diabetic environment of hyperglycemia). Small interfering RNA (siRNA) were used to inhibit expression of Duox2 and hydrogen peroxide production was determined using an Amplex Red assay. Western blot analysis was used to observe differential protein expression.

**Results:** We provide evidence that the NADPH oxidase of the Nox family, Dual oxidase 2 (Duox2), is present in cultured glomerular cells, including podocytes. Exposure of cultured podocytes to high concentrations of glucose (HG) elicited a rapid upregulation of Duox2 protein expression. Inhibition of Duox2 with specific siRNA prevented the HG-induced increase in intracellular reactive oxygen species (ROS) generation and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) production in cultured podocytes. In additional experiments, we established a functional link between Duox2-derived ROS generation and podocyte injury in response to HG. Impairment of Duox2 function nearly abolished HG-mediated DNA fragmentation, apoptosis and decrease in/reorganization of slit diaphragm protein expression in podocytes, indicating that Duox2 is required for the deleterious effects of glucose in podocytes.

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## *PROJECT RAVEN: QUANSER QDRONE POWERLINE RECOGNITION AND TRACKING SYSTEM DESIGN*

**Jovany Avila; Tristan Brouwer; Nick Castillo IV<sup>1</sup>**

**Purpose:** The objective of this Senior Capstone was to develop an autonomous Unmanned Aerial Vehicle (UAV) system to detect and track powerlines and utility poles to perform fault inspections of their electrical and material components.

**Rationale:** This paper presents the development of an autonomous system using the Quanser QDrone to perform above-ground autonomous powerline inspections. The powerline infrastructure is exposed to various extreme weather conditions that create an operational concern for utility companies. Frequent inspections ensure the safe operation of a power transmission grid. There are mainly two methods of examinations, i.e., ground and air. The ground inspections are often slow and challenging due to the rough terrain, utility pole height, and inaccessible remote areas. The aerial inspections are accomplished by deploying helicopters that are expensive to operate, maintain, and repair. Lightweight, portable, and easy to deploy and use in even hard-to-reach locations, UAVs are being widely adopted by energy and utility companies for powerline inspections due to their safety and cost-effective inspection processes. UAV inspections of utility tower structures and powerlines reduce corrective maintenance costs and improve asset life while avoiding hazardous

working hours. Detailed visual imagery captured by drones allows for more comfortable, safer, and faster identification and analysis of structural defects, hotspots, and other anomalies.

**Methodology:** The proposed algorithm used a state machine to make decisions for searching, identifying, and flying along utility poles and powerlines. The proposed system was implemented using Mathworks MATLAB and Simulink with Quarc, a third party toolbox designed by Quanser, enabling real-time applications with the QDrone.

**Findings:** Project Raven was funded by the Autonomous Vehicle System (AVS) Laboratories under the supervision of Dr. Michael Frye, PI and Director of the AVS Labs at the University of the Incarnate Word, located in San Antonio, Texas. This project provided the senior engineering students an invaluable opportunity to apply their existing technical knowledge, improve their time management, communication skills, and work as a team on a real-world problem. Project Raven found that the QDrone could be used to identify utility poles and follow powerlines, however, the team would like to investigate light detection and radar (LiDAR) or Infrared (IR) to improve the accuracy of the utility pole and powerline detection process.

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## *SPOP DOWNREGULATED BREAST CANCER IS MORE RESISTANT TO TARGETED THERAPY*

**Natalie Deml; Marieke Burleson<sup>1</sup>**

**Purpose:** Breast cancer is a highly heterogeneous disease with multiple genetic alterations that can act as drivers of cancer progression. Due to this heterogeneous nature, every patient responds differently to specific cancer therapies. One subclass of breast cancer involves downregulation of Speckle Type POZ Protein (SPOP). Breast cancer tumors who display downregulated SPOP have aggressive cell growth likely due to upregulated Sonic Hedgehog (SHH) signaling and therefore require aggressive treatment. The purpose of this study is therefore to screen a natural compound library to determine if SPOP downregulated breast cancer differentially responds to potential novel cancer therapies.

**Rationale:** There is a critical need for superior breast cancer treatment since this disease remains the second leading cause of cancer deaths among American women. Conventional treatment for breast cancer relies mainly on chemotherapy and radiation, however, there are discernable issues regarding current breast cancer treatment options. One of these issues is that different subclasses of breast cancer have differential response to treatment thereby indicating that personalized treatment for patients is critical. As a result of this, the overall survival rate for breast cancer is frustratingly low which has led many researchers to instigate investigations in order to find superior treatment options. Natural products derived from various sources provide promising answers to the current breast cancer epidemic as more than 50% of drugs currently available in the pharmaceutical

industry are derived from natural sources. Recently, studies have indicated that up to 60-70% of breast cancers undergo copy number loss at the SPOP locus, thus indicating that SPOP is a likely key player in breast cancer tumorigenesis. It is hopeful that natural compounds could provide a novel therapeutic strategy for this subclass of breast cancer, however, based on the aggressive nature of SPOP downregulated breast cancer, we hypothesize that these compounds will likely show a differential response in SPOP downregulated breast cancer.

**Methodology:** We employed a lentivirus-mediated approach to knockdown SPOP expression in MCF-7 breast cancer cells. To confirm that SPOP downregulation promotes more aggressive cancer cell growth, we carried out cell proliferation assays. Finally, a natural compound library and MTT assays were utilized to screen for novel targeted therapies for SPOP downregulated breast cancer.

**Findings:** First of all, our findings confirmed that SPOP knockdown promotes proliferation of breast cancer cells. Furthermore, through our natural compound screen, we identified several natural compounds that are effective at promoting cell death of MCF-7 wildtype cells, but not SPOP downregulated MCF-7 cells. These results therefore suggest that SPOP downregulation could render breast cancer cells more resistant to treatment thereby further urging the need to find effective therapeutic treatments for this subclass of breast cancer.

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## *SPOP PROMOTES GLI3-DEPENDENT SHH SIGNALING IN BREAST CANCER*

**Mariana Araujo Rincon; Marieke Burleson<sup>1</sup>**

**Purpose:** Personalized treatment, which is designed to only block oncogenic pathways activated by specific cancer mutations, is rapidly rising as a superior treatment for cancer.

**Rationale:** One gene that has recently been identified as highly mutated in a variety of cancers is Speckle Type POZ protein (SPOP), a substrate binding subunit of an E3 ubiquitin ligase. Interestingly, recent studies have found that SPOP is downregulated in up to 70% of breast cancer tumors and, furthermore, a correlation has been found between high levels of SHH signaling and poor prognostic pathological breast cancer features. Previous studies from our laboratory have shown that SPOP binds directly to GLI3, a downstream effector in SHH signaling, to target it for degradation in a manner that is disrupted by prostate cancer-associated SPOP mutations. We therefore hypothesize that downregulation of SPOP induces hyper-activated SHH signaling to promote

breast cancer progression through stabilization of GLI3.

**Methodology:** In order to study this, we employed lentivirus-mediated SPOP knockdown followed by western blot, co-immunoprecipitation, and proteasome analyses.

**Findings:** Our results indicate that SPOP knockdown promotes upregulation of the SHH downstream effector GLI3 through a direct physical interaction. Furthermore, we show that SPOP likely targets GLI3 for degradation through the proteasome pathway as MG132 treatment promotes GLI3 stabilization even in the presence of SPOP. Our collective results therefore indicate that SPOP targets GLI3 for degradation through the proteasome pathway which, in turn, would cause hyper-activated SHH signaling and subsequent progression of breast cancer oncogenesis.

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## *SUPERVISED MACHINE LEARNING TO CREATE A SELF-DRIVING VEHICLE*

**Steven Marquez<sup>1</sup>; Srikanth Vemula<sup>1 2</sup>**

**Purpose:** The purpose of this study is to explore the possibilities of supervised machine learning to accurately navigate a predefined path using a convolutional neural network (CNN) to determine the optimal steering angle to keep the vehicle within the borders of the path.

**Rationale:** The reason we chose to study this idea is because of the long-term implications that this project could yield. With the results of this study, we can apply our self-driving model to more complicated projects, such as creating a method for a completely autonomous drone inspection program. Such a method would utilize the results of this study in the drone and the vehicle in a way where the drone would follow the vehicle and the vehicle would follow a path.

**Methodology:** This study operates by taking the real time input from the Intel RealSense camera,

attached to a Quanser QCar. A convolutional neural network model is applied to the input, determining a steering angle that would allow the car to maintain a path within the predetermined path. The reason a convolutional neural network was chosen for this study was because of its usefulness in determining features in images. A convolutional neural network is prevalent in object detection and facial recognition due to its ability to identify lines and, in deeper layers, facial features. For the purposes of this study, the lines of the path need to be properly identified in order to then determine the steering angle required to maintain the course.

**Findings:** Through this study, we have been able to create a convolutional neural network model that can take the input of an Intel RealSense camera and determine the optimal steering angle by identifying the boundaries of the path.

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<sup>2</sup> Trinity University

## TREATING DRUG-RESISTANT CANDIDA ALBICANS BIOFILMS WITH HSP90 INHIBITORS

Jose Villarreal III, BS; Christopher G. Pierce, PhD<sup>1</sup>

**Purpose:** The aim of this study is to identify novel Hsp90 inhibitors to treat antifungal resistant biofilm-associated fungal infections.

**Rationale:** Candida species represent a main cause of opportunistic fungal infections worldwide, and *C. albicans* is the most common etiological agent of candidiasis. These infections are typically associated with unacceptably high morbidity and mortality rates, mainly due to the limited arsenal of antifungal drugs. Two important virulence factors associated with candidiasis are the formation of biofilms on the surfaces of host tissues and implanted biomaterials, as well as the ability of the organism to filament. Biofilm-associated infections are generally more difficult to treat because of their heightened resistance to antifungal drugs and host immune defenses. Considering the role of biofilm formation and filamentation in *C. albicans* infections, it represents a valuable target for the development of anti-virulence treatment strategies. The molecular chaperone, Hsp90, is linked to the morphological switch of *C. albicans* from yeast to hyphae. This transition is associated with elevated pathogenicity of the fungal organism

and is essential for the architecture of biofilms. The literature shows blocking Hsp90, genetically or by chemical inhibitors, increases the susceptibility of *C. albicans* to azoles and echinocandins.

**Methodology:** In this study, 600 novel compounds from the Hsp90 Inhibitor Library commercially available from ChemDiv were tested to determine their anti-biofilm activity using the microtiter plate model of biofilm formation coupled with a metabolic XTT reduction assay.

**Findings:** Three Hsp90 inhibitors were identified in the initial screen as compounds that inhibit *C. albicans* biofilm formation by more than 50 percent. Furthermore, all three compounds displayed greater than 50 percent inhibition at a concentration of 40 µg/ml, compared to 24 percent inhibition by Geldanamycin, a reported Hsp90 inhibitor. While the Hsp90 inhibitors were tested in combination with fluconazole, no synergistic effects were observed. Considering the role of Hsp90 in filamentation and biofilm formation, targeting Hsp90 represents a valuable strategy for the treatment of drug-resistant biofilms.

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## WOUND HEALING AND REGENERATION IN AN ANNELID MODEL SYSTEM

Fatima T. Ali; Roman H. Barrera; Journie B. Gaeta; Veronica G. Martinez Acosta<sup>1</sup>

**Purpose:** *Lumbriculus variegatus* is a freshwater oligochaete known for being an excellent regenerating model system. *Lumbriculus* can regenerate using two different mechanisms: epimorphosis, which is characterized by a wound blastema, and morphallaxis through tissue transformation. Analysis of its regenerative process can help identify the signaling pathways used to recover both structure and function following injury.

**Rationale:** *Lumbriculus variegatus* provides a unique opportunity to identify pathways triggered following wound formation in a system that is committed to successful regeneration and recovery of function. *Lumbriculus* is capable of regenerating an entirely new body from a fragment that is 1/50th the size of the original animal. Unlike other regenerating model systems, *Lumbriculus* possesses the ability to recover structure and function along any portion of the anterior-posterior body axis. *Lumbriculus* thus provides a simplified template for the study of basic biological questions that are challenging to elucidate in organisms with more complexity. Genetic model organisms like the fruit fly, the nematode worm, and mouse, although powerful, do not allow for study of other whole-body regeneration. The work in our lab represents the first steps towards development of a more tractable model system for the study of wound healing, regeneration, and recovery of function. Understanding of these mechanisms and how they have evolved in all phyla, may also lead to advancement in the field of regenerative medicine.

**Methodology:** Our approach to understanding regeneration in *Lumbriculus* has been through analysis of neuroanatomical and proteomic

changes associated with regeneration. We have long focused on the basic cellular, physiological, and proteomic changes occurring in the regenerating worm fragment using traditional microscopy techniques, including transmission electron microscopy and fluorescence microscopy methods, coupled with proteomic analysis. The current study includes the use of stem cell labeling to identify populations of stem cells within regenerative tissue, immunohistochemical analysis of synaptic proteins, the ultrastructural characterization of changes in myelin organization in regenerating fragments, and lastly the analysis of RNA transcripts produced as a result of changes detected within the nervous system as it regenerates.

**Findings:** Like vertebrate responses to injury, our lab has demonstrated that injury to the central nervous system of *Lumbriculus* may be necessary for the induction of regenerative processes. Our studies suggest that initial nerve damage precedes cellular plasticity events, perhaps via a signaling cascade that is reminiscent of other types of neural plasticity. Proteomic analysis has also identified two initial candidate gene targets that are correlated to the induction and maintenance of neural morphallaxis. One of these proteins, beta-catenin, has been well characterized as an early acting gene during development which is responsible for setting the anterior/posterior axis. *Lumbriculus variegatus* thus provides a unique opportunity to study the possible origins of these remarkable forms of cellular plasticity and how they might relate to more primitive injury and wound healing responses. The outcome of our experiments will also lead to increased understanding of regenerative pathways which may have fallen silent in humans.

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*A COMPARISON OF THE PAIN ASSESSMENT CHECKLIST FOR SENIORS WITH LIMITED ABILITY TO COMMUNICATE (PACSLAC) AND PAIN ASSESSMENT IN ADVANCED DEMENTIA SCALE (PAINAD)*

**Teofanes Natavio PhD; Elizabeth McQuillen PhD; Mary S. Dietrich PhD, MS; Nancy Wells DNSc; Bethany A. Rhoten, PhD; April Hazard Vallerand, PhD; and Todd B. Monroe, PhD**

**Purpose:** To determine interrater reliability of the PACSLAC and PAINAD in assessing pain behaviors in patients with the same pain stimulus, determine the consistency of the reliable changes between and within the instruments and assess nurse preference for either instrument.

**Rationale:** There is no gold standard in observational pain assessments. Patients with severe dementia, who cannot articulate their needs, will experience unrelenting pain because health care providers rely on self-report.

**Methodology:** A single-group, within-subjects repeated-measures design was implemented. A convenience sample of 30 patients was used with a diagnosis of severe dementia rendering the patient unable to reliably express pain, 60 years of age, recovering from hip fracture surgery. The study

took place in a small suburban hospital. Pain levels were observed at 24, 48, and 72 hours postsurgery using two instruments: Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC) and Pain Assessment in Advanced Dementia Scale (PAINAD). These instruments were selected because they are among the most commonly recommended tools for clinical use. Interrater reliability was analyzed along with reliable changes in pain for each period, and the study concluded with the nurse raters completing a preference survey.

**Findings:** Greater interrater reliability was found for the PACSLAC, with reliable change potentially affected by the type and level of pain medication. The nurses' preference for the tool was split; however, rater training and familiarity with the tool is critical.

## SOFT TISSUE MOBILIZATION INCREASED HAMSTRING MOBILITY

Jeffrey R. Doeringer, PhD, ATC, LAT<sup>1</sup>

**Purpose:** The objective of this study was to determine if there is a difference between administering Graston Technique Therapy (GT) and Therapeutic Cupping (TC) on hamstring tightness.

**Rationale:** Limited research reveals that the use of different soft tissue mobilization techniques increases tissue mobility in different regions of the body.

**Methodology:** This cross-sectional study was conducted in a research laboratory. Thirty-three subjects between the age of 18-35 years old with bilateral hamstring tightness participated in this study. Subjects attended one session where treatment and leg order were randomized before attending the session. The GT and TC was administered on different legs for 8 minutes and over the entire area of the hamstring muscles. One TC was moved over the entire treatment area in a similar fashion as the GT 4 instrument. The intervention measurements include soreness visual analog scale, Sit-n-Reach (single leg for side being tested), goniometric measurement for straight-leg hip flexion motion, and superficial skin temperature. The timeline for data collection included: 1) intervention measurements for the first randomized leg; 2) eight minute treatment with the first intervention treatment; 3) intervention measurements repeated for post intervention outcomes; 4) repeat the same steps for 1-3 with the contralateral leg and the other intervention. The independent variables were

intervention (GT [vs.TC](#)) and time (Pre vs Post-Intervention). The dependent variables were the intervention measurements.

**Findings:** A 2 [intervention] x 2 [time] repeated measures ANOVA revealed a significant difference for superficial skin temperature ([PreGT – (90.14±2.72), PostGT – (92.99±2.05)]; [PreTC – (90.01±2.45), PostTC – (96.80±1.40)]; [P = 0.000]). Paired T-tests confirmed TC having the largest warming affect (P = 0.000). There was a main effect over time for soreness visual analog scale, Sit-n-Reach, and goniometric measurements (Soreness visual analog scale ([PreGT – (3.30±2.02), PostGT – (1.74±1.87)]; [PreTC – (3.47±1.69), PostTC – (1.35±1.44)]; Sit-n-Reach test [PreGT – (29.50±8.54), PostGT – (32.11±8.31)]; [PreTC – (29.67±8.21), PostTC – (32.05±8.25)]; Goniometric measurement [PreGT – (83.45±13.86), PostGT – (92.73±13.20)]; [PreTC – (83.76±11.97), PostTC – (93.67±12.15)]; [P=0.000]). Conclusion: Both GT and TC impacted hamstring mobility during a single treatment with using only an instrument assisted soft tissue mobilization technique without any additional therapeutic intervention. Furthermore, TC was the only treatment that had the greatest increase in superficial skin temperature which would indirectly suggest more blood flow to the area. Based on the results from this study, healthcare professionals could use either instrument assisted soft tissue mobilization technique on increasing hamstring mobility.

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## SCHOOL OF OSTEOPATHIC MEDICINE

### *COMMUNICATION SKILLS EVALUATION IN PEDIATRICS: ANALYSIS OF PARENT, FACULTY, AND RESIDENT ASSESSMENTS WITHIN A “BAD NEWS” CURRICULUM*

**Hannah M. Redwine, MS OMS-II<sup>1</sup>; Adam D. Wolfe, MD, PhD<sup>2</sup>**

**Purpose:** To compare performance ratings of SLAI skills of interns in pediatrics between self-, faculty, and parent evaluations. We hypothesized that parents might interpret or apply the Milestone language differently from physician observers, and exhibit different priorities related to SLAI skills of physicians.

**Rationale:** Sharing life altering information (SLAI; also known as “breaking bad news”) is an important skill for physicians. Educators utilize the pediatrics milestones, which include interpersonal communication skills, as a measure of resident performance semiannually and to certify post-training competence. Patients and families are generally not invited to provide evaluation of resident communication skills.

**Methodology:** Ten PGY-1 residents role played 8 progressively complex SLAI cases. Quarterly sessions included two filmed encounters with trained improvisational actors. After each session, residents watched their videos for self-evaluation. Four parents were trained to rate residents, using 3 pediatric subcompetencies (PROF1, ICS1, & ICS2) on a 5-point scale. Parents and two faculty members watched, rated, and provided comments on the filmed encounters. Milestone ratings were compared using descriptive statistics. Two investigators employed analysis of themes, identifying 13 themes within the comments, noting

positive or negative comments in each theme. Correlation coefficients were calculated to compare ratings and comments.

**Findings:** Mean milestone ratings by all raters showed improvement over the year by 0.064-1.6 points in total, with absolute milestone score ranges improving from 2.413–3.075 to 3.14–4.021. Parent and faculty milestone ratings were positively correlated, 0.933 for PROF1, 0.955 for ICS1, and 0.991 for ICS2. Parent rating ranges (0-3.5) were higher than that of the faculty (0-2) overall, with average rating ranges of 1.467 for parents and 0.517 for faculty. Quantitative evaluation of the comments was also positively correlated between parents and faculty at 0.920. In qualitative analysis, parent comments were more likely to be negative. Faculty vs. parent comments emphasized different themes, including those relating to shared decision making, empathy, and compassion. This indicates that parents may have expectations and priorities in SLAI encounters that differ from those of the teaching faculty. Parents sought better communication around availability of the healthcare team, support from provider/team, anticipation of questions or responses, and care strategy. Therefore, greater incorporation of parent expectations in teaching and assessment of these high stakes communication skills by residents is warranted.

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## *IMPLEMENTING AND UTILIZING A MOBILE CLINIC IN SOUTH SAN ANTONIO, TX*

**Gabrielle Brewer, MPH; Brendan Comuzzie; Jacqueline Danisi MS; Christina Davis; Victoria Fahy<sup>1</sup>**

**Purpose:** The purpose of this study is to implement a mobile medical clinic in the southside of San Antonio, Texas in order to help reduce the burden of chronic illness among this population. By implementing a mobile clinic in this community, we aim to provide health care workers the unique opportunity to bring medical care such as annual screenings, vaccinations, and treatment directly to the community. Our first research aim of this study is to create a survey that will be randomly distributed to members of south San Antonio in order to determine what type of medical care is in most need by the community members. It is hypothesized that acute care and vaccinations will be most desired among the local community.

**Rationale:** According to the Mobile Health Map Project, there are currently 1,500 mobile clinics in North America which serve approximately 6.5 million people. The advantages of a mobile medical clinic include improving continuity of care and adherence to treatments for chronic illness. The relationship between poverty and obesity is evident in District 3 of San Antonio, with almost 50% of adult individuals considered to be obese and 30% having been diagnosed with Type II Diabetes as of 2017. The onset of obesity and diabetes is linked to other co-morbidities, such as metabolic disease and chronic kidney disease. In addition, almost 23% of District 3's community is uninsured. Therefore, implementing a mobile clinic to help with preventative care may help diminish the disease burden on this population.

**Methodology:** The method chosen for gathering

this information is an in-person survey of residents in San Antonio, TX. The survey is designed to establish baseline demographic and medical information from the participants and interest in a mobile clinic. Participant response to a mobile clinic will depend on their knowledge and use of medical care and barriers to accessing a mobile clinic. The survey will be administered in both English and Spanish, and the study protocol will be submitted for review by the University of the Incarnate Word Institutional Review Board. Participants of the community survey will include at least 100 randomly selected residents of the southside of San Antonio. The targeted participants of the survey will be individuals aged 18 and older that reside on the southside of San Antonio. The surveyed area of the southside of San Antonio will be defined by the following zip codes: 78214, 78224, 78235, 78210, 78223, 78211, 78222, and 78263.

**Findings:** This research aims to identify the best utilization for a mobile clinic to be implemented in San Antonio, Texas. There is a demonstrated need for mobile medical clinics in this community based on the increased incidence of chronic disease, as well as socioeconomic limitations. The proposed clinic should also address language and cultural barriers to ensure that patients feel comfortable when seeking medical care. Based on the results from our administered survey, we plan to work with the community to create a mobile clinic that is effective and accessible.

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*OSTEOCLAST-SPECIFIC OVEREXPRESSION OF CASPASE-2 ALTERS MUSCLE FUNCTION IN FEMALE MICE*

**Arunabh Bhattacharya, PhD<sup>1 2</sup>; Peter Gonzalez, BS<sup>2</sup>; Joseph Valentine, PhD<sup>3</sup>; Stacy Hussong, PhD<sup>2 4</sup>; Vanessa Martinez, BS<sup>2</sup>; Ramaswamy Sharma, PhD<sup>2</sup>**

**Purpose:** This study was designed to understand the role of caspase-2 mediated bone-muscle crosstalk using mice with osteoclast-specific overexpression of caspase-2 (Casp2 Tg) and determining its effect on skeletal muscle mass and function.

**Rationale:** Caspase-2, a cysteine aspartate protease, is an important regulator of apoptosis. Our earlier studies showed significantly reduced bone mass from 2-month onwards and from 5-month onwards in Casp2<sup>-/-</sup> female and male mice respectively, as compared to age-matched wild-type (WT) mice in the congenic C57BL/6 background. Since bone is intricately linked to muscle mechanics and function, we subsequently analyzed skeletal muscle mass and function in 6-month-old WT and Casp2<sup>-/-</sup> mice of both sexes. While no difference in muscle mass was observed between WT and Casp2<sup>-/-</sup> male or female mice, significant decrease in muscle function was observed in female Casp2<sup>-/-</sup> mice as compared to female WT mice. Since these earlier studies were performed in mice with whole-body ablation of caspase-2, in this study we asked if osteoclast-specific overexpression of caspase-2 modulates

skeletal muscle mass and function in 5-6 month-old Casp2 Tg mice.

**Methodology:** Quantitative nuclear magnetic resonance was used to measure whole-body lean mass and fat mass. Muscle mass of isolated quadriceps, gastrocnemius, and soleus muscles was measured. Peak isometric torque of ankle plantarflexors (gastrocnemius, soleus, plantaris) was measured in vivo to determine muscle function.

**Findings:** While body weight, lean mass and fat mass were all found to be decreased in male Casp2 Tg mice, there was no difference in either muscle mass or function. In contrast, no difference was observed in body weight and lean mass of female Casp2 Tg mice as compared to age-matched WT mice; however, fat mass increased. Muscle function significantly decreased in these mice without any change in muscle mass. Together, these data implicate a novel role for caspase-2 in mediating bone-muscle cross-talk in female mice and in the skeletal muscle aging process.

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*TOMS ONE FOR ONE GIVING*

Judy Trevino; Ryan Lunsford, PhD<sup>1</sup>

**Purpose:** This case study aims to discover if a for-profit business created to improve lives, promote corporate responsibility, and conscious consumerism can remain sustainable. In 2006, during a trip to Argentina, Blake Mycoskie witnessed the hardship faced by children without shoes. The lack of shoes affected their ability to attend school, provide essential protection and well-being. This experience inspired him to create a for-profit business to provide shoes to the less fortunate children in Argentina, hence the creation of TOMS (Tomorrow's Shoes). For every pair of shoes sold, TOMS provides a new pair to a person in need. This study will determine how a for-profit business can continue to increase sales to continue its corporate social responsibility program.

**Rationale:** There have been many studies regarding corporate social responsibility (CSR) programs that organizations have put in place to affect issues, ranging from reducing carbon footprints, improving labor policies, participating in fair trade, etc. Most corporations donate a fraction of their proceeds to a particular charity (Talpalaru, 2014). This topic's importance is that there is a great need for private companies to develop, improve, and expand their CSR programs. These programs are crucial to our societal needs, thus creating a solution to global social inequity; therefore, sustainability is vital.

**Methodology:** The paper uses qualitative analysis using the TOMS Impact report, which includes giving programs, market trends,

and CSR research data. Additionally, secondary data research from books and articles will be used to establish current trends and incorporate empirical studies of CSR programs. Content analysis will measure the impact of TOMS social responsibility program from its inception. Additionally, a systematic review of the published literary studies on the current subject matter will be conducted.

**Findings:** Although the company enjoyed great success, the One for One giving program developed was not sustainable. The two significant challenges for TOMS was the shoe business competition and their traditional sales model. First, competitors began to copy the shoe and develop a less expensive version that included a giving program to their philosophy. Consumers began to question if the TOMS product was worth the price. Hence, the market it originally occupied has since become crowded, and the brand has struggled to compete against brands with lower prices (Hall, 2019). The original TOMS shoe had not evolved to increase the interest of consumers. Secondly, the company's traditional sales model was not increasing sales as projected. Most TOMS shoes are sold at department stores instead of online sales (direct to consumer model). This case study found that the impact of competitors and brand experience has a negative effect on the success of TOMS CSR program.

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## SCHOOL OF PHYSICAL THERAPY

### *DOCTOR OF PHYSICAL THERAPY STUDENTS' PERCEPTIONS OF AN INTEGRITY-BUILDING CLASSROOM ACTIVITY*

**Karen Gandara SPT; Madeline Larose SPT; Laura Barrientos SPT; Sarah McMillan SPT; Nathaniel Brown PT, DPT, GCS; Scott Smith PhD**

**Purpose:** The purpose of this study is to evaluate Doctor of Physical Therapy students' perceptions of an integrity activity which uses self-reflection and peer-to-peer mentoring to create future professionals.

**Rationale:** Incorporation of integrity into health care graduate students' personal morality is vital to creating professionals the public can trust. Health care programs teach professionalism and integrity, but there are few studies that evaluate student perceptions of those lessons.

**Methodology:** A sample of convenience was used from the student body at UIW's School of Physical Therapy. The integrity lesson included assigning a quiz and then anonymously asking them if they cheated afterwards. Then, upper class students addressed the class regarding the role that integrity has in their profession and helps the students link negative emotions to the act of cheating. Finally, students read articles that showed the negative effects of cheating while in school. In order to gain an understanding of students' perceptions of an integrity-building activity, a 5-point likert scale survey was used. N=32- an 80% participation rate. We used Cronbach's alpha to check the internal consistency of the survey. We coded responses to 1 through 5 (1 = Strongly Disagree, 5 = Strongly Agree), looked at sample mean response for each question, and used a bias-corrected accelerated bootstrap to get a 95% confidence interval for the

overall mean of student responses. We also looked at the proportion of respondents who answered 4 or 5 and computed a 95% upper confidence interval for the overall proportion of the target population who would answer 4 or 5.

**Findings:** Fair-to-strong level of internal consistency (.811) Sample mean corresponding to the 10 statements had a value over 3.0-4.438, indicating the average responses were "neutral" or "agree" for each item. Statements #4 and #8 had the highest averages, indicating higher agreement among participants, with averages of 4.4375 and 4.21875, respectively. The statement "The JoT activity will reduce my chance of committing fraud as a PT" had a high sample mean of 3.969. Statements #2 and #7 had the lowest averages, indicating lower agreement among participants, with averages of 3.3870 and 3.375, respectively. The integrity activity had a positive impact on DPT students' professionalism. Students valued having discussions about integrity with the upper class students and reflected on their own professionalism, indicating affective growth. By making students aware of the impact unprofessional behavior in school can have on their future careers through the activity, we might reduce the likelihood of fraud in the workplace. Future studies should look at how student perceptions of the lesson may change with variations of the timing and type of integrity activity.

*FOSTERING A SENSE OF BELONGING: PERCEPTIONS AND EXPERIENCES OF FIRST YEAR DOCTOR OF PHYSICAL THERAPY STUDENTS*

**Isabelle J. Hwang SPT; Cecilia M. Mancera SPT; Rosa Ramirez SPT; Raquel A. Woods CSCS, SPT; Mona Bains, PhD<sup>1</sup>**

**Purpose:** To evaluate graduate student perceptions on feelings of belongingness to develop student-driven program recommendations to cultivate belonging and connectedness within the DPT program.

**Rationale:** While there is abundant literature on sense of belonging in primary schools and undergraduate programs, the literature in graduate education has only expanded in recent years. Belonging at the graduate level is distinct because of new expectations of developing into scholars, knowledge consumers and producers and/or entry level clinicians. The formation of these new identities contributes to a sense of belonging that is different from undergraduate education and may be shaped by the social history of the individual.

**Methodology:** 1st year graduate student perspectives on defining a sense of belonging at the University of the Incarnate Word (UIW), School of Physical Therapy (SoPT) DPT program was assessed using a modified World Cafe method. 54 students from the SoPT Class of Dec2022 were invited to participate in a 1.5 hr virtual Cardinal Cafe event hosted during orientation week. Participants were introduced to the concept of “belonging vs. othering” and participated in small group discussions on fostering community and belonging amidst the COVID-19 pandemic. An anonymous 15-question post event survey was disseminated following the workshop.

**Findings:** 22 students participated in Cardinal Café and 14 students responded to the post event

survey. Demographic data of participants was reflective of student demographics in the SoPT DPT program. Likert scale questions ranging from strongly disagree to strongly agree indicated the Cardinal Café event was perceived as meaningful and important (93% combined agree and strongly agree) and created an open environment to share a dialogue on belonging (100% combined agree and strongly agree). Specifically, participants believed the breakout room discussions were thorough (86% combined agree and strongly agree; 14% combined neutral and disagree) and believed they gained insight about belonging vs. othering (79% combined agree and strongly agree; 14% neutral and 7% disagree). Respondents were asked to select all potential interactions of positive quality from a list of 13 that they would most like to experience in a DPT program. Out of the total experiences selected among the respondents, 48% centered on belonging, while 28% centered on academics and 24% focused on diversity, equity and inclusion (DEI) centered experiences. Respondents were then asked to select 3 experiences they valued most to foster a community of belonging from the same list. Out of the total sections made by respondents, 55% were interactions promoting belonging while 31% were academic focused and 14% were interactions centering DEI. DEI interactions that aligned with belonging (i.e. have meaningful discussions about race relations outside of class) were selected more often than university sponsored DEI events. Cardinal Café created an engaging opportunity for students to share narratives on the topic of belonging and othering in graduate education.

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## NURSES' HEALTH STATUS AND LONGEVITY IN THE NURSING PROFESSION

Justin Crawford SPT; Tiffany Messimer SPT; Gustavo Ramos SPT; Sarah Luna, PT, DPT, GCS<sup>1</sup>

**Purpose:** The purpose of this study is to describe the general health status of nurses age 50 and older, their work schedule and exercise frequency in comparison to evidence-based recommendations for longevity in the workforce.

**Rationale:** Individuals are remaining in the workforce beyond traditional retirement age due to social pressures, financial security, health issues, and the need for health insurance. Age-related physiological changes complicate the ability to remain in the workforce for as long as a person needs or wants to work. This is especially true for physically-demanding professions such as nursing. Describing existing trends in body mass index (BMI), hours worked, time off between shifts, medical conditions, and frequency of exercise is a necessary step in ultimately determining the best interventions for promoting longevity in the nursing profession.

**Methodology:** Nurses age 50 or older in 2 hospital systems were anonymously surveyed about their primary role in the facility, the number of hours they worked per week, the length of their shifts, the amount of time off they had between shifts, and how frequently they exercised. Participants also reported their height and weight, and they indicated whether or not they had an existing medical condition that limited their ability to perform their work duties. The authors calculated BMI, descriptive statistics were analyzed for all variables, and a regression analysis was completed

for the existence of a medical condition that limits performance of job duties to all other variables.

**Findings:** 153 nurses participated in the survey. 82.3% of nurses reported working full time or overtime hours. Most nurses (60.8%) worked shifts longer than 10 hours, and 67.3% of nurses reported having 12 hours or less off between shifts. Average BMI was 29.77 with a range of 19.74 to 48.15 ( $s=5.87$ ). 19% of nurses indicated "yes" when asked if they had an existing medical condition that limited their ability to perform their job; 75.8% answered "no," and 5.2% indicated they preferred not to answer. When asked how frequently they exercise, 64.7% reported exercising 1-2 times per week or not at all. Chi square for the presence of an existing medical condition that limits performance of job duties with frequency of exercise, time off between shifts, and the number of hours worked per week was statistically significant ( $\chi^2(9) = 17.561, p < .05$ ). Frequency of exercise alone was the most significant predictor of existence of a medical condition ( $\chi^2(3) = 10.07, p < .05$ ). The majority of nurses in this study have BMI in the overweight or obese categories, have limited time off between shifts, and do not meet minimum recommendations for exercise frequency. The nurses' work schedule and frequency of exercise predict the existence of a medical condition that limits job function. Future intervention studies should target work schedule and exercise frequency of exercise to promote longevity in the nursing profession.

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## SERVICE LEARNING AND ENGAGED SCHOLARSHIP SHOWCASE

COLLEGE OF HUMANITIES, ARTS, AND SOCIAL SCIENCES

*CONTEMPORARY CATHOLIC SOCIAL JUSTICE PEDAGOGY IN CONVERSATION WITH NINETEENTH-CENTURY TRANSCENDENTALISTS: SERVICE LEARNING IN THE COMPOSITION CLASSROOM AT UIW*

**LuElla D'Amico<sup>1</sup>**

In a composition course focused on Transcendentalism at the University of the Incarnate Word—the largest Catholic university in Texas—I require students to volunteer at the only nature sanctuary in the city. This sanctuary is located adjacent to the campus at “the Headwaters,” a non-profit Earth Care ministry of the Sisters of Charity of the Incarnate Word, the founding order of UIW. Located within this sanctuary is a spring called “the Blue Hole,” which is the source of the San Antonio River that flows into the city’s famous Riverwalk. I initially frame this class by teaching that the transcendentalists were a group of nineteenth-century philosophers and thinkers who instigated worldwide conversations about God, self, society, social justice, morality, community, education, nature, and activism. In the class, students are charged with using transcendentalism as a platform to consider and craft their own arguments about these issues, and they are asked to spend time pondering the legacy this movement continues to inspire. Because the Catholic mission of the college simultaneously intersects and diverges from transcendentalism’s goals, the students are required to ruminate specifically about Pope Benedict XVI’s 2011 call for a resurgence of “transcendent humanism” in Catholic institutions of higher learning. Moreover, they are tasked with deeply examining transcendentalist texts and pondering how Emerson, Thoreau, and Fuller might have interrelated purposes with the university’s missional focus to care for God’s creation, a tenet taken directly from Catholic social teaching.

During the course, I emphasize heavily that transcendentalist thinkers believed that their important philosophical ideas required equally important action. As such, each class member is required to work at least 20-hours at the sanctuary. During the students’ visits, they help with the Headwaters’ ecological restoration process—removing weeds, managing trails, and even growing new plants. The Headwaters website specifies that the sanctuary was created for aesthetic and educational purposes but that it also has the intention to act “as a sanctuary where people are encouraged to reflect and find meaning in their connection with the Earth, themselves, and each other.” During and after their time volunteering, students must reflect on the experience and the way it influences their reading, their writing, and their connections to the classroom community, the UIW community, and the larger global community around them. They read transcendental texts at the sanctuary itself, and they write a formal essay about how the service-learning component of the course informs their perspective on the transcendentalists as well as the relationship between thinking through ideas and acting on them.

Further information about the Headwaters Sanctuary can be found here: <https://www.headwaters-iw.org>

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*CREATIVE LIFE AND RELATIONSHIPS EMERGING FROM DIA DE LOS MUERTOS*

**Sister Martha Ann Kirk, Th.D.; Dr. Gabriel Saxton-Ruiz; Alyssa Kennedy, MA; Deborah Quinones<sup>1</sup>**

We sought to build a healthier and more inclusive community by building relationships across borders in a virtual educational gathering for Dia de los muertos, the Day of the Dead. Almost one hundred people from two US and two Mexican schools gathered with a Peruvian to learn, discuss, remember deceased loved ones, and make new friends. In this project we consider civic engagement in broader ideas of Global Citizenship Education as UNESCO explains this.

Read some about our presentation <https://www.globalsistersreport.org/news/coronavirus/column/may-communion-saints-bring-us-comfort>

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*STUDENTS' PRE AND POST AFFECTIVE REACTIONS TO A SERVICE-LEARNING EXPERIENCE: A PILOT STUDY*

**Lisa Lockhart, PhD<sup>1</sup>**

There is some evidence that when given a choice, students may avoid service-learning courses as they are perceived as more time-intensive, effortful, and challenging than traditional courses without a service-learning component (e.g., Tobias, 2014; Blouin & Perry, 2009). This may deter some from signing up for a course identified as a service-learning course. This is particularly relevant to UIW as we are currently in discussions about designating particular sections as service-learning courses in the class schedule.

This pilot study focused on the affective responses of students enrolled in a Social Psychology course in which a service-learning project was required. Reactions were assessed before the service-learning project had been completed (immediately after it had been described in detail) and then again after it had been completed (on the last day of the class). Although service-learning was a required component of the course each semester, students were given the option to participate in the assessment of their experience; most students elected to do so (pretest  $n = 35$  out of 45 enrolled across both sections assessed). Participants' affective response to both the service component of the project as well as the overall service-learning project was measured using a modified version of the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). This was first administered immediately after the service-learning project was explained to them at the beginning of the semester. They were asked to think about the overall service-learning project, including the service that they would be providing, the effort that they would be putting into applying the content of the course to that service experience, the paper that they would write about the experience, and the informal presentation that they would be making about it. They were also asked to focus specifically on the community service that they would be participating in, and completed the PANAS in reaction to that experience alone. Participants completed the same assessments at the end of the semester, rating how they felt about both the overall service-learning project as well as on the service component only. Due to some students electing not to complete either the pre-test, the post-test, or both, the final sample consisted of 28. Results indicated a significant pre-post difference in participants' self-reported positive affect regarding both the service component and the overall service-learning project; significantly more positive affect was indicated after they participated than they reported feeling before they participated in the service-learning project. There was no significant change from pre-post project in negative affect; fortunately, reported negative affect was quite low both pre- and post-project.

The results from the current pilot study demonstrate that positive affect increased pre- to post-service-learning. This is encouraging, although additional analysis of students' reactions to service-learning, in addition to an examination of their perceptions of it, is warranted. Further investigation into potential individual differences that may predict students' affective reactions to service-learning is currently underway.

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*COMING TO THE TABLE: BREAKING DOWN WALLS AND ADVANCING INTERFAITH UNDERSTANDING  
BETWEEN CHRISTIANITY AND ISLAM*

**Sandy Guzman Foster, PhD<sup>1</sup>**

This engaged scholarship and experiential learning project benefited all students, not just Christians and Muslims. Our main objective for our engaged scholarship project was to examine in what ways might learning about a peer's religion, faith, or spirituality—strengthen understanding among Christians and Muslims; in particular, how might these new learnings empower members of the Christian and Muslim communities to disrupt/dismantle discrimination about each other's religion, faith, or spirituality in relation to their religious and non-religious neighbors? Students in the Qualitative Research Class were paired with a peer from a different religion. As a class, they created an interview protocol, an observation protocol and a focus group protocol. Once these protocols were created, students interviewed each other and visited their partner's church, mosque, temple, spiritual group, etc. Students were encouraged to inform their faith leaders of their partner's visit out of respect for each other's place of worship. The instructor of the class facilitated the focus group as to refrain from any possible biases. Additionally, students took photos of artifacts that were symbolic to their faith, religion, or spirituality via photovoice. Students were encouraged to visit and learn from each other as many times necessary to gather data. Once data was collected, students took this information and used narrative inquiry to write their peer's story related to how they feel as members of this community we can disrupt/dismantle discrimination about each other's religion, faith, or spirituality in relation to their religious and non-religious neighbors. All narratives were examined for patterns, themes that speak to breaking down walls and advancing interfaith understanding between Christianity and Islam. The goal of this poster presentation is to share these findings. This project indirectly addressed the religious, cultural, and political divides facing our country and advanced interfaith cooperation in the classroom in concrete ways because it strengthened understanding among Christians and Muslims and empowered members of the Christian and Muslim communities to disrupt/dismantle discrimination about each other's religions, faith, or spirituality through students' stories.

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*INTERFAITH GUIDED READING LIBRARY AND TEACHER RESOURCE CENTER*

**Stephanie Grote Garcia, PhD<sup>1</sup>; Lopita Nath, PhD<sup>1</sup>; Gabriel Duarte<sup>2</sup>; Erica Duarte<sup>2</sup>; Phoebe Castellano<sup>2</sup>**

The Dreeben School of Education (DSE) prepares undergraduate students to become culturally responsive teachers. Part of this process involves DSE preservice teachers designing and conducting literacy lessons using diverse children’s literature at St. Peter Prince of the Apostles Catholic School (Grades K-5). The featured service-learning project created an Interfaith guided reading library and teacher resource center at St. Peter Prince of the Apostles Catholic School.

The project had three phases. Phase one, required DSE preservice teachers to create a list of children’s literature featuring characters of different faiths (Judaism, Islam, Hinduism, Sikhism, Buddhism). Doing so, strengthened their understanding of available literature and various genres. This phase was completed in the Fall of 2019. The second phase of the project will begin in the spring of 2020. DSE preservice teachers will create lesson plans and additional resources that can be used with the books. The targeted audience for the lessons and resources will be students in grades kindergarten to 5th grade at St. Peter Prince of the Apostles Catholic School. The final phase will involve DSE preservice teachers and the teachers at St. Peter Prince of the Apostles Catholic School using the books and resources with the children.

The book collection and resources will be referred to as the Interfaith Library and Teacher Resource Center and will be housed in the library at St. Peter Prince of the Apostles Catholic School. The location of the books and resources will allow multiple audiences to access the Center (e.g., elementary teachers, elementary students, parents, administrators, pre-service teachers, and faculty).

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<sup>2</sup> St. Peter Prince of Apostles School

*MUTUAL DIALOGUE, COMMUNITY BASED PARTICIPATIVE RESEARCH WITH WOMEN'S GROUPS IN PERU*

**Monica Hernandez; Sister Martha Ann Kirk, CCVI, Th.D.; Yesenia Caloca; Yesenia Alcalá<sup>1</sup>**

Fourteen members of our university community including graduate and undergraduate students participated in an international service-learning trip to Peru in 2019 furthering community based participative research with groups of Peruvian women. Our partners in Peru over the years have been listening to the communities and encouraging them as they define their goals. Our short service trips are to help the women's groups build their capacity to sustain projects and work towards their goals. The presenters hope as a result attending participants will: 1) learn how students can support the capacity building of communities through workshops; 2) learn how the world-café format can maximize community engagement and invite mutual dialogue; and 3) learn how cross-cultural communication and relationships are developed and sustained.

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## *ROOTED IN COMPASSION*

**Dr. Joan Labay-Marquez; Mary Guerrero-Munoz<sup>1</sup>**

Compassion in higher education is a vital requirement for the graduate student's holistic growth beyond the textbooks and curriculum of a university. Compassion, as it pertains to this study, will be defined by the components of empathy, understanding, and nurturing the emotional aspect of a student's growth in furthering and complimenting their knowledge and experience at UIW in keeping with the commitment to service and aligned with the mission of the Sisters of Charity of the Incarnate Word. While students throughout their graduate journey develop a deeper devotion to the universities' core values, an effort aimed at augmenting this endeavor with compassion can build this benevolent capacity in each student and serve to aptly prepare students for life-long learning. There currently exists a body of literature to support the theory that the emotional growth of an individual is at least as significant to the learning experience as exponential knowledge acquisition. Therefore, we will attempt to demonstrate the need and critical benefits of the creation of a student led organization founded in compassion. This service-learning project entitled "rooted in compassion" focuses on identifying the advantages of compassion in higher education by investigating the perceptions of the graduate students of the Dreeben School of Education, and identifying resources currently available at the University of the Incarnate Word. Further, this action research study will propose the establishment of a student peer compassion organization entitled Compassionate Student Peers Organization (CSPO) dedicated to providing peer support to graduate students of the Dreeben School of Education. The objective will be to further the mission of the Sisters of Charity of the Incarnate Word by nurturing students with compassion, transforming their way of thinking, sharing their voice, and developing a strong commitment of service to their fellow students and the UIW community. By enjoining this effort with the overall student experience, we will holistically impact the growth and development of each student.

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*ENCOURAGING STUDENTS' PASSION FOR SERVICE-LEARNING TO STUDY ORGANIZATIONAL BEHAVIOR*

**Teresa Harrison<sup>1</sup>**

Each semester in my Organizational Behavior course, students complete a "Passion Project." This is a team-based service-learning project (4-5 students per team). Teams identify and discuss social causes they are passionate about that lead to serving others. This varies each semester from pets to veterans to homelessness to special needs children and more. They must develop their project plan to include contacting area non-profit organizations (including UIW) and coordinating and scheduling their event day/time to serve as a team. They write a report based on chapters they each pre-select from the Organizational Behavior textbook, identifying concepts that they have observed during their service and the planning process (the final report is usually about 25-30 pages). They also create a 10-minute multimedia presentation similar to a movie trailer or an infomercial explaining their service (including on-site pictures and video) and discussing the Organizational Behavior concepts that were observed. I give them full creative license for how to put the video together (iMovie, YouTube, etc.). An individual reflection requirement is included as part of the project, answering many of the reflection questions from the Etling Center website about their experiences. The passion projects are always successful because the students have had a voice from the start and the choice of organization to serve. These projects receive excellent feedback from students, and many have continued to serve multiple times at their chosen organizations throughout the semester, going beyond the requirements for the project. A couple groups have created fundraisers for their chosen organizations even after the semester is over. Some students have applied for jobs or internships at the organizations. All say they have made connections with their classmates through the process. It truly is a transformational experience for many of the students. Surprisingly, even with COVID-19, most of the groups chose to meet face-to-face to serve in the community even though our class was online. Serving face-to-face was not a requirement and serving virtually was an option. This semester, students served face-to-face at Church Under the Bridge, the San Antonio Food Bank (2 groups), Animeals (part of Meals on Wheels, but for recipients' animals), and First Tee. Due to COVID-19, one of the groups was affected due to two of the group members being in quarantine. However, they immediately joined an online project with MOVE TX to help those in the local community become involved in the 2020 election by encouraging them to vote. This was all done via Zoom, phone calls, and texts. The group was still able to complete all the elements of the assignment without being face-to-face and truly enjoyed the experience. This project resulted in approximately 300 phone calls and 2,000 text messages sent to area residents. Some of the organizations we served in previous semesters include: Habitat for Humanity, The Village (UIW), Kinetic Kids, Fisher House, Hemisfair Park, Ronald McDonald House, SNIPSA, San Antonio Pets Alive, Cardinals Cupboard, Ella Austin, Texas Diaper Bank, Gods Dogs, Haven for Hope, St. PJ's Children's Home, CRIT Teleton, and Morgan's Wonderland.

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ILA FAYE MILLER SCHOOL OF NURSING AND HEALTH PROFESSIONS

*WIN, WIN, WIN! DIABETES NUTRITION PATIENT EDUCATION*

**Alessandra Mendiola, MSN; Claire Pizzimenti, OD; Joseph Pizzimenti, OD; Beth Senne-Duff, PhD, RDN<sup>1</sup>**

**Purpose:** To develop diabetes patient education materials in print and video format to be used in the Rosenberg School of Optometry (RSO) three clinics and to develop a workbook for educating UIW health care providers on basic diabetes nutrition and patient counseling.

**Rationale:** Collaboration between the authors from their respective health professions would produce the most accurate and beneficial patient education materials.

**Methodology:** The first author designed the initial patient education pamphlet, video and health care provider workbook. All authors edited and refined the materials for maximum patient and health care provider benefit. The second author organized the implementation of the patient education materials for the three RSO clinics.

**Findings:** This inter-professional collaboration is a Win for the authors who gained new knowledge and respect for the other profession. It is a Win for UIW health care providers who desire to learn basic diabetes nutrition and patient counseling and have clear and accurate information to share with their Spanish and English speaking patients. Most importantly, the authors hope their collaboration is a Win for diabetes patients in our community who will enjoy improved health and quality of life.

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ROSENBERG SCHOOL OF OPTOMETRY

*MAXIMIZING PATIENT BENEFIT THROUGH TARGETED AND COORDINATED DIABETIC RETINOPATHY CARE*

**Jeannette Wong-Powell, OD, FAAO; Joseph Pizzimenti, OD, FAAO; Saoul Mancha, OD, FAAO; Maria Lourdes Alarcon Fortepiani, MD, PhD, FAAO; Russell Coates, OD<sup>1</sup>**

The prevalence of type 2 diabetes mellitus (DM) in the state of Yucatan, Mexico is increasing at an alarming rate. Diabetic retinopathy (DR) is a major complication of this disease and an overwhelming burden on the public healthcare and socioeconomic systems. Despite patients having access to government-run clinics where they may be diagnosed with DR, the wait for laser treatment can be long and that delay can cause irreversible vision loss. Over the past three years, we have refined a clinic protocol to maximize patient impact and clinic efficiency. Our targeted approach and coordination of care involves the state Desarrollo Integral de la Familia (DIF), local, government-employed ophthalmologists, local nurses and lay volunteers as well as US optometrists, optometric residents, optometric interns and a retinal ophthalmologist to provide collaborative, efficient treatment of DR, and educating patients for better self-management.

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